

GOVERNANCE SYSTEMS AND SUSTAINABILITY OF RURAL DEEP UNDERGROUND
WATER SOURCES OF LWENGO DISTRICT IN UGANDA

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List of Abbreviations and Acronym

CDA - Community Development Officer
CM - Community Management
CBOs - Community Based Organizations
DWD - Directorate of Water Development
DWO - District Water Officer
FGDs - Focus Group Discussions
GOU - Government of Uganda
HPM - Hand Pump Mechanic
IMF - International Monetary Fund
KIIs - Key Informant Interviews
LC(s) - Local Council(s)
LGs - Local Governments
MFPED - Ministry of Finance, Planning and Economic Development
MLG - Ministry of Local Government
MDGs - Millennium Development Goals
MWE - Ministry of Water and Environment
NGOs - Non Government Organizations
NPM - New Public Management
O&M - Operation and Maintenance
RWS. Rural Water Supply
RWSS. Rural Water Supply and Sanitation
SSPS. Statistical package of social scientist
UNICEF - United Nations Children Fund
UWASNET - Uganda Water and Sanitation NGO Network
VECs - Village Executive Councils
WSS - Water Supply and Sanitation
WSC - Water and Sanitation Committee
WSSWG - Water and Sanitation Sector Working Group
WSDD - Water and Sanitation Development Department
WUA - Water User Association
WUC - Water User Committee

CHAPTER ONE

INTRODUCTION

Introduction

Water scarcity experience is severe in many of the emerging economies globally, with about 1.2 billion people, who do not have access to safe water. It is estimated that, more than 1 billion people who do not have access to safe drinking water and domestic use live in Africa and yet water is insurance to life (Heinrich Boll 2014)

The effective Governance Systems and Sustainability of Rural Deep Underground Water Sources concept is crucial and calls for sense of citizen based participation in the management system. The inappropriate governance of underground water sources is attributed to failure of adopting community based participation approaches and practical models for effective management of water sources (Hacker, 2013a). Community involvement makes inhabitants accountable and promotes local development in form of popular representation in governance, empowerment and participation of local people in planning, decision-making and initiative water project implementation. It will also give an analysis on water users' management committees' functionality and impact of rules and regulations in respect to shade light on constraints that hinder effective governance and sustainability of the water sources. This chapter therefore, will present the background to the study, gives the statement of the problem, objectives of the study, the research questions, hypotheses, conceptual framework, study significance, justification and operational definitions of selected terms.

Historical Background to the study

Rural Deep Underground Water Sources have historically worldwide been known to provide the only realistic safe water supply option to rural communities that meet discrete supply

and demand for safe drinking water. The Deep Underground Water Sources apparently are envisaged to be unreliable and expensive to develop and maintain in most of the developing countries (Maslow, 2013). As a result, many of the constructed Deep Underground Water Facilities are unsuccessful and they perform poorly (Rotberg, 2010). Governance Systems and Sustainability of these Rural Deep Underground Water Sources seems to remain a challenge with a lot of uncertainties hence creating a knowledge gap for effective running in order to provide safe drinking water to rural communities (Giddens, Duneier, Appelbaum, & Carr, 2013).

Throughout history, human progress and sustainable development has depended on access to safe water and ability of the society to harness the potential of water as a productive resource (Harkort, 2013). Underground Safe Water sources were known as an essential resource for life, economic and sustainable development of ecosystem at International and National levels. It is notable that, a lot of efforts and strategies have been put in place by governments in developing countries with a view to enhance availability and access of safe water because it is directly linked to promoting quality of lives of rural communities (Welzel, 2013). However, inadequate knowledge of good governance systems affect the functionality of the available water sources and enhance resulting into inaccessibility to safe drinking water, which is not only a technical problem to rural communities, but also to those people living in peri-urban and urban areas. The study of governance systems and sustainability of deep underground water sources therefore remains fundamental. It will shed light to uncertainties and enhancing good governance practices, functionality of water facilities and optimize use of the available water facilities, including both deep underground and surface water sources in order to satisfy citizens competing needs for safe water. In addition to that, the disclosing uncertainties of governance systems, it

will reduce the complexity of managing water sources and facilities in many of the developing countries hence increasing chances of rural community to have accessibility of safe water.

However, the researcher observes that constructed water projects and facilities do not stay for test of time and their functionality is short lived. This makes one wonder what is dilemma around governance and sustainability of the established safe water sources.

Kerzner (2013) observe that, Governments and Water AID supplied or established water Facilities have been strongly criticized due for their planning approaches and management systems. They mainly focus excessively on physical construction of water sources and increasing coverage targets, but largely ignored what happens after construction of these facilities. Pruitt, Tamara, Adlin & Wall (2010) argue that, the scanty information on the governance, maintenance and sustainability of Rural Deep Underground water Sources have left a lot to be desired to supply safe water to rural communities in developing countries.

Theoretical Background

The study will be moldered on the governance theories as advanced by Max Weber & Woodrow Wilson,1986 which has been cited Twebaze, Julia, Billiard,2010) these classical Scientific management theories advocates for effective service delivery and suggests for application of community participatory based concept and good governance system of rural water sources. SAPRU, (2013) affirms that, these administrative theoretical concepts post into pragmatic and positivism paradigm philosophy that examine the ultimate reality of governance and sustainability of deep underground water sources mainly based on the wide debates of grounds. The spirit epistemological stance advocates for effective governance which results into sustainability framework of the available resources as cited in the studies of

Paul Burger, Alexandra Sauer, Bianca Bärlocher and Michael Berger as well as Frido Brand (2008). The ongoing debate on theoretical issues of sustainability proves to be very illuminating which post into nominative theories and empirical literature of governance underground water sources. This philosophical model posts into theories of sustainability which attempts to prioritize and integrate social responses to environmental and cultural problems in the society. An economic model looks to sustain natural sources and financial capital; an ecological model looks to bio-logical diversity and ecological integrity of the water source users' governance and the political model which examines governance structures and realization of sustainability of underground water sources.

The aim notion of the wide governance mechanism discussion is to distil pessimistic, optimistic views and opinions generated around sustainability framework science of these existing safe water sources and their governance system. The sustainability theories and paradigm provides firm and grounded concepts that advocates for community based participatory approach which are used in most of the developing countries. However, despite all of the presence of national policies and sustainability theories, one wonders whether the leaders do apply national safe water guideline and legal framework in the study area due to the prevailing satiation. The numbers of non-functional deep underground water facilities are seemingly to be attributed to inappropriate governance system and sustainability which has implications on government policies and use of community-management models of service delivery(Sabatier & Weible, 2014).

Hacker (2013b) affirms that, since 1980s, developing economies adopted the popular approach of community based governance idea that starts at village level Operation, sub-county and district level up to the national. This approach was envisaged to be very important and promoted good governance and maintenance system of safe water sources. However, despite all

that many of the rural communities do not enjoy the privileges accompanying the popular community based management system.

Sjögren,(2013)observes that, community based participatory approach empowers management structures and framework to have responsibility over the governance systems of water sources and they are to be held accountable to their own resources as advocated by theory of Paul frère. In addition that (Un-Habitat, 2013) contends that, the community based empowerment approach ensures that community members are equipped with necessary technological knowledge of how to repair and maintain their water sources. This dimension shapes most of all public policies of the developing world because they put into community participation and effective management of their own resources. The resilience of rural deep underground water sources , sustainability can be realized as an outcome of good governance practices and policy option aimed not only at empowering users of public services in decision making, but also to fundamentally achieve cost reduction and management efficiency of the water sources(Obama, 2011)

This means that, Community based Participation and involvement of the beneficiaries eventually transform the communities' attitude towards the effective management and control of their ownership of water supply (Giddens et al., 2013). However, it is notable that, despite the undoubted significance of the effort made to ensure good governance practices and maintainance of the deep underground safe water sources, there are deficiencies and unpredictability with regard to the realization of sustainability.

This uncertainty leads to the serious problem that the concept of good governance and its ambition loose a steer action of these interventions of community based participation. The application of theories governance and sustainability science are seen to enhance community

commitment and functionality of water sources as required for the common good of the community which seem not to be realized in the study. Therefore the study of governance systems and sustainability of deep underground water sources remain imperative to shade light on the uncertainty areas in order to underpin the challenge governance and sustainability which result into scarcity of safe water amidst the enormous underground water sources in Uganda.

Conceptual Background

In Africa studies indicated that, about 300 million people do not have access of safe drinking water and 313million have no access to sanitation respectively. This means that, Africa has the lowest total water supply coverage as compared to other continents, yet it has a plenty of water sources(Regional focus,2014) ‘‘Water is life’’ and especially potable water is essential for life and good health. This implies that, access to safe drinking water, improves overall health of people, socio-economic and development for human progress in their environmental existence (Chapter ,2014). Sub-Saharan Africa has about 250 million people (67%) with in appropriate access to safe drinking water, while 81% of the rural populations have inadequate sanitation facilities and about 40 million people spend a lot their time walking in search for water(WASH, 2014). In many of emerging economies more especially in East Africa, governments and Non-Governmental Organizations have greatly invested huge sums of money every year in the development of rural safe water supply projects (Government policy,2010 to 2015).

In Uganda’s rural community the challenge is envisaged around governance policy and institutional legal framework for safe water in they are applied and there are three levels distinguished at different areas in water sources sector, but mutually reinforcing ‘enabling actions’ may be undertaken for effective safe water service delivery (Fischhoff, 2012). The performance of Community Based participation in water projects management impacts on the

sustainability of rural point water facilities. Therefore, policy and governance dynamics presented within the country and among macro and micro level actors and institutions, influence of these actors constituted this study's independent variables(Sabatier & Weible, 2014) Governance System and Sustainability of Rural Underground Water Sources has been ongoing in most of developing countries since the 1930s through construction of deep boreholes, shallow wells and protected spring wells. The studies further indicates that, there are approximately 20,000 deep boreholes, 3000 shallow wells and 12,000 protected springs in the country constructed mainly for rural households' domestic water supply. The main focus the study is on Rural Deep Underground Water Sources, which uses simple hand pump water-supply technologies that seem rather affordable by most of the rural community in Uganda.

The Government of Uganda since 1993 has embarked on the process of putting in place appropriate strategies for water sources management systems and sustainability through the water action plan (MWLE, 2011:9). The ongoing efforts, of ensure people enjoy safe water are measured basing on the institutional performance of the existing water sources and on rural communities achieving short term objectives.

This approach is based on need to raise their output in order to meet set targets of improving access of safe water to at 72% by the year 2015 (MWE,2010). However, the low community participation in governance and maintenance activities of their water sources greatly influence the water users' management committees and affects the functionality of water facilities. This does not only water users' management committees their willingness to offer effective services but also the community attitude and willingness to pay user fees as required for good governance and sustainability of the existing water facilities.

Contextual Background

This study examines the relevance of governance and functional sustainability of rural deep underground water sources aspects. It also analyses the applicability of widely held beliefs based on community participation model supported by local governance systems and decentralized service delivery. Lockwood and Smits Stef(2011) affirms that, community based engagement in governance practices promote capacity and efficiency in operation systems and maintenance water sources. The approach include regular protective servicing, maintenance and carrying out major rehabilitation of the non-functional water supply sources, regardless of whether government or non-governmental agencies did provide the water facility (Hacker, 2013b). The concept of good governance and sustainability is widely recognized these days in various sectors; it is questionable how adaptable and how most of the beneficiaries corporate solutions regarding sustainability of the underground water sources are in Lwengo District. It is very likely that most of what passes challenges for deep underground water facilities in the study area are the governance structures and sustainability legal framework which fails to do precisely the one thing it purports to do in regard to safe water sources.

However, this scenario governance and politics in the district it makes it impossible for the district local government to do its mandate in regards to effective governance of these underground water sources in order to realize sustainability of their operations (McElroy, Jorna, van Engelen, 2007). It is important to note that, while the selection of Lwengo District, as study area in Uganda it was purposively based on the challenges of governance and accessibility of safe water presence of enormous deep underground water sources and their functionality levels. The study focus on application policy régimes and guidelines for safe water assert that Uganda upholds the policy framework as any country and it is not very peculiar from the rest of Sub-Saharan Africa(GOU 2011a &(Bellamy, 2014).

The study also examine leadership structures and the district Local Governments, enforce the policy framework and whether there are committee responsible for maintenance of water sources which go ‘beyond the capacity’ of the communities. However, this notion does not rule out the Community Based Management model as advanced in Ugandan decentralization strategy, it operates on the idea that when Water Users Committees are functional, they meet regularly, sensitize the water source users, collect funds for Operation & Maintenance, and ensure proper sanitation and hygiene at water sources. That alone creates high chances of sustainability of the existing water facility in the community.

The governance systems and sustainability practice in Lwengo seemingly different that is why the district has high rate of non-functional underground water sources. The governance approach applied in the study area does not yield high levels of functional sustainability of underground water sources that meet high access safe water, equity and efficiency standards as stipulated in safe water sector policy framework. It should also be observed that, nearly all districts in the Country have been implementing public sector reforms since the early 1980s and they are facing also most similar experience in regard to governance and sustainability of rural deep safe water supply (Willis, 2011),(Rees & Hossain, 2013)

However, Yin (2012) also views the purpose of contextual as case study designs, among others, to be suitable in evaluation of theory for effective management and the application governance structures in the rural communities. He considers theoretical propositions to be a starting point rather than the outcome of case study analysis. In order to fit in the context, this study of governance systems and sustainability of rural deep water sources will shade light on the knowledge gap and provide direction to underpin the prevailing situation in the district.

Maputo (2013) observes that, Lwengo District alone has 228 Deep Underground Water Sources, 385 shallow well and 38 spring wells (DWD Report, 2013). However, despite all that, there is scarcity of safe water in the rural communities; the underlying concern and crisis of inadequate access to safe water is about the uncertainty and knowledge gap around the governance systems and sustainability of the existing water sources. Similarly, the arid geographical nature and quality of governance strictures affects rural safe water service delivery in Lwengo District.

The study observes that Lwengo is not peculiar from the rest of the rural communities in Uganda in terms of accessibility to safe water, quality and governance. While minor deviations may not be ruled out, Lwengo district as the case study community remains underserved. The governance of rural deep underground water sources and sustainability is still a countrywide problem in Uganda (MWE 2011a, GOU 2011b), as it is in much of sub-Saharan Africa (UNICEF and WHO 2012).

Although, the District Local Government and Non-Governmental Organizations have invested huge sums of money and constructed several Rural Deep Underground Water Sources in the district. The aspect of sustainability, this problem is even more imminent, the operational and functionality of the existing water facilities is at (40.7%) which creates a public concern and a crisis of safe water in the community. The objectives of this study is to contribute and shade light on governance and a solid scientific sustainability measures to get past the uncertain understanding of governance systems and sustainability of underground water sources.

It is further notable that the uncertainty and knowledge gap of effective governance and maintenance mechanisms possess a challenge in Lwengo District and raises anxiety for sustainability of the available water sources whereby 59.3% of the existing deep underground

water sources are non-functional (Namutinda, 2013 &MWE 2011a). Indeed, the findings of this study will underpin the fundamental facts that affect underground water users' management committees to its full functional, yet there are high potential for them to impact positively on functional sustainability of rural point water facilities in the district. It is for this noble cause that, the study of governance systems and sustainability of Rural Deep Underground Water Sources remains vital and pertinent for the rural community households in Lwengo District as it is elsewhere in Uganda.

1.3 Problem Statement

Lwengo District governments is mandated to plan, oversee the implementation of Water development projects of underground water sources and ensure safe water coverage increase and besides, they are expected to prepare plans and budgets incorporating operation and maintenance aspects(Evans, 2012) as advanced in (National safe water policy & legal framework for operation and maintenance of rural safe water supplies, 2014-2015). Namutinda, (2013) &Kamusingize,2014.)Observe that, the District leaders working together with non-governmental Actors have invested huge sums money to ensure the populace access safe water in their areas However, while this seemingly ideal situation to be attainable in principle, there is scarcity of safe water in Lwengo, is crucial and the problem of access to safe water in rural areas seem to closely linked and depend almost on governance system and sustainability mechanisms at all levels. Despite all the efforts made by the District Local Government and Non-Governmental Actors, the rural communities have access to adequate clean and safe water; there is low accessibility to clean and safe water. For example, only 40.7% of the Deep Underground Water Sources are functional and 59.3% are non-functional across the district (Namutinda, 2013). Strong evidence hereof can be justifiable in community knowledge gap levels of governance; policies as well as maintenance strategies in place to increase sustainability water sources. The

scenario of knowledge gap in governance and sustainability affects people's accessibility to clean and drinking water (Calow, Ludi, & Tucker, 2013). It further makes a difference on inputs by the local governments and non-governmental actors to achieve at least 72 % water coverage in the district. If this prevailing situation of low knowledge in governance and sustainability measures of existing water sources persists, it will result in increased problematic effects and scarcity of safe water to the rural communities. Therefore, the study of governance systems and sustainability of deep underground water source in Lwengo district remains very pertinent.

1.4 General objective of the study

The general objective of the study is to examine the Governance Systems and Sustainability of Rural Deep Underground Water Sources in Uganda.

1.5 Specific Objectives of the study

- (i) To examine the influence of governance structure on the sustainability of rural deep underground water sources in Lwengo District.
- (ii) To assess the influence of community participation on the sustainability of rural deep Underground water sources in Lwengo District.
- (iii) To establish the extent to which water users management committees' rules and regulations influence sustainability of rural deep underground water sources in Lwengo District.

1.6 Research questions

- (i) How do governance structures influence the sustainability of rural deep underground water sources in Lwengo District?
- (ii) How does community participation influence the sustainability of rural deep underground water sources in Lwengo District?

(iii) To what extent do water management committees' rules and regulations influence the sustainability of rural deep underground water sources in Lwengo District?

1.7 Hypothesis of the study

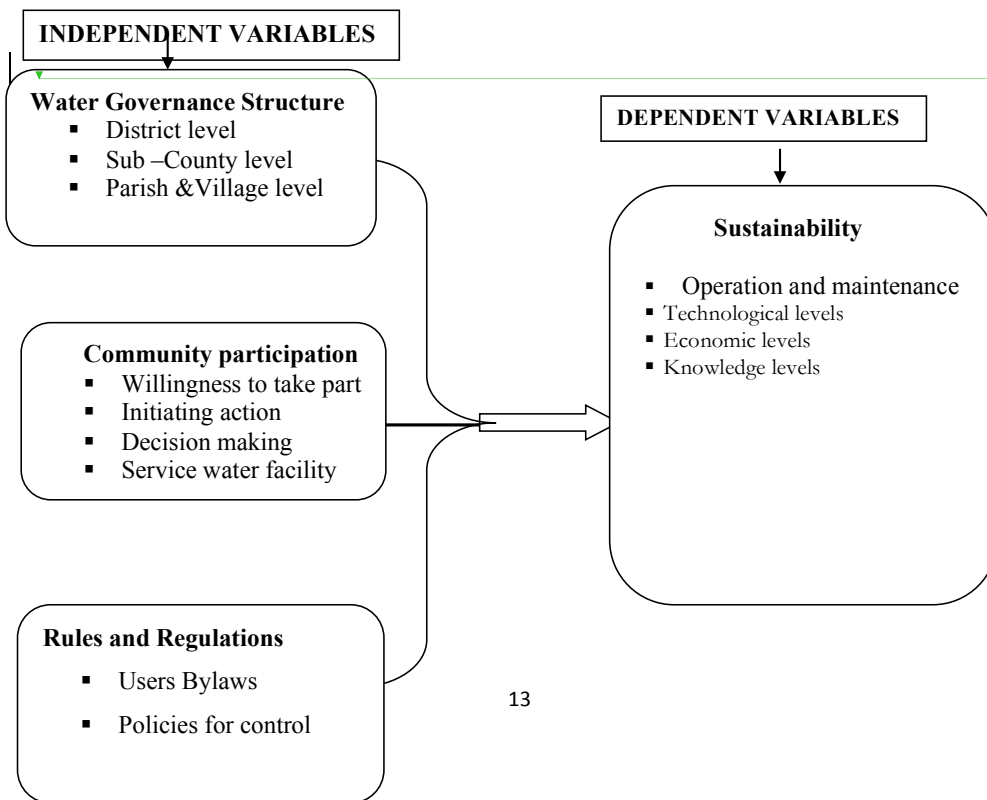
(i) There is no influence of governance structures to sustainability of rural deep underground water sources in Lwengo District.

(ii) There is no influence of community participation to sustainability of rural deep underground water sources in Lwengo District.

(iii) There are no influence of water management committee rules and regulations to sustainability of rural deep underground water sources in Lwengo District.

1.8 Conceptual Framework

Governance systems



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Figure 1:

(Source: Adapted with modifications from MWE (2011a p. 12))

The conceptual framework, explains the influence governance systems to sustainability of underground water facilities in Uganda. It further demonstrates how legal policies, regulatory and institutional frameworks for rural deep underground safe water supply provide a potentially enabling legal framework for an effective governance system for rural underground water service delivery and sustainability (Stazyk and Goerdel, 2011). From the conceptual framework it is notable that there is foregoing perception and indicators of a few regulatory by-laws; of Uganda's legal structure, regulatory policies and institutional frameworks for rural safe water supply that provides a potentially enabling framework for an effective Community participation and decentralized governance system for rural water service delivery and sustainability.

This enabling potential is even reflected in the fact that Uganda's safe water management sector has more ambitious targets than those set in the millennium development goal (MDG) target 7; while the MDG target is aiming at halving the proportion of the global health promote without sustainable access to safe drinking water and sanitation by 2015, Uganda is targets. Thus, looking at plans, policies and strategies for the water sector as elaborated in the conceptual framework. The right governance practices and operational maintenance leads to sustainability resources as advanced in sustainable community-based management models for rural safe water supply (General Science and Scientific Theory & Method, 2013). It is certainly known in Uganda's water policy sector and planning framework, that community based participation and engagement posts in productivity but achieving functional sustainability progress remains problematic and theoretical foundations informing governance structure for sustainability of rural point-water facilities.

1.9 Significance of the study

The study is expected to generate new knowledge and dynamic technological model in order to add value on the already existing body of knowledge of rural groundwater sources, governance system and sustainability in Uganda. It will also broadly contribute to the current debates on governance and to the critical debates on new public management and citizen participation. More specifically, the study contributes to critical debates on water governance and sustainable rural deep underground water sources in Uganda and Africa as whole.

Besides that, the findings of this study are expected to inform the government; local community leaders as well as policy makers to rural community of adopt alternative technological skills and dynamics in order to enhance groundwater source governance system and sustainability. The local community is expected to put in action the generated knowledge to effectively manage groundwater sources and develop social connections with knowledgeable people (Agrawal, 2010). The adaptive skills of alternative technology is expected to make the groundwater source Users grounded with appropriate measures and alternative strategies to exploit the existing wealth of knowledge for effective governance system and sustainability of rural water sources(Hilgers, 2012).

It is also hoped that, this study will provide rural deep under groundwater sources management committees with practical skills and apply the adapted technological knowledge to governance and sustainability of their own under groundwater sources. The adaptive action involves the new approaches and community participation will enhance sustainability of rural deep under groundwater sources at different levels(Ochola, Sanginga, & Bekalo, 2010) The application of good water sources management practices are embedded in use of local knowledge and alternative governance strategies enhance sustainability of rural deep under groundwater sources.

1. 10 Justification of the study

The study of governance systems and sustainability of rural deep under groundwater sources in Uganda remains critical and very important it will contribute facts to the already existing body of knowledge and current debates on governance and sustainability of safe water sources. The study will contribute to critical debates on governance and sustainability of underground safe water facilities with the application of national policy and legal frameworks advanced by water management sector in Uganda.

The study is also expected to enhance community based engagement towards effective governance and sustainability of their underground water sources using the integration of alternative technology adapted consciously work as drivers of dynamic changes pursued (Ochola et al., 2010) and more so as cited (Sandor, Kanakasabai, Marques, & Clark, 2014) for effective the utilization of deep underground water sector This study will add value to existing scholarship on the fundamentals that need to be adhered to by policy actors wishing to build effective synergies between them and the service beneficiaries, particularly those living in rural contexts such as those in sub-Saharan Africa.

1.11 Scope of the study

1.11.1 Geographical Scope

Lwengo district is made of 6 Sub-Counties, it borders with Masaka, Kalangala, Lyantonde, Rakai, and Bukomansimbi Districts. The study area is semi-arid corridor region having water scarcity and enormous significant limiting factor for accessibility and sustainability. It is for that reason that the researcher targets Lwengo District for the study.

1.11.2 Content Scope

This study will focus on local levels structure's influence governance systems and sustainability of rural deep underground water sources. It will further examine the national water

policies, legal framework and institutional arrangements used to identify the demands and accessibility of safe water. It will also make a comprehensive valuation of water users' committees' functionality, successes, operations and impact of rules and regulations in respect to solve constraints facing local institutions that hindering effective governance and sustainability of the underground water sources as applied in Lwengo District.

1.11.3 Time Scope

The study will be limited to a period of five years 2010 to 2015. The study targets those years because it's when the district local government leaders, non-governmental organizations and the entire country made a lot of effort to ensure they improve on safe water coverage in the attempt to meet the national set targets of millennium development goals.

1.12 Definition of key concepts

Governance: Bell (2002), defines governance as the use of institutions, structures of authority, and even collaboration to allocate resources and coordinate or control activities in society. Governance therefore is a process which unpacks complex global dimensions of management and proposes a new theory built on the strength of innovation and positive outcomes for the people everywhere.

Community: Community may be understood in terms of political, spatial or social dimensions with various contestations. That is why scholars like (Berner & Phillips, 2005) maintain that, "the concept is fashionable to the point of ambiguity, but remains deeply problematic".

Community Participation: Participation plays a greater role as a foundation of community development projects including water services in developing world. According to (Awortwi 2007), participation is aimed at inculcating a sense of self-reliance and ownership to create equity in resource distribution.

Sustainability: Sustainability concept emerged as a synthesis of issues of civil rights, environmentalism and anti-poverty interventions (Ricketts 2010).

Decision making: Refers to the ability of project beneficiaries to decide on issues pertaining to their own lives. Respondents were asked to rate their agreement whether they exercise their powers over project activities, whether development employees encourage additional options and ideas about the project and provide opportunities for joint discussion by both project designers and beneficiaries.

Initiating Action: Refer to the community members' abilities to achieve their own activities and agenda. It is measured in terms of resources earned and owned, resources mobilized for more control over the project activities and micro projects initiated in relation to the water sources being implemented.

Water Technical Committee: Refers to a group of people elected from the community by the beneficiaries with skills to manage affairs of the water source and sanitation on their (community) behalf.

Operation and Maintenance: Refers to the sum total of activities required to achieve smooth running and continuous sustenance of a water facility to ensure long service. It was measured by the following indicators; regular inspection and servicing, minor repair, replacement of broken and worn out parts, maintenance of fence, drainage and vegetation.

CHAPTER TWO

LITERATURE REVIEW

2.1. Introduction

This chapter presents a review of the related literature of relevant authors and domain experts in fields Governance systems and sustainability of rural underground Water Sources. This chapter starts with the introduction, theoretical review of relevant thematic areas developed from study objectives and conceptual framework, empirical studies of domain experts and a Synthesis of the identified gaps in the reviewed literature.

2.2. Theoretical review

This study is to be guided by “Governance System Theory” as developed by Paulo Freire,” The advocate of this Freire’s theory asserts that, pedagogy of the oppressed which advocates for empowering community with relevant knowledge to given degree of proper utilization of the available resources , development and sustainability which is determined by the extent of buy-in the local population.(Eggen, 2011). The major idea in this pedagogical theory is to ensure, buy-in citizen or water users for the most part by the extent to community based participation and involvement in own project activities. “Unless an innovation is highly compatible with clients, its life span may be short lived. This theorist believes that, “unless clients feel free and are willing to participate in all sectors sustainability may not be eminent. This Paulo Freire’s theory advocates post into the spirit of sustainability theory which describes different forms of people in socio-economy and society that is lasting and can be lived on a global scale. The society-changing potential of the claims of knowledge and skills to effectively manage and enhance the functionality of the underground water facilities. Sustainability is just

not the trivial general claim to take social, economic and environmental policy serious independent of any relationship in time and space and to strike a sound balance between these aspects. These theories advocates for involvement of the local community and innovation which helps the users to own the available water resources and they regard it as ‘theirs’. The theory posts how proper community-based participation forms of governance and communication are such a strong approach to management systems of community affairs. (M. Lockwood, 2010).

The researcher believes that, this community based participation approach will provide opportunities to identify common problems affecting governance systems and sustainability of existing deep underground water sources in study area. Although the theory pedagogy of the hopelessly advocates proper governance systems and community based participation in order to realize ownership and sustainability, it does not reveal other factors like enabling local government politics, national policies, legal framework, education levels and the technology used by the deep underground water facilities and ecologic environment. The researcher further observes that, the theory remains silent on the social economic set up and ability to contribute monetary for the servicing, operation and sustainability mechanism of the underground water sources. In order to supplement the theory, the researcher further opted to use another concept of enablement.

2.3. Concept of enablement and enabling of local government environment

The concept of enablement of the local authorities structures and enabling environment which leads to better governance practices and sustainability of Rural Deep Underground Water Sources (Roberts & Kanaley, 2006) and (Rajabifard & Williamson (2008) affirms that, socioeconomic and political environment should be taken into account in order to realize the sustainability of developed rural projects because they significantly influence the operation systems and functionality of Actors and Water Users Committees. In addition to creating

enabling environment, social work a profession and community empowerment is another vital concept which should be undermined to realize effective water service deliver. It also observed in generalist governance practice that, having skilled personnel and sensitization it plays the mutual role of reinforcing service delivery in the community. However, it should be noted that, on the way to achieve good governance practices of rural underground water sources ‘advocates’, ‘negotiators’, and ‘educators’ need to be involved as individuals, groups and communities in order to attain efficiency (Ambrosino *et al.* 2011). In addition the researcher observes that, inadequate knowledge of water users, untimely servicing underground water facility and interdependence between individuals, groups and communities institutions creates a complex environment that affects the sustainability of the available water sources. Hence the research advocates for human resource empower and sensitization on pertinent aspects required and respect policy, legal framework to guide actors or change agents as advanced in safe water management sector (Sabatier & Weible, 2014). The sensitization and community capacity building will broaden community participation base and increase knowledge level about the need for safe water and functioning of waters sources in rural area (Hacker, 2013b) and (UNICEF, 2013.)

Although the concept of enabling environment is seen to be yet another concept which became more popular in the 1990s, as an approach to effective service delivery it seems not to be applied governance structures of Lwengo district. One wonders whether it can be applicable in areas of Lwengo district in order to avert the situation of scarcity of safe water in the community. Despite its enabling approach, it is even silent about the remuneration and motivating of the water users management committee members; technical water personnel who cater for servicing and Water Sources technology well-being.

2.4. Governance systems and Sustainability of water sources

Governance system is conceptualized in many ways. Lebelet *al.* (2006) conceive governance as laws, regulations, discursive debates, negotiation, mediation, conflict resolution, elections, public consultations, protests, and other decision-making processes in the maintenance and sustainability of groundwater sources. Sabatier & Weible(2014) views governance as a complex set of institutions and actors that are drawn to help government create the conditions for ordered policies, rule and regulatory approaches for collective action by which individuals in the community to make decision and share power. For Rhodes (1996) governance is a self-organizing, inter-organizational network.(Bozzini & Enjolras, 2012) characterize governance as the relationship between society and its government

Although these definitions of governance are predominantly applied within national regulatory regimes, they can be applied at the local scale. Bell (2002), for example, describes governance as the use of institutions, structures of authority, and even collaboration to allocate resources and coordinate or control activities in society(Ernst, 2013). At the local level, governance is about decision-making regarding asset portfolios of individuals and households. The Sharing roles and responsibilities of individuals in regard to provision of safe water is defined at households and community level (Agrawal, 2010). Concepts of community participation in governance indicate the various ways through which power is exercised in a society, specifically to people who has influence in society. Pahl-Wostl (2009: 356) argued that efforts to separate community participation may not do justice to the complexity of real-world governance regimes.

The aid of good governance paradigm has been seen to influence community participation enhancing the effectiveness, efficiency and coverage of the project benefits. The good governance in encouraging self-reliance of the project participants, participation is useful

for the achievement of sustainability because sustainability depends on the role played by stakeholders particularly those directly concerned with project or programmes. The intended participants are important because these people are the ones who can decide to continue or to stop the use of services created by development projects. Thus genuine stakeholders' participation has become a critical factor in promoting project sustainability (Freeman, Harrison, Wicks, Parmar, & Colle, 2010).

According to (Hacker, 2013b) people's participation in governance system is an essential and a prerequisite for the continuity of activities. The involvement of local community and utilization of their local resources generates a sense of ownership over development interventions to the community which is essential for the sustainability. Research has found out that, positive community participation influences project sustainability for example a study of small farmer projects in ten African and Latin American countries found a link between the involvement of small farmers in project decision making and the willingness of farmers to make commitment to the project. Also the study on seventeen (17) water supply schemes in the Malawi rural piped scheme programme have shown that projects with community participatory approaches are more sustained than projects with little or no community participation (Freeman et al., 2010).

Pollnac & Pomery (2005) findings show that, governance system is essential factor and it influences sustainability of the integrated coastal management projects in Indonesia and Philippines. (chrisallsup, 2012) This indicator includes the type of participation involved which includes the contribution of money or time and having influence on both project planning and changes after project implementation. The authors suggest that project sustainability requires a combination of both community involvement and locally appropriate benefits.

Beneficiary's participation helps in the grounding of initiatives on existing and legitimate local institutions and the cultural values. The existing cultural norms and indigenous knowledge

constitute valuable social capital for institutionalizing development intervention for effective sustainability, as was put by (Regional safe water focus, 2015). Compared to professionals, beneficiaries have important and complimentary information on their needs and capabilities, are competent and reliable. These three factors may become causes of improved effectiveness in development projects hence sustainability.

Bozzini & Enjolras (2012) agreed that community participation is an essential prerequisite for the continuity of activities since it generates a sense of ownership, which is essential for project sustainability. However, the researcher wonders whether these scholars' findings are universal so as to apply in Lwengo District basing on the fact that it is located in a semi-arid corridor and nature of their political environment which is integrated with many controversial issues of lives.

2.5. Community Participation in governance systems of water sources

Community Participation; is a process by which individuals, families or communities assume responsibility for local problems and develop a capacity to contribute to their own community development (Gboku & Lekoko, 2007) regards community participation as a means of empowering people by developing their leadership skills and abilities so that they can negotiate with the rural development system and can make their own decisions in terms of their development needs and priorities. According to FAO (2007), Community Participation in Governance System is a process of equitable management and active involvement of all stakeholders in the formulation of development policies and strategies and in the analysis, planning and implementation, monitoring and evaluation of development activities. Owing to these views, the researcher ponders Community Participation in governance systems as an effective process of involving members of a community in all the actions and decisions, which

affect their lives and the life of their community. However, he observes on the other hand the level of knowledge and economic status matters for effective involvement and participation.

According to Parker(2015)lack of beneficiary participation in governance system leads to most projects falling prey to disuse immediately after external funding ceases. Community participation in governance systems increases people's sense of control over issues that affect their lives and also promotes self-confidence and self-awareness (Nampila, 2005). It provides a sense of community leadership to take responsibility for oneself and others, and a readiness to share and interact (Aref et al., 2010). There exists a growing view that local communities governance and beneficiaries should be involved in the development, implementation, and monitoring of interventions designed to reduce poverty and enhance sustainability of the available resources. One motivation for this view is that beneficiary participation in governance systems carries with it intrinsic value; that is, there is inherent value in ensuring that individuals have a voice in activities that will affect their well-being. Further, participation can contribute to empowerment, such as that gained through enhanced organizational capacity, individual learning processes, or increased political voice (Bellamy, 2014). This implies that the benefiting community need to participate or get involved in all project governance activities so that they can own the project and once a project is owned by the community then it would be taken care of as "ours" and it can be sustained.

Brennan, Barnett, & McGrath(2009) widely cite the essential role that community participation governance system plays in engendering a sense of ownership for the water system among community members, which in turn ensures users' commitment to long term operation and maintenance (Whittington et al., 2009). More so community participation in governance systems ensures that projects are developed according to the needs of the people (Raniga and Simpson, 2002). This can improve the outcomes of projects through cost sharing,

increased efficiency and effectiveness. Through community participation governance system, resources available for development projects will be used more efficiently and fewer costs will be incurred if the people themselves are responsible for the project (Kumar, 2002).

Theron (2005) states that, some governance levels are more relevant than others to ensure authentic public sector. These management approaches become more relevant when the impact of participation is assessed in relation to a program or project, and the degree of participation becomes a central feature in this regard (Fokane, 2008). The four levels of intensity of community participation in governance examining them from the simplest to the most complex as highlighted by Thwala, (2010) are as follows: information sharing; consultation, decision making and initiating action.

Johannessen et al.(2014a) argues that, long-term sustainability of the water and sanitation system is dependent upon a continuous flow of accurate information regarding operations, water quality, maintenance and financial status. Project managers and other development partners should work with the community in developing a long-term monitoring plan. This implied that the local people should be aware of what is going to take place and what is expected of them so as to ensure the sustainability of the project.

According to Laessoe(2007:5), the success of the participatory process relies upon educating and informing the public and this enables the people to participate and chose their future which in turn provides them satisfaction. So the concept of participation is not only valid to make people involved in development, but also to make citizens feel more fulfilled through the developing process. This implies that the beneficiary community needs to be informed and educated about the development projects before being implemented so that they get involved and participate willingly for the sustainability of the project.

2.5.1 The decision making process

According to Mandersheid (2009), public participation in decision-making can influence the responsibility of people into development. Generally the shape of social relations can play an important role on the will of people to get involved in decisions. Social relations can also serve as a key of success to resolve the conflict coming from competing interests as well as to build trust in institutions. Good social relations also depend on access to goods. This implies that as people are involved, the responsibilities and strategies for sustainability of the projects are agreed upon.

Thwala (2010) observes that an even higher level of intensity involves a decision making role held by community members in matters related to program design and implementation. The decisions may be taken only by beneficiaries or in collaboration with other parties on specific issues or aspects relating to a program. This implies that Community participation or involvement in decision-making by the external agency is a much more viable level of participation which helps in capacity building and subsequent empowerment of the local people and institutions. Decision-making may be about policy objectives, project design, implementation or maintenance of the project.

According to Warner (2005), community involvement in the project does not end with planning but must continue through the implementation and sustainability phases. Project managers should encourage the community to remain engaged in decision-making and in the various implementation activities. It also should remain patient with the level of community interest and involvement and not accelerate implementation faster than the rate at which the community is willing to progress. This implies that community participation should go through all the stages of the project from planning, design, implementation to monitoring and evaluation.

According to Nekwaya (2007), the methods of community participation play a crucial role in terms of meaningful participation. Community participation is rooted in democratic approaches to public policy and community planning and development, which assume that people have a right to make decisions that affect their lives. In short, a community that gives up the ability to make its own decisions loses “some essential humanity”. Citizen participation must be understood in relation to local and regional patterns of power and powerlessness, that is, individual and collective experiences of influence, acquiescence, privilege, or exclusion based on membership in dominant groups. This implied that people need to make their own decision regarding the sustainability of the development projects and not just to be imposed on decisions from the outsiders (project managers).

Studies by Mandersheid (2009), Warner (2005), Bailur (2007), and Nekwaya (2007), concerning decision making as a level of community participation found out that it is a higher level of intensity that involves a decision making role held by community members in matters related to program design and implementation and by involving the community, organizations and local authorities in the decision making and auditing, the beneficiary community have been given control and a sense of ownership to the project and can be in position to sustain it for a long time. But their studies were done in different areas with different setting from that of Lwengo. However, there is none of study had been carried out in Lwengo District to find out how decision making, governance structure influence the sustainability of rural water supply and this justifies the need for specific study to be under taken in governance systems.

2.5.2. Initiating Action in governance

According to Thwala (2010), initiating action is the highest level of intensity that community participation can reach in governance systems; this is the phase in which community members take the initiative in terms of actions and initiative regarding a certain programme.

Initiative expresses a proactive capacity and confidence to get things going on its own. This level calls for self-initiated actions which is an indication of self-actualization. Once the beneficiaries are empowered, they are more likely to be proactively and energized to take creative initiatives with confidence in solving emerging problems such as repairs and paying for operation and maintenance of their deep underground water sources.

Creighton (2005) states that, initiating action level of community participation promote self-confidence and self-awareness Nampila (2005). This assertion agrees that this heightened consciousness makes people continuously aware of the reality about them and of their own capacity to transform it. This implies that at that level, the community is in position to take up actions for the sustainability of the established development intervention.

According to Mansuri & Rao,(2012)Initiating action as a level of community participation is a citizens action that influences or seeks to influence policy decisions or as an action that incorporates the demands and values of citizens into public administration services. People's participation is essential to do with economic and political relationship within the wider society; it is not just a matter of involvement in project activities but rather the process by which rural people are able to organize themselves and, through their own organization, are able to identify their own needs, share in design, implement, and evaluate participatory action. This implies that, at level the local people would be in position to come up with strategies for the sustainability of the project established.

Mansilla & Tony (2011) in a study found out that, at the level of initiating action, the communities are able to assess their own situation, organize themselves as a powerful group and work creatively towards changing society and building up a new world. This increases capacity of individuals, allow communities to mobilize and help themselves to minimize dependence on the state and leads to a bottom-up approach. This implied that as the communities reach that

level then they are self-reliant and are in position to sustain the established development projects like the rural water supply.

Literature of Thwala (2010) and Mansuri & Rao, (2012) observes that, initiating action as a level of community participation agrees that it is the highest level of intensity that community participation can reach and a phase where community members take the initiative in terms of actions regarding a certain program. The level expresses a proactive capacity and the confidence to get going on one's own and calls for self-initiated action which is an indication of self-actualization. However, the researcher wonders and doubts whether the similar cases of initiating action level are happening and applicable in Lwengo District.

2.6. Water management committee rules and regulations of water sources

The management committee Water rules and regulation are there as Codes of ensuring that there is well organized system of governance to be followed by water resource users. The "Water Code" vesting upon the National Water Resources Board (NWRB, 2013) to ease the administration and enforcement of the provisions of services in the community thereof, the following rules and regulations are hereby promulgated in the community (Namutinda, 2013). The committees are meant to come up with good idea to encourage community involvement and participation in managing, monitoring and checking infrastructures that are absolutely necessary for proper usage of deep water sources and ensure functionality of the facility. (Zimmerman, 2014) affirms that, there is an established Good Governance Working Group tasked to identify and recommend measures to promote and monitor transparency, accountability and good governance in the water sector. The researcher observes that all these were put in place to support the regulatory process and ensure effective and efficiency of water supply sources and enhance community management based approach of water sources in rural communities. Secondly the committee makes all possible effort to ensure that, the community gets the services as required without lacking such

essential human needs in the community. Lockwood & Smits (2011) asserts that, access to clean and safe water is largely dependent on governance system, comprising of rule and procedure for effective community participation in decisions on improved water supply in the Volta basin of Ghana. The results indicated that probability of using the improved source decreases with price and increases with income. Although insignificant, larger households were less likely to use improved water sources in communities charging prices per bucket. For communities charging a per-bucket price, education had a significant positive effect on the accessibility of water in the community. In the same vein, households that were headed by women were significantly more likely to use the improved source due to that fact they were loyal and responsive to regulations and governance authority. According to the results, supply characteristics such as the location and pricing system were identified to have an effect on households' decisions to use the improved source.

The study further revealed that opportunity cost also matters in the sense that the further the distance from the water source as compared to the distance from the improved source, the more likely the household uses the improved deep water source. In support of the findings for(Hacker,2013a) also noted that there is an opportunity cost of time used for fetching water. According to these authors, the further away a source is located from the house and the longer one must queue, the less water from that source will be used. (Johannessen et al., 2014b) there is an opportunity cost of time used for fetching water The water management committees in the case are to regulate the use of the water facilities and ensure appropriate administration of water users in the community.

Arouna and Dabbert (2009) carried out a study on the determinants of domestic water use by rural households without access to private improved water sources in Benin. According to the findings, time required for fetching water negatively affected water demand. In addition, water

demand from purchased sources was found to be price inelastic among the wealthier households. In support of these findings Sandiford et al. (1990) showed a positive relation between wealth and water use in the community. In this research it was assumed that poverty negatively affects water use because poor people cook less and often have less clothing to wash. Also Arouna and Dabbert (2009) found village population having a negative sign and are significant for free and purchased water at the 10 percent and 5 percent levels, respectively.

This shows that people in villages with more inhabitants consume less water as compared to people in urban communities. The study also established that the time required for fetching water positively affects purchased water demand implying that the quantity of purchased water used increases with the time required for fetching water. The water management committees in such a case were to regulation and ensure the community access water as required for their consumption. In the same study, Arouna and Dabbert (2009) found out that household size positively affects both free and purchased water demand. However, nevertheless, there are rules and regulations to demand for water coefficient of this variable was not significant but the results do not reflect the values for money in term of maintenance and sustainability of water sources.

2.7 Sustainability of Deep Underground water Sources

Sustainability is defined as the power or capacity of programs to continuously respond to identified community issues (Marek and Mancini, 2005). Scoones (2007) defines Sustainability as the ability of a system to bounce back from such shocks and stresses and adopt stable states, while Khan (2000) defines Sustainability as the ability of a project to maintain its operations, services and benefits during its projected life time. In the researchers' view, Sustainability is defined as a balance between the financial, human, and environmental. It is about living your values and acting with integrity, responsibility and generosity. It is about being in a community

of discussion, dialogue and action because no person or company is an island and everything is interconnected.

According to Connelly (2007:318), Sustainability as in sustainable development has become widely accepted concept but essentially contested. Nowadays there is nothing that cannot be described as “sustainable” and this contributes to the complexity of the notion of sustainability (Scoones, 2007). Sustainability of institutional and financial services are seen as a means to achieve the sustainability of benefits, as (Sustainable Development Environment European Commission, 2015)states different dimensions of sustainability need to be recognized and woven into each other as a comprehensive mutually reinforcing strategy. Sustainability of a project can only be evaluated after the donors have withdrawn from the projects

According to Directorate of Water Development (2011), all water point facilities are required to have Water Technical (User) Committees with half the membership being women, and at least two caretakers. These Water Technical (User) Committees are responsible for management and should collect and manage funds for maintenance and repair.

2.7.1 Functional Water Technical (User) Committees

According to the newsletter by UWASNET (2012), water user committees are charged with the following roles; Promotion and improvement of sanitation and hygienic behaviors, Mobilizing the community for sanitation and hygiene improvement, Maintaining an up to date record of Water Users, mobilizing Users to pay for maintenance costs and properly look after water source funds, Regularly visiting and monitoring the performance of the water source, ensuring preventive maintenance (Johannessen et al., 2014b) i.e. monitoring service and major service which are carried out on the water points e.g. repairing of cracks on the water source, engaging a mason in case of need of repairs and remunerate of the mason, purchasing any materials needed for repairs and proposing, enacting and enforcing bye-laws to govern the use of

the water source(Kimani, Nyagero, & Ikamari, 2012) . This implies that functional water user committees perform the above roles and once these roles are performed then the water sources can be sustained. Water and sanitation activities need a dedicated group at the community level to oversee and be responsible for project implementation as well as system operation and long term sustainability. Governments and development partners should help the community set up and support a water supply committee to take on these tasks. Responsibility for the continuing management and operation of the water and sanitation system will be with the community, most likely through the water supply and sanitation committee. Project managers and other development partners should ensure that the community understands that, unless it accepts responsibility, sustainability of the system is not possible (Warner, 2005). This implies that the water user committees play a vital role in the sustainability of the water sources.

2.7.1. Operation and Maintenance of groundwater sources

Communities are responsible for the routine maintenance and minor repair of their water facilities and that with good routine maintenance the need for repair is normally minimal, and where it occurs the costs are relatively low(The 2014-15 Budget: Maintaining Education Facilities in California,2014). Some maintenance tasks can be done by the local community. This implies that when the operation and maintenance is taken care of, then the water sources can remain functional for a long time(Zimmerman, 2014) water and sanitation activities may require water user committees to collect water fees, hire caretakers, and oversee operations and repairs. Governments and other partners in such situations should ensure that the establishment of the water user committee is in accordance with local laws and financial regulations. This implies that, the water user committees are supposed to carry out the operation and maintenance of the water facilities plan. However, the prevailing of scarcity safe water and non-functionality of deep underground water sources in Lwengo district. One wonders whether there are functional

water user committees in Lwango District and they really carry out the operations services and maintenance as expected. The water scarcity situation and un-functional deep water sources in Lwango District make current study to remain very pertinent needed to find out whether water user committees play their roles and devise means of how to address the prevailing situations in the district.

2.8 Empirical studies in governance systems and use of underground water sources

The studies reveal that, there are abundant Underground water Sources that provide an alternative option of safe drinking water to rural community households and the dilemma is around the functionality and sustainability of these water sources. (Adler & Clark, 2014) Developing countries are often faced with a dilemma of trying to manage their resources under a variety of socio-economic and political constraints. However, it is observed that, Underground water Sources and facilities are not low and probably higher than in any European or Asian countries, such as India and China that are some of the highest users of these Underground water.

Wang *et al.* (2011) In Study conducted on urban water sector of management system in China found a negative correlation between private sector participation and investments in fixed assets constructed by the government. It is not only do the lumpy investments face more than 20 years recovery time; but it is socio-politically impossible for private operators to set their own cost-recovery tariffs. It was observed that, under these constraints, lighter forms of public-private arrangements perform better in governance systems of the water projects they use of management contracts, in water supply industry for most developing countries (Sandor *et al.*, 2014)

It was notable that, although there was a technology gap across the *public-private* owned utilities was found to decline of water services systems overtime. Such decline is attributable to the

increased performance-based regulatory advanced by private contracts across the utilities by the government in China(Eggen, 2011) It is possible that other input and output variables define better both Water Users-groups' production technologies to ensure functionality and accessibility of water facilities in urban areas.

Empirical studies in sub-Sahara Africa context covered particular countries which include: Kenya, Uganda and Ethiopia, Nigeria, Zambia.These emerging economies are clustered under regions eastern Africa, western and southernwhere groundwater sources development is prevalent countries (Adelana SMA and MacDonald AM. 2008). It has been determined by availability of underground water supplies, accessed through hand-dug wells and springs.

However, the studies did not mention on how Deep Underground Water Sources and their technology is employed to the management of water facilities. One wonders whether similar experience can apply in different governance system and local political environment. It is for that noble reason that the researcher attempts to bridge the knowledge gap on governance and sustainability of Rural Deep Under Groundwater Source in emerging economies. It is notable in Africa that, regardless of the difference in viewpoint, there is consensus that there is a myriad of factors which affect most of Under Groundwater Sources are socio-economic, governance and institutional policies.

SobonaMtisi and Alan Nicol (2013) entitled Good practice and water development indicate that, there are issues that affect underground water source and yet water is a crucial factors for life, social and economic development. The study mainly focused on countries with arid and semi-arid lands like Kenya and Uganda (WRI, 2010).

In addition the study covered Ethiopia, dry lands areas constitute 63% of the country's total land area, and are mainly found in Somali, Afar, Oromiya, SNNPR (Southern Nations, Nationalities and Peoples Region), and in Benishangul-Gumuz and Gambella regions (REGLAP

Secretariat, 2012). The lessons from the case studies are diverse, but there are common practices and principles that underpin unsuccessful water development and management projects in dry land areas. This study synthesizes some common good practice principles in water development and management in dry land areas and highlights some gaps that effects and influences water sources in the region.

Naratu, Muhammad (2014) The study examined the role of women in water management with a view to ascertaining their relevance in decision making that pertains the use and management of water at the household level in Nageria. To achieve this, the various sources of water supply in the area were identified, the decision making roles of women related to water use in the study areas were analysed to samples for the study, purposive sampling where a total of 300 samples were drawn from the study areas.

The findings from this study suggest the main source of water for majority is boreholes 29.7%, well water 21% tap water 20.3% and streams 8.7%. These water sources could be private or public services to the community. It was found that women are the chief users of water and water is used for cooking, washing cleaning and drinking. The decision related to availability of water in the homes is the husband's duty. The per capita water consumption varies with household size where the chi square computed for household water consumption shows significant difference in water consumption across the settlements.

However, the researcher critiques the methodology used in study and the sample size this unveils the weakness and knowledge gap for generalization of the findings of the study. The further kept silent about deep water sources thought at some point mentioned underground water facilities. Musonda K. (2004) the study conducted in Zambia about waters resources sustainability issues five categories of factors were found among others, financial, management, technology, social and policy factors which comprehensive analyzed (Perry Jones and skinner

2001: 8), heavy and skinner 2004:22). The study used mixed methods and 16 focus group interviews were conducted in the study areas. The results indicate there five categories of factors that affect sustainability of water sources, these include: policy, social, economic, technology and management factors and a knowledge gap of relationship of how the identified variables can be addressed in Zambia. However, one wonders whether Uganda's experience is exceptional or they could have the same influence. Besides, that it failed to clearly state which kind of source of water do the identified factors apply. The study did not observe the issue of community political instability and natural climate changes and how they affect the water users in paying for the services and maintenance of water facility.

Although, a lot has been mentioned about Underground Water Sources but, Rural Deep Underground water Sources are commonly known as boreholes are not properly analyzed in these studies. The researcher observes that, these studies did not come up boldly to highlight Water governance and sustainability in Lwengo District. There is a lot of uncertainty and knowledge gap in analytical models that hydraulic properties have been estimated in various parts in the country (Tindimugaya, 2008; Taylor and Howard, 2000; Tindimugaya, 2000). The study of governance system and sustainability of Rural Deep Underground water Sources remains vital it will underpin the knowledge gap and promote that sustainability of the water facilities.

2.9 A Synthesis of reviewed literature and Identified Gaps

Literature reviewed regarding Underground water Sources clearly disclosed what has been done by other scholars and identified knowledge gaps which this study attempts to bridge as an intervention in way of improving on governance systems and sustainability of the available water resources(Eggen, 2011).

Thwala (2010), states that, it is an important aspect at all level to involve the community for effective and management of community resources and projects since it helps project designers and managers to share information for governance and sustainability with the intention to bridge the knowledge gap. However, the premise for the studies does not clearly shade light and bring out insights on underground water systems throughout globe is sparse and the current low state of knowledge and public service water sector creates a barrier to governance systems and functional sustainability strategies of underground water facilities.

The researcher believes that, this contrast of the policies with the national framework has significant bearing state due to high socio-economic and ecological importance more especially in emerging economies and this notion is supported by(Freeman et al., 2010) . The synthesis of there viewed literature often limited, dispersed and difficult to access safe water in some of the rural areas in most of the developing countries in Sub Saharan Africa and Uganda is not exceptional(Mansuri & Rao, 2012) This study aims at shading light and generating new knowledge on the study variables and help to consolidate existing knowledge on deep underground water sources for better service delivery. It will further service as tools to support reasonable underground water development, governance and sustainability of the available water facilities.

Gboku & Lekoko,(2007) puts it that underground water Sources are critically of great importance for human survival and economic development across the vast drought-prone areas of Southern, Eastern and Western Africa. The challenge of knowledge gaps that grip governance systems and sustainability of underground water sources are numerous especially in many of emerging countries.

It is observed that, East African countries like Kenya, Somalia, Tanzania, Uganda and Ethiopia are underlain by Precambrian basement complex rocks over which younger rock

formations have been deposited, and in such areas the groundwater reserves are low and not easily sustained(Sandor et al., 2014). Although, studied have tried to shade light on ground water sources, it did not properly examine or disclose what happens in arid zones and remained silent which poses a challenge to most of the people in study area. The fact remains the semi-arid areas have different characteristics and mainly suffer with scarcity safe water in such zones, when it comes to underground water sources sustainability and functionality are found to be problematic due to topography. The scanty information and the knowledge gap also affect the management and sustainability of water sources(Kimani et al., 2012).

Despite, that continuous monitoring on resource availability and the quality of education level of the people in the study also creates deficiencies to their response towards safe water. It is important to raise information on monitoring up the priority list since it is indispensable for effective water resources management and maintenance of water sources(Morris, Sandford, Bigas, Adeel, & Staff, 2012). It is also essential therefore to examine the influence of governance systems and sustainability of water sources in Uganda in the attempt to underpin challenges associated with rural deep underground water sources. Although authors support the view of Community Participation in Governance Systems as a very pertinent venture towards sustainability levels of community sources no body cited Lwengo District and one wonders whether the views are universal yet it is a different case in the study area. One wonders whether such levels of governance mechanism are applicable in District, therefore, it calls for the study to find out the truth. The authors like(Freeman et al., 2010) give the relationship between Community Participation in Governance and Sustainability levels of Rural Water Sources Malawi, Philippines, Indonesia and Latin American, but no study that mentions Lwengo District particularly in the governance system and sustainability of underground water sources, therefore, a study is needed to find out whether such influence also applies in the study area.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The chapter will discuss the methodology and procedure of investigation aiming at establishing the influence governance systems to sustainability of Rural Deep Underground Water Sources in Lwengo, Uganda as earlier indicated in the objectives. It also describes the research design, research process, method of data collection, method of data analysis, and the application of the data analysis. According to (Katsirikou & Skiadas, 2010) and (Baker, 2012) research methodology and design gives the overall nature of research activities, its influence is embalmed in epistemological space of the study (Creswell, 2013). The chapter starts with the research design which clearly explains how the inquiry will be carried out in the attempt together both qualitative and quantitative data, then followed by study population, sample size and selection, sampling techniques and data collection instruments. The chapter further presents procedure of quality control, data management, data analysis and measurements of variables.

3.2 Research Design

Bell, (2010) defines a research design as the overall plan or strategy for conducting research. It is a master plan specifying the methods and procedure for collecting, analyzing and interpreting the data in order to get the desirable information. This study will adopt a cross section design and mixed methods which will enable collection of qualitative and quantitative data. This approach will give a broad understanding that leads to a justifiable means of investigating the relationship between governance system and sustainability variables in the study (Wagenaar & Burris, 2013). However, it is important to note that, the nature of study and

mixed methods will lead to the generation of huge amounts of data from different sources, and indeed, this have potential to clarify confusion or cause frustration particularly at the analysis stage Ritchie, Lewis, Lewis, Nicholls, & Ormston,(2013)argues that, cross section design is helpful in the study, because of its single analytical case, enable one to get a cross section sample of the targeted population at a time.

The study further will adopt a philosophy that posts into a positivism paradigm which supports the expressions of the epistemological and ontological concepts in the endeavor to establish the truth and ultimate reality(Kuhn, 2015). Ritchie (2013)contends that cross sectional study design gathers data from the sampled population at a particular time and provides in-depth understanding of the variables under study.

3.3 Study Population

Population refers to an entire group of persons or elements which the targeted study population will take (Valencia-GO, 2015). A targeted population means a group of persons with the characteristics which the researcher wants to study for a particular problem solving (Adler & Clark, 2014). The study targeted population 3017 people in Lwengo district who are living around the areas where deep underground water sources are located. A sample size of 1458 respondents will be drawn from the targeted populated(Glennerster & Takavarasha, 2013)as guide of Krejcie and Morgan's table. With the reflection of (Cohen, Manion, & Morrison, 2013)the worldview it is perceived by the researcher that these living around the underground water facilities in case study were knowledgeable and hard experience on variables under investigation(Cohen, Manion, & Morrison, 2013)

Table 1: Below shows the population of Lwengo District, targeted study population and sample size bySub County.

Sub- County	Population		District Total Population(N)	Targeted Population (N)	Sample Size (S)
	Male	Female			
Kyazanga Town Council	3,829	7,109	10,938	373	186
Lwengo Town Council	4,059	5,231	9,290	368	186
Kisekka S/C	22,037	22,818	44,855	380	181
Kkingo S/C	17,878	17,500	35,378	379	181
Lwengo S/C	18,585	28,172	46,757	380	181
Ndagwe S/c	15,802	17,091	32,893	379	181
Malongo S/C	12,721	17,516	30,237	379	181
Kyazanga S/C	10,869	21,410	32,279	379	181
Total population			242,627	3,017	1,458

(Source: This data is extracted from the CIS statistics, 2014)

3.4 Sampling Size

Sampling is the procedure a researcher uses to gather information from targeted people in the study. A sample is the actual accessible population from the targeted population(Hands, 2014) therefore sample size of the study will be 1458 people of different categories selected from the targeted accessible population with the guidance of Krejcie & Morgan's table (1970). (Jolicoeur, 2012) affirms that, sample is a part of the population which is studied in order to get inferences about the whole population. It is a representative of the population only if it has similar or basic characteristics of the population from which it has been drawn. The sample will include, (6) senior engineers officers, (18)

head of department and (150) local government and water management committee leaders at all levels and other water Users (1,284) respondents from Sub-counties and town councils respectively this will be determined using statistical tables of Morgan as cited by (Alighieri, 2015).

3.5. Sampling Techniques and Procedure

Sampling technique is the process of selecting a number of individual representatives from the targeted population of study (Gravetter & Forzano, 2015). The key informants and participants will be sampled basing their roles, proximity and experience of governance system and sustainability of underground water sources (Awulachew, 2012). The choice of the sampling elements depends exclusively on the discretion of the researcher and its usefulness in the study. Purposive sampling will be used to choose (6) senior engineers water directorate department and (18) Heads of departments at Sub-County who will be interviewed to provide the in-depth of variables under investigation. (Creswell, 2013) further elaborates that, interviews provide qualitative data which initiates with assumptions, a world view, the possible use of a theoretical lens and the study of research problems inquiring into the meaning individuals or groups ascribe to a social problem.

The researcher will also use stratified and simple random sampling technique to select 150 respondents' leaders at levels who live close to water facilities and they are expected to be knowledgeable and have a long experience in the governance systems of water sources. The researcher will apply convenience sampling approach in selecting the participants living around the water facilities under study all these various sampling techniques will be used to get sample from the targeted study population (Ritchie et al., 2013).

3.6. Data Collection Methods

The survey method will be used whereby quantitative data will be gathered guided by structured and multiple choice instruments in the study. This survey method will be used because

it is the most common and popular method to collect data in social science research (Galala & Yusof, 2013). It is highly valued due its ability to provide insights that cannot be obtained by using any other means (Smith, 2011)

The study will use interviews, focus group discussions and observation to collect qualitative data because they are widely acceptable instruments in social research and the targeted population can easily respond to them (Denzin & Lincoln, 2011). The interviews and follow-up focus group discussions will be conducted among key informants who will be involved in the study in order to supplement and justify the quantitative data (Patton, 2014) A critical documents review will also be used to collect secondary data which will support the findings for comparison purposes and empirical evidence of the study.

3. 6.1 Questionnaires

Questionnaires will be used because they can easily be administered, they eliminate potential interviewer bias, and respondents are expected to express their views freely with less influence from the researcher. The questionnaires will contain structured and unstructured questions in order to enable collection of quantitative and qualitative data for comparison among different groups of respondents (Bowling, 2014). These questionnaires will comprise of sections that are systematically organized according to objectives of the study.

3.6.2 Interview

Pasian, (2015) The interview guide will be used to help the researcher to gather valid and reliable data from the key informants of the study. It will enable the researcher to obtain data direct from the key informants who are appropriate to research questions and objectives of the study. Ambrosino et al. (2011) elaborate more clearly the roles interview as intertwined,

mutually reinforcing and crucially important in stimulating the key informant to give the in-depth of variables of the study.

These interview guides will employ semi-structured and unstructured questions which will be given to the key informants who hold important and crucial information relevant to the objective of the study(Denscombe, 2014). This instrument will be used with the consideration that interview method of gathering information can be used to suggest assertions and as a means of following up of some interesting and unexpected responses (King & Horrocks, 2010).In this research, interviews will be helpful and it will enable the acquisition of pertinent knowledge which is the focus in this study(Friedman, Keane, & Resick, 2014). This method will allow probing for thorough understanding of core knowledge which is central to meeting the objectives of this study. It will further enable the researcher to observe the expressions and perceptions of the respondents on the relevant variables under study. This approach will generally supplement data obtained by other research methods utilized by the research.

3.6.3The Observation

Observation is a method for systematically watching the behavior and practices of relevant individuals and deep underground water sources in the field in terms of operational and servicing schedule of all categories (DeWalt & DeWalt, 2011). This observation approach will be applied as guided by the study objectives in gathering information where a checklist items to be observed will be developed as Mugenda &Mugenda (1999) affirms that observations give factual information and reality of what is on the ground. Observation enhances accuracy and it enables one get the required data very quickly from a large number of samples easily, it offers the quickest and the least costly way of gathering information This enables an analysis of water users committee effects on target water facility and experience on servicing, maintenance and functionality of the facilities at all level in rural community (Mugumya,2013)

This method will also be helpful in the analysis of the resources required for servicing and maintenance that effect to occur on each water source. However, the quality of accuracy cannot be easily verified by the use of a single tool for collecting data from large samples. The realities on the ground in particular can be determined by interviewing water management committee members and water users around the water source, to appropriately get the functionality of individuals and services provided for sustainability. The observation will be ongoing examinations and complemented with interviews to key informants around unlimited time available.

3.6.4 Focus group Discussion

Follow-up Focus group discussion will be conducted with selected key informants and users of deep water sources from the selected villages where water facilities under study are concentrated in order to gather information relating to influence of governance system and sustainability of water supply systems. The focus group technique is a discussion based approach with about (6-10) multiple research participants to simultaneously produce the required data on a specified issue (Chilisa and Preece, 2015). This will help the researcher to gather data much more quickly and at less cost than would be the case if each individual being interviewed separately. Six focus groups comprised of 15 participants will be organized that is one from each sub-county. Key informants and Ordinary community members from all villages in the six sub-counties will be selected for follow-up focus group discussions. The Focus group discussion approach is preferred in addition to semi-structured interviews because; there is a need to generate variety of responses some of which the individual respondents may over look (Bryman, 2008).

3.6.5 Documentary Review

Sekaran (2015) defines secondary data as data that already exists; this kind of information is refined by other scholars. This method is highly supplementary, aims at supporting arguments from the survey, interviews, focus group discussions and observation methods (Medjedović, 2011). Secondary data will be obtained from the government policy documents, safe water guideline and environment reports, District Local Government budgets, and quarterly reports among other documents. Data will also be obtained from National water studies, government publications and journals, national water management framework, policies and water service sector guidelines. This method is expected to generate more information about the research variables (Calow et al., 2013).

Gibson and Brown (2009 p. 65) contend that, documentary review is a process of using documents as a means of data collection and which allows researchers to gain detailed insights into people's lives, and how they govern water sources in the rural community. The Documents review and analysis will involve identifying and using pre-existing data and information to answer different research concerns planned in data collection (Schutt, 2011, Gibson and Brown 2009). The review and analysis of policy, theories and guidelines will also facilitate a deeper understanding of the relationship between the district and national contexts of rural water supply policy formulation. In order to understand the national guidelines and laws concerning governance systems, financial accountability and sustainability in the rural water sector, the Specific Schedules and Guidelines 2013/2013 will be reviewed along with the Public Finance and Accountability Act, and the Public Procurement and Disposal of public assets Act. All these will give a firm ground to the researcher in the study.

3.7. Data Collection Instruments

The designed instruments for data collection will be approved after the test and pretesting of the instruments (Creswell, 2013)&(Cross-Cultural Survey Guidelines2014). The data collection instruments for this study will be structured questionnaires; this instrument will have themes and sections as guided by the study objectives. Interview guide will have structured questions in line with the study objectives and themes of the study as well the follow-up focused group discussion guide. The checklist will be composed of three core areas concerning governance structures, community participation and regulation for effective management of water facilities.

3.8 Data Quality Control

The researcher will maintain quality control of Data, which will be made through carrying out the accurate research processes and procedures, the researcher present the instruments to the supervisor and other domain experts to verify their accuracy. (McAfee & Brynjolfsson, 2010) The researcher will test validity of the instruments further by piloting them in Rakai and Masaka districts because they have similar challenges and characteristics with Lwengo district in management and sustaining their deep underground water sources.

3.8.1. Validity

Validity refers to the correctness of an instrument in measuring whatever it is intended to measure (Lichtman, 2010). The study will ensure accuracy of the items to the research instruments. This instrument will be checked by domain experts including the supervisors of the researcher and they will be tested to determine the accuracy of the items in the instruments (Kenpro,2012). Content validity ratio will be used to calculate the Content Validity Index, using a formula below.

CVI = $\frac{\text{Total Number of items rated by all judges}}{\text{Total Number of Items in the Instrument}}$

Total Number of Items in the Instrument

A content Validity index of 0.7 and above according to (Kerzner, 2013) qualified the instrument for the study.

3.8.2. Reliability

Reliability is the level of internal consistency or stability of the measuring device over time and when the instrument produces the same results (Saldana, 2012), it implies that, the instrument is reliable and dependable because it can obtain what it is intended to measure (Oso and Onen, 2008). The data collection instruments will be piloted and pre-tested, then modified before the commencement of the study. This will be made to ensure quality control of the test items in the instrument and it should reach reliability coefficient which is accepted as valid and reliable in research (Kurande, Waagepetersen, Toft, & Prasad, 2013)

3.9 Procedure of Data Collection

The researcher will seek for clearance from the University and researcher authority Centre before is set off data collection, the researcher will further seek permission from the district governance authority to help access the employees in place of work and their residences. The instruments of data collection each questionnaire will contain an opening introductory letter requesting for the respondents cooperation in providing the required information for the study. The researcher will also assure respondents and participants' confidentiality of the information.

The ethical approval and considerations will help the researcher to commence the activities of the field work. Study participants will receive full verbal explanations on the aims and objectives of the study. Participants will be particularly informed and voluntary participation will greatly contribute to success of the study findings (Harrison, 2013) However, in order to increase opportunities for full community involvement interview and focused group discussion

will be conducted to make a follow-up of the questionnaires. In addition, requests to use the digital recorder, camera and other machine will be always made to the participants before their actual use. This will enhance their confidence levels to freely share of relevant information in the study, with their views and opinions, particularly regarding government policies, governance dynamics and functional sustainable practices of deep underground water sources.

3.10 Data analysis of the study

Before starting field work, researcher will employ research assistants and train them first to finalize data collection instruments; this will sensitize them of the processes and procedures like seeking for permission, editing filled questionnaires of the previous day in order to uphold ethical values(DoH ,2015) Subsequently, the assistants will be encouraged to exchange individual questionnaires in groups of two or three for further cross-checking to ensure clarity, visibility and completeness of the items in data collection instruments. This will ease data entry into the computer software and processing analysis

A full day questionnaire editing will be given and most significantly for discussion of emerging findings from the survey as well as sharing of experiences and lessons learned during data collection. The discussion will be organized on a weekly basis in addition to the 2 hours daily morning meetings. The meetings are not only ensuring effectiveness and well managed fieldwork process, but also will most importantly generate very interesting signs that enrich the analysis of findings. This research assistant training age and meeting experience not only improve their ability to synthesize some of the preliminary findings from the survey data but will also help to clarify most of the issues encountered in the community using FGDs and in-depth interviews.

3.10.1 Qualitative data

Qualitative data analysis is the organizing of data into thematic constituent parts in order to obtain answers to questions (Ahuja, 2001). Analysis of qualitative data will be employed by translating the narratives into a set of themes paying attention to actual voices as used by interviewees and other key informants (Feig & Stokes, 2011). Each interview findings will be transcribed verbatim, with thematic analysis which will be used to guide the analysis of the interview with the help of theoretical flexibility and sound methodology (Braun and Clarke, 2006). Thematic qualitative data analysis focuses on identifiable themes and patterns of the variables under study (Aronson, 1994). The qualitative data collected will be analyzed using appropriate procedures in order to obtain accuracy and consistency of the information.

3.10.2 Quantitative data

Quantitative data analysis will involve generating descriptive, bivariate and multivariate statistics for study variables and display using frequency distribution tables and charts. The quantitative data will analyse using excel software and Statistical Package for Social Scientists to generate statistical data that used in generating table frequencies and percentages. Some of these in turn were used to construct Pie Charts and Graphs which were applied to drawing conclusions. These will be reinforced by the researchers own observations and focus group discussion. Deductive, prescriptive and descriptive analyses which, will mainly be applied to desk research and corroborating data gathered through consultative group discussions and water facility providers interviews. Bivariate analysis will be used to determine relationships between variables of interest and include generating cross-tabulations for demographic characteristics and livelihood by access to safe water, knowledge of governance system and functionality of underground water source in the community and safe water user committees' perceptions. The chi-square test statistic will also be used to test the strength of the relationship between the

dependent variable and independent variables. Multivariate analysis will include computing logistic regression models in order to predict the significance of the study.

3.11 Measurement of Variables

The questionnaires specifically for respondents will be measured on a five interval Likert Scale, the level of agreement will be ranked as strongly agree, agree or disagree compared to just strongly disagree (Achilleas,2012) Ordinal Scale as measurement of variables will not only categorize the elements being measured but also rank them into some order (Lodico, Spaulding, & Voegtle, 2010). For the case of nominal measurement of variables, numbers will be assigned only for the purposes of identification but will not allow for comparison of the variables to be measured.

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APPENDICES

GUIDE A: QUALITATIVE DATA INSTRUMENT

FOCUSED GROUP DISCUSSION GUIDE (FGDS) WITH WATER USERS (ORDINARY CITIZENS WATER USERS)

I'm Mark Kiiza a Doctoral student of Mbarara University of Science and Technology pursuing studies leading to the award of Doctor of Philosophy in Development Studies. I'm conducting a research entitled 'Governance Systems and sustainability of rural deep Underground water sources in, Lwengo District.' I request you to volunteer and give sincere information that will guide me write my dissertation. The information given is purely for academic reasons and will be treated with the confidentiality required. Thank you in advance.

SECTION A: 1

Demographic Characteristics of Respondents

- i. Name of the Sub-County
- ii. Name of the Parish
- iii. Village/LC 1
- iv. Gender of (Ordinary Member)

A: 1 Details on the water source

- i. Types of safe water sources in the community.
- ii. When they were constructed?
- iii. Name institution or Organization that constructed the water source
- v. What is the present status of the water facility, functional or not functional
- vi. Name others alternative sources of water existing in the community

A: 2 Knowledge of deep underground water source and safe water

- i. What is the importance of safe water to human life?
- ii. How do the deep underground water sources influence access of safe water to people's needs in your community?(**Probe** the other needs and ask the community indicators)

- iii. What percentages of rural community households' have access to safe water?
- iv. Explain how safe water contributes to social and economic well-being of people in your area.
- v. Which persons are most affected when there is scarcity of safe water in your area?
- vi. What should be done to increase the accessibility to safe water sources in your area?

A: 3 Governance and community participation in safe water provision

- i. What do you know in regard to government policies or guidelines governing the provision of safe water to rural communities?
- ii. Specify the roles and responsibilities of your sub-county in provision and maintenance of rural deep underground water sources?
- iii. Give other Actors who part in the provision and maintenance of deep water sources in your community?
- iv. What are roles and responsibilities of the community when it comes to rural deep water sources service delivery? (Probe whether water users know their roles as stipulated in National Policy Framework i.e. Participation in: Planning and decision making?)
- v. How are rules and regulations for proper governance and use of water sources in your community formulated?
- vi. What is your contribution in governance system to ensure that there is safe water in your community?
- vii. How do you contribute to actual Operation & Maintenance of deep underground water sources?
- viii. What is the influence of community participation in the governance of deep underground water sources?
- ix. Give challenges encountered by the water Users management in the attempt to enforce the rules and safe water sector guidelines?
- x. Suggest how to improve on governance systems and maintenance of the available deep water sources in your community?

A: 4 Community ability for Operation and Maintenance deep Water Sources

- i. What community governance structures are responsible for managing deep underground water sources in your community?

- ii. What have you done to ensure that existing deep underground water sources remain in good operating conditions? (e.g. have they ensured that they have a fairly skilled/trained pump mechanic)
- iii. How are the water users committees responsible to enforce good governance usage/operation and maintenance of your water sources? (**Probe** what they are and use)
- iv. What challenges do the water users committees face in ensuring that the deep water sources are well maintained in your community? (**probe**: collection of user's fees and accountability for funds collected).
- v. What factors determine community ability and willingness to contribute to maintenance of deep water source?
- vi. What forms of contributions are preferred by the community: Cash or in-kind? **Probe** for other mechanisms of contribution preferred by the community and why etc.)
- vii. With regard to deep water source services in your community, how have you been involved in the actual processes of decision making?
- viii. How has your involvement impacted on the governance and sustainability of the water source?
- ix. How can you improve on governance practices of deep water sources in your community?

**GUIDE B:
QUANTITATIVE DATA INSTRUMENT GUIDES**

STRUCTURED QUESTIONNAIRE (ORDINARY WATER USERS)

I'm Mark Kiiza a Doctoral student of Mbarara University of Science and Technology pursuing studies leading to the award of Doctor of Philosophy in Development Studies. I'm conducting a research entitled 'Governance Systems and sustainability of rural deep Underground water sources in, Lwengo District.' I request you to volunteer and give sincere information that will guide me write my dissertation. The information given is purely for academic reasons and will be treated with the confidentiality required. Thank you in advance.

B: 1 Demographic Characteristic of Respondents

(Tick or circle the correct alternative)

1. Gender of the respondent a) Male b) Female
2. What is your age category?
a) Below 20 years b) 20-29 years c) 30-39 years d) 40 – 49 years
e) 50+ years.
3. What is your highest level of education? (Please tick below any of the following).
a) No formal Education b) Primary c) Secondary d) Diploma e) Degree
f) Any other qualification _____
4. How long have you lived within this area of safe water sources?
a) Less than 1 year b) 1 – 3 years c) 4 – 6 years d) Over 7 years
5. Marital status: a) Married b) Single c) Widow d) Widower
6. What is your occupation? a) LC official b) Civil servant c) Self employed
d) Trader e) Farmer
f) Any other (specify _____)

B: 2 Governance systems and sustainability of deep underground water sources

Please kindly tick the appropriate number from the choices below.

I strongly disagree	I disagree	Slightly Agree	I agree	I strongly agree			
1	2	3	4	5			
i) Governance structures and sustainability of deep underground water sources							
			<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
1	Our Sub County authority always involves us in governance structure of deep underground water sources						
2	Our Sub county authority invites us to participate in planning meetings for underground water source in our area.						
3	All beneficiaries are aware of the rules and regulations regarding the management of our water sources						
4	We consistently facilitate the maintenance of our deep underground water sources						
5	We are updated on status and functionality of our water sources						
ii.) Community Participation							
			<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
6	We collectively participate in the planning for well-being of our water sources.						
7	Our water management authority regularly involves us in the cleaning exercise around our water sources						
8	We regularly hold open discussion with our water managers about the status of our deep water source.						
9	We regularly humbly contribute towards the sustainability of our water sources						
10	Our water managers always hold consultative meetings with us on the view to improve safe water service delivery						
11	We participate in the monitoring and security issues related to the water sources						
iii)The Functionality of Water management committees							
			<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>

12	Our water management committee convenes meetings with us regularly to discuss ways for effective safe water service delivery of rural deep water sources					
13	Community leaders do involve us to decide on issues related initiating action for sustainability of the water sources					
14	Decisions related to the water sources are made by water management committees					
15	Local community members are best placed to make decisions related to the water sources					
16	To what extent are involved in the decision-making process regarding development of deep water project being implemented in this village					
iv) Community participation and willingness to initiating Action						
		<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
17	We always mobilize both physical and financial resources for the sustainability of deep water sources					
18	There is an income generating project out of the users fees paid.					
19	There is transparency and accountability of the users fee paid					
20	We are involved in establishing bye laws for governance system of deep underground water source					

B: 3 Sustainability of Rural Deep Underground Water Sources

Please kindly tick the appropriate number from the choices below.

I strongly disagree	I disagree	Slightly Agree	I agree	I strongly agree		
1	2	3	4	5		
i) Functional Water Technical (User) Committees						
		<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
1	Our water user committee organizes regular meetings to inform and deliberate on issues of sustainability of our water source.					
2	Our water user committee maintain and keep records for our water					

	source					
3	Our water user committee has a system to access the records on the maintenance and sustainability of the water source					
4	Our water user committee motivates the technical team regularly					
5	Our water user committee enforces byelaws regarding the water source use					
6	Am satisfied with the job performed by water user committee					
7	The Sub county authorities Officially launch completed water sources and handover to our users committee and the community large					
ii) Functionality of water source operation and maintenance						
		<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
8	Our water user committee does regular inspection and servicing of the water source					
9	Our water user committee conducts minor repairs and maintenance					
10	Our water user committee consult technical personnel to replaces broken and worn out parts					
11	We are involved in regular monitoring the operation and functionality of the safe water source					
12	We regular carryout sanitation practices and maintenance around the water source					
13	We are involved monitoring and provide security around our water source.					
14	Our Sub county authority initiates actions on the operation and maintenance of deep underground water facilities.					

GUIDE C:

KEY INFORMANT INTERVIEW GUIDE FOR SUB-COUNTY/LC III OFFICIALS

Dear Participant, I'm Mark Kiiza a Doctoral student of Mbarara University of Science and Technology pursuing studies leading to the award of Doctor of Philosophy in Development Studies. I'm conducting a research entitled 'Governance Systems and sustainability of rural deep Underground water sources in, Lwengo District.' I request you to volunteer and give sincere information that will guide me write my dissertation. The information given is purely for academic reasons and will be treated with the confidentiality required. Thank you in advance.

C1. Demographic Characteristics of Respondents

- i. Name of the Sub-County
- ii. Name of the Parish
- iii. Village/LC 1
- iv. Level of education
- v. Time of service in leadership
- vi. Participants and their designation (Ordinary Member/Leader)

C2. Safe Water Accessibility from deep underground water sources in Lwengo District

- i. What is the current estimated sub-county safe water coverage?
 - a. What kind of tools is used for collecting data on safe water in this sub-county?
 - b. What methods do you use to collect the data of safe water access in your area?
- ii. When ranking the major problems faced community in this sub-county, where would safe and clean water fall?
- iii. Which Parishes and Villages are at list well covered in regard to accessibility of safe water?
- iv. Which ones parishes and village have the poorest coverage in accessing safe water and why?
- v. How best can you help these people safe water sources in the sub-county?
- vi. What types of water sources mainly exist in the sub-county and why?
- Vii. How is the governance structure of these water sources in your community?

Viii. How are functionality levels of these structures and water source in your area?

ix .Which measures are taken to ensure highest functionality levels and why?

X .How is the functionality of water users' management committees in your community?

Xi. How useful are these Water Users management committee in your area?

Xii. What major changes are realized in terms of access to clean and safe water in the sub-county with help of water users' management committee in the last 5 years?

C3. Use of Policies and guidelines for water sector service delivery

- i. How does a community get to be served with deep underground water sources in this sub-county?
- ii. What guidelines and policies exist for the provision of water services in the sub-county?
- iii. How can you tell that the guidelines and policies for water sector provision are well known or not known to the community?
- iv. What kind of rules and regulations are put in place to promote quality service delivery of deep underground water sources in your area?
- v. What is the status quo of rural deep underground water sources in your community at present?
- vi. Are the safe water guidelines and policies strictly followed in the allocation of water sources in the Sub-County? Explain.
- vii. How does the Sub-County participate in the formulation of these guidelines and policies?
- viii. In what ways does the sub-county leadership involve the community in making these policies and water source management framework?
- ix. What can you comment on the existing water guidelines in your area?
- x. What are the strengths of these guidelines and policies in the provision of safe water services in this sub-county?
- xi. What are the shortcomings of these safe water guidelines and policies in the provision of water services in this sub-county?

C4. Water Users management committee and Community participation in safe water Provisioning

- i. To what extent do the regulations, safe water guidelines and policies promote quality service delivery?
- ii. Explain the challenges faced by the leaders and Water Users Management Committee service delivery in the sub-county?
- iii. What are the major factors that affect rural people's accessibility to safe water in this sub-county?
- iv. Does the Community support your water Users Committee in maintenance System for the existing safe water sources in your community?
- v. What could be the best options to forester operation and Maintenance of deep underground water supply facilities?
- vi. What are the main challenges of using hand pump (Manual technology) in communities in this sub-county?
- vii. What approach do you suggest we could use to solve the identified challenges and enhance sustainability water sources in this sub-county?
- viii. How do you identify that your deep underground water source maintenance systems are functional or not?
- ix. How water source sustainability levels were in the past five years and how are they at present in this sub-county?
- x. To what extent are citizens adhering to the rules and regulations for water users committee in this sub-county?

C5 ACTOR-LEVEL INITIATIVES AND EFFECTIVENESS OF RURAL DEEP WATER SOURCES

- i. To what extent do Water Actors respect for community's decision to participate in their water service provision?
- ii. Do community households choose the choice of technology for the source of water in their area?
- iii. How is the servicing levels and community willingness to pay for their water source?
- iv. How does the Community participate in making decisions for effective governance of their water services?

- v. How are you involved the community in making decisions on your water source maintenance?
- vi. How do poor persons in your community affect functionality water source service delivery?
- vii. How does the level of water users' poverty affect local government and other actors to deliver safe water services?
- viii. What activities is your sub-county leadership often engaged in regard to build the capacity of water users/communities in the provision of safe water?
- ix. How often are the sensitization and training activities undertaken for safe water services?
- x. How is the relationship between the sub-county and the private sector in your community?
- xi. To what extent do policies and safe water guidelines are regulate the activities of the private sector goals in provision of safe water?
- xii. Suggest what could be embraced in your sub-county in order to improve on governance practices and sustainability of water sources?

GUIDE D:

KEY INFORMANT INTERVIEW GUIDE FOR SUB-COUNTY CHIEFS/ CHAIR PERSON LOCAL COUNCIL 1

Dear Participant, I'm Mark Kiiza a Doctoral student of Mbarara University of Science and Technology pursuing studies leading to the award of Doctor of Philosophy in Development Studies. I'm conducting a research entitled 'Governance Systems and sustainability of rural deep Underground water sources in, Lwengo District.' I request you to volunteer and give sincere information that will guide me write my dissertation. The information given is purely for academic reasons and will be treated with the confidentiality required. Thank you in advance.

D1. Identification

- i. Name of the Sub-County
- ii. Name of the Parish
- iii. Village/LC 1
- iv. Gender
- v. Level of education
- vi. Time of service in leadership

D2. Accessibility to Deep Water sources in the community

- i. What is the current sub-county's safe water coverage? **Probe** how did you arrive at stated figure?
- ii. What are major problems faced in this area as far as deep underground water sources is concerned?
- iii. What percentages of households' are well covered with safe water sources?
- iv. What percentage of the households are poorly coverage and why?
- v. How do you rate the governance system of these deep underground water sources in your area?
- vi. How is the monitoring and maintenance system of these water sources which exist in your area?
- vii. How do you rate functionality levels of the different water sources within your area?
- viii. Of those identified above which ones have the highest functionality levels and why?

- ix. What are the major challenges that have affected access to safe water in your area in the last 5 years?
- x. What strategies have been put in place to address the identified challenges?
- xi. When there is a breakdown of the deep water source in your area what do you do and how do you get the water facility repaired?
- xii. In your opinion what should be done to improve on the operations and maintenance of available water sources in the area?

D3. Knowledge and utilization of rules and guidelines for water service delivery

- i. How does the community access to safe water sources in this village?
- ii. What guidelines and rules have been put in place for the provision of safe water?
- iii. How can you tell that the guidelines and policies for safe water provision are well known to the community and what is the status quo at present?
- iv. Are the guidelines and policies strictly followed in the maintenance and sustainability of deep underground water sources in the sub-county? Explain.
- v. What are the impact of these guidelines and policies in the provision of deep water services in this sub-county?
- viii. What are some of challenges of these guidelines and policies in the provision of deep underground water services in this area?
- ix. To what extent do these guidelines and policies influence the governance and sustainability of water sources?
- x. Suggest how best we can improve on the guideline and policies on governance and sustainability of the existing deep underground water sources.

GUIDE E

INTERVIEW GUIDE FOR DISTRICT LEVEL TECHNICAL ACTORS (DIRECTORATE OF WATER DEVELOPMENT)

I'm Mark Kiiza a Doctoral student of Mbarara University of Science and Technology pursuing Studies leading to the award of Doctor of Philosophy in Development Studies. I'm conducting a research entitled 'Governance Systems and sustainability of rural deep Underground water sources in, Lwengo District.' I request you to volunteer and give sincere information that will guide me write my dissertation. The information given is purely for academic reasons and will be treated with the confidentiality required. Thank you in advance.

E1. Identification

- i Name of the Sub-County
- ii Name of the Parish
- iii. Gender of the participant
- iv. Level of education
- v. Time served in current position

E2. Community involvement in governance and Maintenance for rural deep underground Water sources

- i. How is the governance System for constructed deep water sources in your area of operation?
- ii. How is the community participation in regard to governance as one of the best options for Operation and Maintenance of communal water supply facilities?
- iii. What processes did government go in order to realize ownership and sustainability of the established water sources in Lwengo District?
- iv. How major actors are and what specific mandates do they do for ensuring that water service delivery approach is effectively followed in your district.

- v. How actors do played their policy mandates towards effectiveness and functionality of existing deep water sources?
- vi. How does government ensure that the activities non-government actors do not compromise goals of government by ensuring the rural communities access clean water

E3. Outcomes of Promoting Community participation

- i. How does poor participation of the community affect actors in water service delivery?
- ii. How does it affect central and local governments, the private sector and NGO actors to deliver safe water services?
- iii. To what extent is equitable distribution of safe water services promoted rural communities development?
- iv. How does the increase in funding relate with effectiveness of rural safe water services?
- v. There seems to be contradictions with regard to access to safe water being a fundamental human right in your district. Comment.
- vi. How can is this seemingly contradicting arrangement being mitigated by water sectors actors?
- vii. What visible indicators can you point that provision of safe and clean water to rural community?
- viii. What should be done in your view to improve on governance and sustainability of the constructed deep water facilities in community?

E4. Enhancing resourceful approaches (beyond the present guidelines)

- i. How has community participation so far influenced rural deep water sources sustainability levels in Lwengo district?
- ii. What has specifically gone wrong in areas where Water Users Management committees of deep water sources have failed to deliver to the expectations?
- iii. What should be done to ensure rural community has safe water services?
- iv. As an authority how can you enhance good sustainability levels the existing water sources in your area?
- v. What has gone well in areas where deep underground water sources have delivered significantly to community expectation levels?
- vi. What in your view needs to change in order to maximize benefits from water sector policy implementation?

- vii. How is community empowering useful or harmful to rural community water users?
- viii. What principles do you feel need to be revisited in order to enhance good governance practice and sustainability of water source in rural areas?
- ix. Suggest how can leaders enhance effectiveness governance and sustainability of deep underground water sources?

GUIDE F:

INTERVIEW GUIDE FOR DISTRICT DIRECTORATE OF WATER DEVELOPMENT SENIOR ENGINEER OFFICIALS

Dear Informant, I'm Mark Kiiza a Doctoral student of Mbarara University of Science and Technology pursuing a Studies leading to the award of Doctor of Philosophy in Development Studies. I'm conducting a research entitled 'Governance Systems and sustainability of rural deep underground water sources in, Lwengo District.' I request you to volunteer and give sincere information that will guide me write my dissertation. The information given is purely for academic reasons and will be treated with the confidentiality required. Thank you in advance.

F1. Identification

- i. Designation of the informant
- ii. Gender
- iii Level of education
- iv. Time spent working with District Directorate Water Development

F2. Introductory question

- i. What achievements have are you proud of during your regime of working DDWD?
- ii. As an authority in water sector what challenges have you enter faced with particularly in sustainability of constructed deep underground water sources? (**Probe further**)
- iii. What are the major factors that affect effective governance and sustainability of deep underground water sources?

F3. Governance systems through resourceful approaches

- i. How has the existing water governance structure so far influenced the sustainability levels deep underground water sources?

- ii. What has specifically gone wrong in areas where governance system has failed to deliver the needed services for sustainability levels?
- iii. What has work well in areas of operation where these existing governance systems have delivered significant sustainability level?
- iv. What in your opinion needs to change in order to maximize benefits of governance system in your community?
- v. To what extent do the existing governance system and policy implementation impact on sustainability of underground water sources?
- v. Suggest how should local government empower the community for good governance systems for better service delivery of deep underground water sources?
- vi. What approach do you feel need to be revisited in order to enhance good governance systems and sustainability for the existing deep underground water in rural areas?
- vii. In your observation recommend who should be the best player to enhance effectiveness in governance and sustainability of deed underground water source?

F4. Community Based Maintenance Systems for sustainability for Safe Water sources

- i. How is Community involved in Maintenance System for constructed deep underground safe water sources is carried out in your area? **(Probe for further explanation)**
- ii. What processes did government go through to change ensure sustainability of water sources?
- iii. Under Community Management System for rural deep water services, do all major actors have specific mandates for ensuring that this governance service delivery and effectively follow-up for sustainability rural safe water service delivery?
- iv. How have the following actors played their policy makers mandates towards effective and functionality deep underground water sources in your areas?
- v. How often does water user community involve the local community water users in decision making for appropriate governance system?
- vi. To what extent does the safe water sector framework and water users bylaws influence sustainability of underground water sources.
- vii. Where do the local community water users report to in case of underground water hand pump breakdown in your community?
- viii. Suggest the possible ways how we can improve on governance system and sustainability of underground water sources in your community.

GUIDE G:

FOCUS GROUP DISCUSSION GUIDE (FGDS) FOR WATER USERS AND LOCAL COUNCIL I LEADERS)

G1. Identification

- i Name of the Sub-County
- ii Name of the Parish
- iii. Gender of the participant
- iv. Level of education
- v. Time served in current position

G2: Governance systems and sustainability of deep underground water sources

- i Types of safe water sources are in your community?
- ii When were they constructed and the institution that constructed them?
- iii. How is the maintenance and present functionality level of the underground water sources?
- iv. How is the management structure of water sources in your community?
- v. How often is the servicing the water facility and how when? Explain
- vi. What happens in case of water facility breakdown?
- vii How long does it take to repair the broken water facility ?
- viii. Who meets the costs for repairs and maintenance of these deep water sources?

G3. Governance system and accountability for deep underground water sources.

- i. How do you contribute to the governance of deep underground water sources in your communities? (Please explain how and why?)
- ii. In which ways do you think you can best contribute governance to ensure that rural people access safe water services to your community?
- iii. How do you normally get to know sub-county and district plans in regard to rural safe water? (Probe: announcements, on radio, or media reports)
- iv. What roles and responsibilities do you as citizens ensure that service provider's especially local governments make known to you (deep underground water source) they ought to deliver in your localities?

- v. How do you go through about repairs and maintenance of your deep underground water source whenever it breaks down?
- vi. Who is held accountable to ensure that effective operation and functionality of deep underground water source?
- vii. How are you involved in decision making for good governance of your water source?
- viii. How often are you consulted any initiative in regards to improve on your water source service delivery?
- ix. Suggest what should be done to ensure effective governance practices and sustainability of the available water sources in your community.

G4. The roles of different community actors and their influence safe water sources

- i. What do you know with regard to water sector policies, guidelines or conditions governing the provision of safe water to rural communities?
- ii. What are specific roles and responsibilities played by the central government in governance and maintenance of rural deep underground water sources?
- iii. Who else plays apart from Central and Local governments in the maintenance of deep underground water sources in your community?
- iv. What are the responsibilities of the community when it comes to sustainability of rural deep underground water source service delivery? (**Probe** whether water users know their roles/ i.e. Participation in: Planning and decision making.
- v. What difference would it make if water actor came and put in place a deep underground water source for you to use without in anyway asking you to participate?
- vi. How helpful have been the water users committee in governance of deep water sources to ensure they are good operating conditions?
- vii. How are your involve in make rules and regulations for effective usage of the existing water sources in the community?
- viii. Suggest what should be done to enhance good governance systems and sustainability in existing water sources in your community.

G 5. Community Capacity building and its influence to water sources

- i. What institutions structures are responsible for sensitizing the public in proper governance of deep water sources in your community?
- ii. What strategies are place to ensure that existing water sources remain in good operating conditions? (**Probe** E.g. have a fairly skilled/trained pump mechanic)

- iii. How useful is empowering citizen in the governance practices of deep water sources in your community?
- iv. What challenges do Water Users Committee in enforcing by-laws for usage/operation and maintenance of your deep underground water sources?
- v. What are the key solutions for faced challenges by the water users committees in ensuring that the water sources are well maintained? (**probe:** community cooperation and conflict interferences)
- vi What factors that determine community ability to willingness contribute to the cost of minor and major repairs at a constructed deep underground water source.
- Vii What strategies can you recommend to use in order to promote functionality of existing safe water sources in your community?
- viii. What initiatives are in place to ensure the community is empowered with relevant skills for maintenance and sustainability of their deep underground water sources?

GUIDE H.

QUESTIONNAIRE FOR HOUSEHOLD HEADS IN, LWENGO DISTRICT

H 1: HOUSEHOLD IDENTIFICATION

1. Respondents' households Number 1 2 3 4 5 6 7 8 9

2. Household Number

3. Name of the Sub-County?

1. Kkingo Sub-County 2. Lwengo Town Council 3. Kyanzanga Town Council

4. Ndagwe Sub-County 5. Malongo Sub-County 6. Kisseka Sub-County

7. Lwengo Sub-County 8. Kyazanga Sub-County

H 2 : RESPONDENTS CHARACTERISTICS

1. Sex of the respondent.

1. Male 2. Female

2. What is your status in the household?

1. Male head of a household 2. Female head in a male headed household

3. Female head of a household 4. Male head of child/orphan headed household

5. Male in a female-headed household 6. Other (specify)

3. What is your level of formal education?

1. None 2. Primary 3. O level

4. A level 5. Diploma Holder 6. Degree Holder

7. Masters 6. Others (specify)

4. What is your main occupation?

1. Crop farmer/Peasant 2. House wife 3. Student 4. Salaried Worker

5. Business persons 6. Other (specify)

H3: HOUSEHOLD LIVELIHOODS & WELL BEING IN LWENGO DISTRICT

1. What is your household's major source of income?

1. Remittances 2. Sale of labour 3. Business
4. Salary 5. Mixed Farming 6. Other (please specify)

2. What is your estimated monthly household income?

1. Less than 10,000 UGX 2. 10,000-50,000 UGX 3. 50,000-100,000 UGX
4. 100,000-200,000 UGX 5. 200,000-300,000 UGX 6. Above 300,000 UGX

3. What forms of expenditure related to your household water needs has your household incurred in the last one year?

1. None 2. Monthly contribution to operation and maintenance
3. Contribution towards repair of pumps when they breakdowns
4. Paying water users fees
5. Purchase of water storage equipment e.g. buckets, pots, jerry cans etc
6. Others (please specify)

4. May you please estimate how much money your household spends on water in a month?

1. No expenditure at all 2. Doesn't know/ cannot tell how much is spent
3. 500 UGX or less 4. 500- 1,000UGX 5. 2,000- 5,000 UGX 6. Above 10,000 UGX

5. Have you ever made a contribution towards any community water source service initiative?

1. Yes 2. No 3. Doesn't know /can't remember
6. If yes, what kind of contribution did you make?
1. Financial 2. Labour 3. Ideas /meetings 4. Land 5. Local Materials

6. Other (please specify)

7. What type of rural underground water sources activity was your contribution?

1. Water and sanitation improvement 2. School development project

3. Health promotion 4. Security and safety of life 5. Servicing water facility

6. Other (specify)

H 4: KNOWLEDGE OF SAFE WATER TO THE COMMUNITY

(1) How can you ensure that water is safe for drinking in your household/ community?

1. Boiling 2. Use of water guard / similar chemical

3. Keep it in well cleaned containers 4. Wash hands before handling water

5. Regularly clean water containers 6. Other (specify)

(2) What kind of diseases do you know that are caused by taking water which is not safe?

1. Don't know 2. Diarrhoea 3. Stomachaches 4. Worms 5. Cough/Flu

6. Others (please specify)

(3) How many members of your family ever suffered from water-related diseases such as diarrhoea, stomachaches, worms or malaria?

1. one 2. Two 3. Four 4 six 5 None 6. If more that (specify)

(4) How did the water-related diseases affect your family /house hold?

1. Increased household expenditure 2. Reduced family labour

3. Reduced / interrupted school attendance 4. We lost the member

5. Increased burden on healthy family members 6. Other (specify)

(5) How much has your household spent on treating the members affected above diseases associated with un-safe water in the last one year?

1. Nothing 2. Less than 1,000 UGX 3. 1,000- 5,000 UGX 4. 5,000-10,000UGX

5. Above 30,000 UGX 6. Other (specify)

(7). What kind of benefits does your household gain from using clean and safe water?

1. Improved health/Reduction in diseases 2. Increased water consumption 3. Saving lives
4. Saving h/hold income 5. Don't know 6. Other (specify)

H 5: ACCESS TO CLEAN AND SAFE WATER SOURCES

(1)What is the main water source do you fetch drinking water for your household?

1. Borehole /deep 2. Shallow well 3. Protected spring 4. Rain water
5. Bottled water 6 Other (specify)

(2) Why is the above mentioned the most common source for your drinking water?

1. Close/ near to the h/hold 2. Permanent and reliable source of water
3. Has good quality of water 4. Meets/provides all the water needs at home
5. No treatment required before drinking. 6 . Other (specify)

(3) Who constructed the existing deep underground water source in your community?

1. Central Government 2. District local government/Sub –County
3. NGO name..... 4.Community efforts 5. Don't know
6. Other (specify)

(4) What major problems do you find in using/technology of water your source?

1. None 2. Too far from the household 3. Road/path is bad
4. Risky for children especially girls 5. Congestion of users /queues
6. Others (specify)

(5). How is the governance system and sustainability of your deep underground water source?

1. Very expensive 2. Difficult source of water

- 3. We cannot meet costs needed for servicing of water
- 4. Spares of water facility are not readily available
- 5. Unlimited knowledge of the technology. 6. Other (specify)

(6). Does your household get water from water vendors or have any other alternative source of water?

- 1. Not at all 2. Yes, sometimes, in wet and dry seasons 3. Yes, only in the dry season
- 4. Yes, always 5. Others (specify)

(7). What problems do you face with your deep underground water source technology?

- 1. No problem at all 2. Tiresome, needs a lot of physical energy 3. It is costly
- 4. Bad road to and from source 5. Limited amount of water at a time
- 6. Other (please specify)

(6) What qualities would you like to see in governance of the water source in your village/community?

- 1. Clean water safe for drinking 2. Does not breakdown so often 3. Cheap to maintain
- 4. No long queues 5. Improved water source e.g. shallow well/bore hole
- 6. Other (please specify)

H 6: KNOWLEDGE OF HAND PUMP FUNCTIONALITY IN THE COMMUNITY

(1) How are you sensitized on hand pumps failure in your community?

- 1. They have never failed 2. Nearly every month 3. About twice or more in a year
- 4. Once a year 5. Once in two years 6. Others (specify)

(2) Which reasons best explain the breakdown or failure of your water source (1) above?

- 1. Over-use of the pumps 2. Misuse of the pumps
- 3. Laziness/lack of responsibility of caretakers & users 4. Poor repair works

5. Proper maintenance 6. Others (specify)

(3). Which periods of the year are the hand pumps not working and why do you think this is so?

1. January, July & August because of dry season
2. All the times pumps fail due to overuse
3. Months/ periods with heavy rains
4. When children return from school due to long queues at the pump
5. Other (specify)

(4). Who is usually responsible for repairs of your hand pumps when they break down?

1. Hand pump mechanic
2. Hand pump caretaker
3. Anyone in the community/from outside
4. Water User Committee
5. Sub-County Leaders
6. Other (specify)

(5). Have you ever observed the hand pump being serviced while it was still working?

1. Yes
2. No

(6). What are the particular problems that water users dislike the most about hand pumps in your community?

1. We were not consulted before the pumps were installed
2. The pumps are difficult to operate
3. The pumps do not pump enough water
4. There are often long queues at the pump
5. The pumped water tastes bad
6. The pumped water makes us

(7) If a hand pump breaks down, where is it reported to in your community?

1. (To whom is it reported)
2. No one
3. Don't know/Not sure

(8) In case you are the first person to observe the condition of your water facility, to whom would you immediately report if hand pump has broken down?

1. The water committee members
2. Pump mechanic in the village
3. Village council /LCI
4. Parish Chief
5. Sub-county authorities
6. Other (specify)

H 7: GOVERNANCE LEVEL DEEP UNDERGROUND WATER SOURCE

(1) Which household water users are regarded most important in relation to governance and sustainability of the water source?

1. Father
2. Mother
3. Children
4. Not sure

(2) How satisfied are you with the way your underground water source is managed in your community?

1. Never satisfied
2. Always satisfied
3. Somehow satisfied
4. Not sure

(3) Are you not satisfied with governance structure, why are you not satisfied with the way deep water source is used in your community?

1. There is a lot of water wastage
2. Gender is not observed
3. Male members are given priority by users committee
4. The is burden water source maintenance
5. No deliberate water source sustainability plan
6. Other (please specify)

(4) If you are member of your water users committee how can you improve to operation and maintenance of your water facility?

1. We have never been denied access
2. Bought water from vendors
3. Used unprotected water sources
4. Collected from source in next village
5. Started harvesting rain water
6. Other (specify)

(5) . Who in your household or community is responsible for providing safe water when there is breakdown of water source?

1. Adult female
2. Adult males
3. Community leaders
4. Water users committee
5. Household workers
6. None/nobody is responsible

(6) How often does water users committee ensure there is timely servicing of the water source you use in your community?

1. Never 2. Some times 3. Often 4. Always 5. Not sure/Don't Know

(7) Which members of your household usually disagree/conflict over water collection and use?

1. Adult females & adult males
2. Adult females & male /female children
3. Adult males & male /female children
4. Adult females & household helps
5. Adult males & domestic workers/household helps
6. Other(specify)

(6). What are the consequences of the disagreements and conflicts over water collection in your household or community?

1. Reduced willingness to collect water
2. Disproportionate funds for water source service
3. Household distress
4. Delayed payment of monthly operation and maintenance fees
5. Disruption of daily activities
6. Other (specify)

H 8: WATER USERS' PERCEPTIONS OF SAFE WATER SERVICES AND SYSTEMS

(1) How would you rate the accessibility of underground water service delivery in your community?

1. Good
2. Fairly good
3. Bad
4. Very bad
5. Can't tell

(2). Which reasons best explain your rating of safe water service delivery in your community?

1. Breakdowns take long to be repaired
2. Water user committees are inactive/inexistent
3. Mandatory monthly financial contributions
4. Conflicts in management of the water source (s)
5. Breakdowns are always repaired in time
6. Other (specify)

(3). How would you rate the way deep underground water source sustainability in your community?

1. Very Good
2. Fairly good
3. Bad
4. Very very bad
5. Can't tell

(4) Which reasons best explains your rating of how sustainability water sources in your community?

1. Community is not involved at all
2. Only involve few members of community
3. Community is involved throughout all planning meetings
4. Our views are considered in all decision making
5. Water user meetings not held/not there
6. Other (please specify)

(5). What can be done in your view to improve on the ways safe water services are delivery in your community?

1. Involve community members in service delivery
2. Sensitize water users to make contributions
3. Put up more alternative water sources
4. Undertake repairs of all broken down sources
5. Build capacity of water user committees
6. Other (specify)

(6). What kind of safe water services does the government provide in your community?

1. None
2. Establishing various water sources
3. Regular maintenance and repairs
4. Training and sensitizing water users
5. Monitoring to ensure quality of services
6. Others (specify)

(7) What is your rating in respect to the contribution of government to your community's access to safe water services?

1. Adequate
2. Inadequate
3. Statifstory
4. Can't tell

(8). What would you like to tell government officials at your district regarding safe water services delivery in your community/areas?

- 1- Services are good
4. Need more community involvement
- 2- Services need improvement
5. Support training of water users on their roles
- 3- Services is poor
- 6-Others (specify)

(9). What do community members make their contribution towards safe water service delivery in your community?

1. Contribute to capital cost (e.g. cash, materials or labour)
2. Contribute cash to regular operations and maintenance
3. Attend meetings and contribute ideas
4. Provide meals for contractors/workers during construction
5. Other (specify)

(10). What is your rating of the contributions of your community to water source service delivery?

1. Adequate
2. Inadequate
3. Does not know/can't tell
4. Completely inadequate/they don't care at all
5. Do not have/have never got a safe water source.

(11). Who usually mobilizes the community to make a financial contribution for operation, maintenance or repair of your deep water source?

- 1- Have never been mobilized
- 2- Water user committee
3. Extension staff
- 4- Local officials
5. Local Council
- 1 committee
- 6- Other (please specify)

H 11: KNOWLEDGE OF EXISTENCE & FUNCTIONALITY OF COMMUNITY WATER USERS COMMITTEE

(1). Does your deep underground water source have a water users committee?

1. Yes
2. No
3. Don't know
4. Have no borehole.

(2). If your deep underground water source has a user committee, what are the roles and responsibilities of the committee in your community?

1. Collecting money for Operation & Maintenance
2. Cleaning the source
3. Routine maintenance
4. Water source operation
5. Carry out repairs
6. Reporting breakages
7. Provide security to water facility
8. Other (please specify)

(3) How often do committee enforcing rules and regulations in the composition of your water user committee?

1. Doesn't know/ can't tell
2. Security officer
3. Vice chairperson
4. Secretary
5. Treasurer
6. Other (specify)

(4) What is the current composition of the water user committee for your protected water source by gender?

1. Male
2. Female
3. Can't tell/ doesn't know
3. Secretary
4. Treasurer
5. Information/Public Relations Officer
6. Other (specify)

(5) Looking at your water user committee and how it enforces policies and guidelines of safe water service delivery. Are they conversant with them?

1. Yes
2. Don't Know/Not sure
3. Policies and guidelines knowledge is not applied
3. Other (specify)

(6) How do you rate the effectiveness and performance of your underground water users committee?

1. Very good
2. Good
- 3.
4. Poor
5. Can't tell
6. I cannot tell.

(7) When did your underground water user committee last call for the meeting?

1. The committee has never met
2. Within this month
3. Last month
4. Months ago
5. About a year ago
6. About 2 years ago

(8). How often does the entire community of water users hold meetings to deliberate on water issues?

1. Never met
2. Once a month
3. Several times a month
4. Once a year
5. Twice or more a year
6. Others (specify)

(9) From your own observation in these meetings held, who mainly attends these meetings?

1. Both men and women equally
2. Mainly women attend
3. Mainly men attend

4. Can't tell
5. Don't know

(10) What are the major issues discussed whenever these meetings take place?

1. Accountability for funds
2. Payment of contributions
3. Operation & Maintenance
4. Cleanliness and hygiene
5. Safeguarding the water source
6. Other (specify)

H 12: RELATIONSHIP BETWEEN GOVERNANCE AND SUSTAINABILITY OF DEEP WATER SOURCE IN THE COMMUNITY

(1) What kind of relationship is there between good governance and deep underground water service delivery have you received in the past?

1. Operation of the water source
2. Don't know
3. Forming water user committee
4. Cleaning the water source
5. Setting and enforcement of bye laws
6. Other (please specify)

(2). When was the last time you were sensitized on the servicing and maintenance your water source?

1. Within this month
2. Months ago
3. About a year ago
4. About two years ago
5. Don't know / can't remember
6. Others (specify)

(3). Which institution /organization took lead in sensitization or community capacity building?

1. Sub-county leaders
2. District leaders
3. Water users committee
4. Local council leaders,
5. Others Specify

(4). Give reasons why it is important to involve the community participation in governance of safe water source?

1. Enhance sustainability
2. Improve on Ownership
3. Increase willingness to contribute for operation and maintenance,
4. Forester functionality of the water facilities.
- 5 Other (specify)

GUIDE I:

A CHECKLIST FOR THE GOVERNANCE, FUNCTIONALITY AND SUSTAINABILITY INDICATORS OF WATER FACILITY

1. What is the current composition of the water user committee for your protected water source by Gender? (PLEASE TICK AS APPROPRIATE/MENTIONED)

	Designation	Male	Female	Cannot at all /Doesn't Know
01	Chair person			
02	Vice chairperson			
03	Secretary			
04	Treasurer			
05	Care takers			
06	Advisor			
07	Information relation Officer			
08	Others specify			

2 . Community capacity building for sustainable utilization of safe water in the community
If there was any training who received, who trained or sensitized you in the following areas (PLEASE TICK AS APPROPRIATE/MENTIONED)

	Local Government	Local Politian	NGOs/Civil Society	Do Not Know
01	Forming water user committee			
02	Cleaning the water			
03	Operation of water sources			
04	Undertaking minor repairs			
05	Management of Cash contribution			
06	Bylaws and Policies			
07	Other Specify			

3. When was the last time you were sensitized?

1. within this month
2. Months ago
3. About a year ago
4. About two years ago
5. Don't know / can't remember
6. Others (specify).....

Appendix J:

TABLE FOR DETERMINING SAMPLE SIZE FROM A GIVEN POPULATION

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	246
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	351
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	181	1200	291	6000	361
45	40	180	118	400	196	1300	297	7000	364
50	44	190	123	420	201	1400	302	8000	367
55	48	200	127	440	205	1500	306	9000	368
60	52	210	132	460	210	1600	310	10000	373
65	56	220	136	480	214	1700	313	15000	375
70	59	230	140	500	217	1800	317	20000	377
75	63	240	144	550	225	1900	320	30000	379
80	66	250	148	600	234	2000	322	40000	380
85	70	260	152	650	242	2200	327	50000	381
90	73	270	155	700	248	2400	331	75000	382
95	76	270	159	750	256	2600	335	100000	384

Note: "N" is population size "S" is sample size.

Appendix K:

Research action plan and schedule:

Activity	2014	2015	2016	2017
Concept paper development				
Research proposal writing				
Proposal defense				
Data collection				
Data analysis				
Draft report writing				
Presentation of draft report				
Dissertation defense				
Editing of final copy of report				
Presentation and approval				
Submission of Final dissertation				
Publications				

Appendix L

Budget and activity breakdown

ACTIVITIES	COST (UG. SHS)	US\$	EUR
SECTION: I.			
1. Researching from libraries, internet sources and other sources.	500,000	204	156.3
Formalities of registration	1,000,000	408	312.5
Proposal Submission	1,194,000	791	373.1
University Charges	18,000,000	7,347	5,625
National Council of Higher Reeducation	60,000	24	18.7
Functional fees	3,906,000	1,594	1,220.6
Accommodation and Living costs	4,000,000	1,632	1,250.0
2. Travels and Transport within rural areas of study countries.	6,591,200	2,690	2,059.7
3. Research Assistants allowances and refreshments.	800,000	327	250.0
4. Stationery.	540,000	221	168.8
SUB – TOTAL	38,537,200	15,410.1	12,080.5
SECTION: II.			
5. Lap top Computer	1,500,000	614	468.6
6. Printer	450,000	187	140.6
7. Recording gats	100,000	40	31.3
8. Camera	385,000	157	120.3
9. Memory stick	80,000	32	25.0
10. Analysis and Compilation of data.	500,000	204	156.3
11. Printing first draft.	70,000	28	21.9
12. Binding cost	40,000	16	12.5

13. First editing by supervisors.	500,000	204	156.3
14. Travels to meet the Research Supervisors.	800,000	327	250.0
15. Printing fair copy	70,000	28	21.9
16. Binding cost	40,000	16	12.5
17. External Backup Gages.	50,000	20	15.6
SUB – TOTAL	3,885,000	1,592.2	1,221.7
SECTION: III.			
12. Printing of final copy	50,000	20	15.6
13. Scanning of pictures and attachments	40,000	16	12.5
14. Binding cost	40,000	16	12.5
SUB – TOTAL	130,000	53.3	40.9
15. Contingencies	200,000	81	62.5
GRAND TOTAL	42,882,200	17,136.6	13,405.6