WATER POINTS ECONOMIC INSTITUTIANAL ARRANGEMENTS AND COLLECTIVE OWNERSHIP IN MVOMERO DISTRICT

By

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A Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree of Masters of Science in Project Planning and Management (MSc. PPM) of Mzumbe University

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CERTIFICATION

We, the undersigned, certify that we have read and hereby recommend for acceptance by the Mzumbe University, a dissertation entitled **Water Point Economic Institutional Arrangement and Collective Ownership in Mvomero District**, in partial fulfillment of the requirements for the award of the degree of masters of Science in Economics – Project Planning and Management

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DEDICATION

I bestow this research work to my Grandmother Rafikiel E. Mshana for her tireless parenthood, assistance, advice, encouragements and support in every way during my study. From the bottom of my heart, I Love her and may the Lord bless her abundantly.

LIST OF ABBREVIATIONS AND ACRONYMS

CPR	Common Pool Resources
COWSO	Community Owned Water supply Organizations
DHV	The Netherlands based NGO
GWP	Global Water Partnership
IFAD	International Fund for Agricultural Development
MoWI	Ministry of Water an Irrigation
MORUWASA	Morogoro Urban Water Supply and Sanitation Authority
NGOs	Non-government Organizations
NWB	National Water Body
SPSS	Statistical Packages for Social Sciences
UNDESA	United Nations Department of Economic and Social Affairs
UNDP	United Nations Development Programme
URT	United Republic of Tanzania
VEO	Village Executive Officer
WBWDRT	World Bank Water Demand Research Team
WEO	Ward Executive Officer
WUA	Water User Association
WTP	Willingness to Pay

ABSTRACT

This study was conducted in Mvomero district in Morogoro region. The general objective of the study was to examine water point economic institutional arrangements and collective ownership with a particular focus to Mlali ward in Mvomero district. The specific objectives were to determine the contribution of water point ownership on the economic accessibility of clean water, to assess the impact of rules on the economic accessibility of clean water and to determine the influence of willingness to pay for water services on the economic accessibility of clean water as well as the factors affecting the willingness to pay. The study involved one hundred respondents. Data were collected using survey questionnaire, interview and focus group discussion. The Statistical Package for Social Sciences (SPSS) software was used to analyze descriptive statistics as well as carrying out the multiple regression model which was used to explain the factors affecting water user's willingness to pay for water. The results are such that, property rights assignment leads to the economic accessibility of clean water and conservation of water. Property rights reduce transaction costs associated with water use in collectively owned water sources and introduce incentives for conserving water resources and allocating water to the most valued users. Mlali water body and village government are the formal institutions for managing water points. They aid in efficient water allocation and conservation of water source. Also, informal rules that govern water use in Mlali are hamlet (Vitongoji) water committees. Norms agreed by all members also prevail. Moreover, there is water rationing which acts as the water use control because every village gets water in a specific day and at agreed hours. The multiple regressions were used to estimate factors that influence the willingness to pay for water. The findings show that WTP is determined by total income, water points being owned by Mlali Water Body and the informal rules used to governing water use. Sex and education level have no significant influence on WTP for water. The research study advocates that water resources should be owned by institutions or private individuals as this ownership increases the efficient allocation of water as well as the conservation of water resources as opposed to collective ownership. Also, the clear roles of Mlali Water Body and village water committee should be defined to avoid overlapping of responsibilities.

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CHAPTER ONE
INTRODUCTION

1.0 Background Information

The physical and technical methods of managing water resources have been used for quite a long time but the attention of water policy is shifting towards institutional reforms. In many countries, the institutional arrangements for managing water have gained remarkable changes at national as well as the micro level. This is due to the capacity of such institutions to mold societal interface and mode the access and use of water resource. According to UNDP (2006), institutions are important in safeguarding water providers to secures both equity and efficiency by coordinating collective action, reduce uncertainty and promote cooperation among individuals. Handling water as an economic good which ensures water allocation through different uses in a way that maximizes the net benefit requires well-formed economic institutions, for example, water users association in Mvomero District.

Water User Associations (WUAs) are formal water institution at the community level which comprises of irrigators, water users, cooperative societies, NGOs, companies and any other bodies or organizations established under any written law (URT, 2009). Water Users Associations is formed for conserving water sources used jointly by WUA members, resolve conflicts related to the joint use of water resource among members of the association and collect water use fees (URT, 2009).

1.1.1 Water Management in Morogoro

Governing water requires formal and informal economic institutions including water users associations in Tanzania. Other institutions are water supply government parastatals such as Morogoro Rural and Urban Water Supply Authority (MORUWASA) which charges water users on a unitary basis. One cubic meter is charged 750 Tanzania shillings for the domestic use category. This charge is based on the services offered including cleaning, transportation and setting up different infrastructures relevant to water customers (MORUWASA, 2012).

Others are the informal institutions based on philanthropic support to water access such as the Netherlands Non-Governmental Organization (NGO) namely DHV

worked in Mlali in the early 1970s. Also, gravity water supply scheme in Mlali ward was built in the 1970s under the support of Netherland's government. The village committees and the District Council managed the project. When the scheme broke down, village water committee and local government had no funds to repair the system. Later, then District Council rehabilitated the system and more than 20 public water points were built. Moreover, individuals and public institutions have been connected with piped water (Mtinda, 2006). This study was interested to find out the current economic institutions continuously governing water in Mlali Ward, Mvomero District.

1.2 Statement for the Problem

Even with all the hard work done by Tanzania government in recognizing and promoting Water User Associations (WUAs), the role of WUAs as economic institution enhancing community willingness to pay for water resources use and its attached service is slightly known. Furthermore, the extent to which the formation of WUAs has reduced water resource depletion or improved water resources management is still remaining in the policy document, but not promoted enough to be used by Tanzanians as a weapon to control and govern the natural resources.

Water pricing signifies the allocation of scarce water resources to the highest valued uses in term of financial or other types of benefits. Reasonable water pricing, as well as water permits, have to sufficiently assure efficient water use and that is environmentally sustainable. The National Water Policy point out that for sustainable water resource use, the trading of water rights and the use of economic incentives and pricing of water use into the management system as a path for demand management and water conservation has to be gradually built (URT, 2002). This statement does not apply only for Tanzania but also the international community is aware and recognizes that the current need for water management and governance is crucial.

According to Evans (2002), a source of water can only yield a certain amount. A good way to limit water use is by the variable pricing of water to create an efficient use, the more water someone uses the higher the price per liter he/she pays.

Therefore, WUAs contribute greatly in enabling optimal use of the available water by simply applying economic incentives, water pricing and by trading the water rights (Meinzen-Dick, 2007). Moreover, WUAs has a role of ensuring that community members collectively participate in protecting water sources through protecting water supply infrastructure, cleaning the surroundings of the water source and to pay a monthly water fee.

According to Ostrom (1999), User-driven organizations are more efficient in organizing shared use of resources than either the State or even the private rights system. Furthermore, in her study in Thailand, Ostrom (1999) pointed out that users have the relevant information on the resource they collectively use, thus they will find creative resolutions through discussions and get the approval of the decision they make. This is supported by Coase (1960) that when the water rights are entirely defined and if the costs of transacting are negligible, then organizing the discussion among the actors will be able to lead to a Pareto-optimum. In that context of Tanzania, various researches have been done in different places in Tanzania. For instance, Lonze (2014) carried a study on the role of water user associations in the management of Water use conflicts in Ilonga sub-Catchment In Wami-Ruvu Basin where he found that conflicts before the formation of WUA were 22% but fell to 4% after the formation of WUAs.

Another study was carried by Sokile and van Koppen (2004) with the aim of examining the local water rights and the informal institutional arrangements influence on managing water in Great Ruaha River catchment in Rufiji basin. The researchers found out that water rotation, water user groups, and the local informal water rights are more influential as contrasted to water fees, WUAs and formal water rights. However, those studies on institutional arrangements had little to say on Willingness to pay for water resource. They paid attention to institutional arrangements on water services as one of the major factors for economic development. Also little was touched on how WUAs contributed to the protection of water sources.

The drive of this study, therefore, was to fill this knowledge gap of incentives provided by WUAs to increase the willingness to pay for water services and to limit the depletion of water resources. Mlali ward of Mvomero district was used as a case.

1.3 Objectives of the Research

This study is made up general as well as the specific objectives

1.3.1 General objective

The general objective of this research was to examine water points economic Institutional arrangements and collective ownership in Mvomero District

1.3.2 Specific objectives

The specific objectives were;

i. to determine contribution of water points ownership on economic accessibility of clean water,

ii. to assess the impact of informal rules on the economic accessibility of clean water,

iii. to analyze the influence of income on the willingness to pay for water services in Mvomero,

iv. to assess the gender influence on the willingness to pay for water services in Mvomero and

v. To explain the impact of education on willingness to pay for water services in Mvomero

1.4 Research Hypothesis

In this study, the following hypotheses were tested

i. Water Points ownership is positively contributing to the economic accessibility of clean water,

ii. Informal rules have a positive impact on economic accessibility of clean water,

iii. Income influence positively the willingness to pay for water services,

iv. Gender has a positive influence on water services willingness to pay and

v. Education contributes positively to the willingness to pay for water services.

1.5 Significance of the Study

Ensuring that water is available in the right quantities and that it is efficiently used is crucial for water management. Various concerns that affect the poor where most of them are located in rural areas can be connected to the lack of access to water and inefficient use of water resources. This is because water is life and forms the foundation of development initiatives. It was in this bearing that this study of water point economic institutional arrangement and collective ownership in Mvomero district was undertaken to understand these arrangements so as to ensure economic use and sustainability of water resources.

In addition, the findings of the study could serve as a springboard or point of an initiative to all the players in the water sector. These include district councils, traditional institutions and non-governmental organizations among others to understand and appreciate the important role of economic institutions towards the economic use of water. Water resource has a great role on socio-economic development thus water resource management should be paramount to all stakeholders.

This study may also help the policy makers to implement the policy instruments that will help to improve water supply and enhance the economic use of water. This is because it reveals the influence of property right, formal and informal rules and willingness to pay for water toward economic accessibility of clean water. Therefore what the policy makers need to do is to integrate these instruments to different water programs and initiatives and thus attains economic use of water.

This research also serves as an addition to knowledge of earlier work that has been conducted. Hence this study will serve as an important document for review in future academic studies in this area of water governance.

Finally, this study will also help the researcher to fulfill and get required award of Master of Science in project planning and management.

1.6 Scope of the Study

This study covers Mvomero district in Morogoro region of the United Republic of Tanzania. The scope of the study can be in term of physical and contextual dimensions. In term of physical dimension, the study was carried out in four villages of Mlali ward in Mvomero district. These villages are Mlali, Mkuyuni, Kinyenze and Kipera. These villages were selected because there are at least 20 water points that have been built by District Council to provide water to the community members. Besides, due to financial constraints only these villages were selected for the study. Also, time allocated to accomplish the study was limited hence the coverage of the study could not be increased further.

Water sources covered in the study includes rivers, wells, private water taps and public water taps which are located in the selected villages of Mlali ward. This means that, these and other water resources which are located in the District but outside of the selected study area were not considered in this study. The ownership of these water resources, how these resources are managed, who manages them and more importantly the willingness to pay for water services and application of formal and informal rules to protect the usage and sustainability of the resources were the focus of this study.

1.7 Organization of the Report

The study was structured into six chapters. The first chapter entails introduction, problem statement, objectives, significance and scope and justification of the study. The second chapter which is the literature review presented a framework for analyzing institutional arrangements and willingness to pay for water services. The third chapter is the methodology of the study. It described the steps to achieve the objectives of the thesis. Chapter four of this study focused on processing data, analyzing and their presentation. The focus of chapter five was on the findings of the study while the last chapter covered recommendations and conclusion.

CHAPTER TWO
LITERATURE REVIEW

2.0 Introduction

This chapter has examined the theoretical and empirical framework concerning the concepts of water points economic institutional arrangements and collective ownership in Mvomero District as presented by the various writers. This review aims at providing the general framework under which this study was undertaken. This reviews not only guides the theme of this research but also notify the discussion and analysis of the survey results from the study.

The first part of this chapter is the theoretical literature review which basically focuses on collective action theory and the transactional cost theory in relation to economic accessibility of clean water. The collective action theory explains the collective ownership of the natural resources and the impact of this ownership on the efficient use of such resource. It is in this chapter that other institutional arrangements governing water resources were reviewed. These are both formal and informal rules.

To shed more light in this study, Coase's transactional cost theory has been reviewed. This section, therefore, covers the allocation of property rights to show how they reduce the transaction costs and lead to the economic use of water resources. The review did not end there, the literature that covers how moving from collective ownership to property right assigning leads to efficient use of water. Moreover in this part property rights and how they enable utility maximization and willingness to pay for water use was also reviewed.

On the other hand review of empirical theories was done focusing on the studies that have been carried by various researchers in different places that cover water user associations and their contribution to the community willingness to pay for water use. Finally, this chapter presented the conceptual framework under which the study was conducted.

2.1 Theoretical Review

Economic institutions are both formal or informal organizations created by members of society to undertake a particular type of activity (North, 1991). An example of an economic institution is such as the rules used at the water point that governs how individuals pay a certain amount of money to access water and whether or not this water could be bought or sold. According to North (1991), Institutions consist of informal constraints and formal constraints. Moreover North (1997) stipulated that formal institutions involve rules that are codified and are written, the directives or contracts that are established and interconnected through broadly acknowledged channels. In contrast, the informal institutions are the cultural norms, the values, taboos, conventions, customs and the practices that jointly shared. I also involve rules created, interconnected and applied outside of the officially authorized channels (North, 1997).

The subject of water point economic institutional and collective ownership has been addressed by various theoretical formulations. This part reviews the literature on collective action theory viewpoint for the collective actions of solving common dilemmas at the local or village level as well as the Coase transaction costs theory which focuses on institutions and transaction costs. This tally with the objectives of this study hence, the study was framed basing on these theories. Moreover, the empirical literature of the previous studies related to this study has been conducted.

2.1.1 Water as a common pool resource

The water resource is not a typical Common Pool Resources (CPR).The common pool resources are the resources often held in common by many stakeholders but neither of them has individual property rights over this precious resource. In broad terms, CPRs are resources that the whole community can access them but there is no particular individual that has an exclusive property right. This is because the costs associated with excluding some individuals from using these common pool resources are high.

In CPRs a person's use of resource subtracts a significant amount from what is available to others. Therefore, if one user withdrawal water from the source, reduces

the amount available for other villagers to use. Also when water is scarce and there is uncertainty about future availability, water users are drawn to obtain as much water as they can get in a fear that water will not be available later on. This can result to overuse and lead to degradation of the resource. This was pointed by Ostrom (1994) that the problem of common pool resource emerges as a result of independent actions by the users leading to outcomes in which these users are made worse off.

In light of this, the theory point out that a self-directed common pool resource where the appropriators of the resource in question are fully involved in the process of making and adjusting with the rules in a collective choice grounds regarding inclusion and exclusion of actors, appropriation strategies, roles of participants, monitoring and authorization and conflict resolution should be used (Ostrom, 1994).

These rules being formal or informal are required for coordinating users in order to obtain an optimal rate of withdrawal for the whole community. In the absence of these rules that put restrictions to users, individuals risk to competitively exploit the water resources. Effective rules ensure that users face incentives to give up their individual short term benefits because they will result in a tragedy of the commons, a situation where water sources would be lost to users (Ståhlberg, 2006).

Hardin's (1968) argued that collective ownership of resource can be resourceful or efficient in circumstances associated with a risk of collectively inefficient use of the resource commonly known as the tragedy of the commons. He argued that this is so because users have more relevant information on the resource and they will negotiate an inventive solution acceptable to all than taking the top down decisions led by the government.

2.1.2 Transaction Costs

Coase (1937) theory has been applied in natural resources management including water resources under the argument that economic efficient can be achieved without considering the initial allocation of property right and given that there is no transaction costs involved and the property rights are well defined. Coase (1960) point out that when property rights are clear and costs involved in transacting are low then involvement in regulating externalities by the government is not needed. This is

because the economic agents involved in the transaction are capable and can bargain to achieve the Pareto optimal allocation of resources. The author adds more that economic agent's ability to achieve the Pareto optimal allocation is independent of the agent provided with the property rights. According to Cooper (2005), Pareto optimal is an efficient allocation that in a society no individual in the community that can be made better off without incurring the cost of making someone else worse off.

According to Coase (1960), numerous resource use conflicts arise because resources are owned by nobody or equally as bad that the resources are owned by everybody as the case of collective property resources. He adds if the unclaimed resources were to be divided up as private property and that if the owner could charge a fee if someone wants to use them then these disputes could be resolved. Also, the owner can sue in court someone that abuse the resource. Assignment of the property rights to the resources enriches the on the use and abuse of resources.

For the case of water resources that are owned collectively, they are associated with high transaction costs for negotiating agreements over the use of the resource. According to Jackson and Morelli (2009) if numerous parties involved in the use of resource the costs associated with the process of reaching an agreement may be higher than the associated benefits. The cost of bringing the interested parties to an agreement is the transaction costs but not the only. Other costs are incurred during searching for information, in finding the involved parties as well as informing them the transaction opportunities. Other costs are incurred in enclosing the property through fencing, monitoring and in policing as a way of ensuring that agreements are kept. If it happens that there are trespassers and violators then more costs are incurred to prosecute them

Assigning property rights to this kind of resource, therefore, reduce the transaction costs. According to Field and Torero (2006) property rights are the Property rights are the essential tool to energize the efficient levels of necessary to incentivize efficient levels of investment and resource use as they will aid the users to internalize the costs and benefit, assist market exchange as the costs of transacting are lower with the single owner than multiple owners. Property rights also help in expanding

the access to credit because the principal asset can serve as collateral and make more enforceable repayments.

When there are transaction costs the institutions always matters (Coase, 1960). The costs of transacting involve all costs of doing business which is ubiquitous and therefore the institution that regulates the way of transacting always matters. This was also pointed out by North (1994) that when it is expensive to transact, institutions matter. The lower the costs, the more efficient the prevailing institutions are (Coase, 1960). With this kind of institutions having minimum transaction costs the stakeholders can be arranged to lead the Pareto optimum resource allocation regardless stakeholders provided with the property rights.

These property rights have to be clearly and well defined in order to be enforceable. From the economic standpoint, the aim of the legal system is to design the arrangement of rights for attaining the economic efficiency. This legal system tends to affect the cost of transacting and its major aim is to reduce to the minimum the harm or the costs widely conceived (Coase, 1960).

2.2 Water Governance Institutions

Water governance refers to different political, social, economic or administrative arrangements that are in place to progress and manage water resources as well as water services delivery at different levels of society (GWP, 2002). The governance involves the procedures and contrivances as well as the institutions that people and actors express their interest, implement their legal rights, carry out their duties and mediate their differences (UNDP, 2001).

GWP (2002) provided the general meaning of water governance that it involve a wide array of administrative, institutional, political, social and economic systems as well as the decision-making process that existing to control the progress and management of water resources and adequate provision of safe and reliable water services. This is achieved through clearly specifying who has authority to make certain choices and when to make such choices based on norms and values. That kind of choices varies from those made at low government institutions such as village government to those that are made at higher levels like in ministries (GWP, 2002).

On the other hand, institutions are wide and include organizations, policies, governance, capacity, regulations and incentives. They can be formal or informal but potentially they offer inducements to individuals and groups through structuring their interactions focused in economic activities in joint actions and sustainable allocation and resource use (North, 1991). Institutions have dual abilities of constraining and liberating different actions in society. These are either through prohibiting people from taking certain action or through recommending circumstances of when something is to be done with regard to environmental and socioeconomic repercussions.

Both formal and informal institutions can be used in management and allocation of water among users to manage and allocate water among and between different users by covering the issues of quality, rights and water pricing to asset management and water service delivery. This is achieved through defining action circumstances, demarcate the action sets, offer incentives and determine the outcome of doing a certain action. According to Agyenim (2011) in the context of water development, institutions define allocation, use, and management. The author added that institutions are formed on the basis that they minimize transaction costs of the repetitive undertaking of the same activity. They aid in stabilizing anticipations through relocating information and endorsing compliance by structuring trust and enforcements creation (Agyenim, 2011).

Tanzania has been using both formal and informal institutions for governing water resources. According to Sokile (2005), the institutional setting in Tanzania is wide with the variety of present and fresh formed institutions for managing or influencing allocation, protection and the use of water. They set conditions on the use of water, setting policies and the provision of water rights at the national level.

These institutions can be rules, policies, as well as the organizations but they are designed to promote organized behavior, equity and provide various opportunities for individuals and group advancement, thereby serving to liberate human action. For the case of the rules, both formal and informal rules have been used in the course of governing water resources. Agyenim (2011) states that water-related rules are meant

to constrain the socially undesirable behavior of individuals and groups in the distribution and use of water.

One of the formal rules that govern water resource in Tanzania is the Water Resources Management Act No. 11 of 2009. This act recognizes that all water in the country is bestowed to the United Republic of Tanzania thus all water users with intents of extracting surface or ground water have to acquire water rights (URT, 2009). The water right is a set or bundle of set or bundle of graduated rights allocated to different social entities (Komakech, 2014). The importance of the water right is also appreciated by the National water policy of 2002. That is why the policy calls for the gradual building of the water rights trading into the management system as a way of managing demand and conserving water (URT, 2009).

It is also argued by Agyenim (2011) that water right is a legal authority for taking water from its source. These rights may include licenses, permits, allocations or entitlements. They can be based on the location of extraction, on the use, nature of the use, rate of extraction and time of the water use. Also, Anderson (2010) argued that water right can be riparian or prior appropriation. The riparian water rights are largely unregulated and not quantified but are tied to riparian land ownership. The prior appropriation system is administered by a state agency and appropriative rights are specifically quantified as to purpose, quantity, place and sometimes time of water use. Agyenim (2011) argues that specification of the water rights with clarity and unambiguity aids in the efficient use of water resource.

Another rule that governs water use is the water supply and sanitation act no. 12 of 2009 which majors in the supply of drinking water as well as the sanitation services. The act offers guidelines in creating authorities for managing water supply and sanitation sustainably. It offers the insight for the creation of water supply organizations for managing potable water resources at the local level. In recognition of this, Tanzania has transferred water use permits, formally water rights, and water management imperatives to Water User Associations (WUAs) so as to manage water resources. This also is stipulated in water policy that water user associations will be

the lowest appropriate level responsible for managing the allocated water resources (URT, 2002).

According to Franks et al (2013) the formal duty of managing and allocating water rests on the set of explicit water institutions, the water user associations. They are the lowest appropriate level liable for managing water resources intermediating disputes among users at the local level and within the areas of their jurisdiction. The national policy state that WUAs are important in collecting various information, preparing water utilization plans, conserving and protecting water sources and catchment areas. Moreover, WUAs help users to use water efficiently and effectively and thus ensure profit flows, law enforcement, implementing conditions for water rights and pollution control (URT, 2002).

Water Users Associations are formed through the by the agreement of the majority of water users to manage, distribute and conserve water from a source used jointly by members of the association. Also, the association can acquire and operate Permit and collect water user fees (URT, 2009). They are responsible for representing and engaging with all the water users of the area on the management and distribution of water.

Members of WUAs pay for water use and in this aspect WUAs is able to market water supplies between them. According to Perret et al, (2006), WUA organizes citizens in its area with access to water for whatever purpose and thus act as a public system in the sense that it is controlled by the collective membership but it is also commercial in the sense that it markets water. Moreover, resource management transfer to an appropriate WUA is a positive thing not only in terms of sustainable local water management but also in a general development sense.

Alongside these formal rules, there is also the official arrangement of primary courts operating at the ward, district and national level (Maganga, 2007). This has a role of making by-laws and imposing self-regulation by both explicit and implicit rules and norms. These by-laws also have a great role in managing how water resources are used efficiently.

2.3 Informal Institutions Governing Water

Informal institutions play a great role in water governance in different regions and different levels of managing water, particularly in the developing countries. This is so since the majority of the population in these countries resides in the rural area depend on natural resources for their survival, therefore, the formation of institutions to govern the access, utilization and control of the natural resource use are important. The local communities in these countries, therefore, develop informal institutions composed of rules, norms and regulations informal institutions with rules, norms and regulations over time for governing natural resource access and the use of such resources in particular socio-cultural and ecological settings (Mwiturubani, 2010).

Water management is a part and parcel of the general customary laws and behavioral norms of each tribal society. According to Franks and Cleaver (2013), the customary system of water management is basically built on the respected council of elders having to stand in the community to resolve disputes from the customs and traditions viewpoint. The study conducted in Lake Victoria Basin by Mwiturubani (2010), gave an overview that informal institutions were governed by customary systems and were based on culture. The researcher added that they had the role of governing access, control, ownership and utilization of natural resources and that contributed greatly in preventing degradation of natural resources or restoration of degraded resources. These institutions implore more respect and are acknowledged more at the lowest tiers of water management. It can, therefore, be generally argued that if water points remain as common property resource then its joint management would rely on the strength of the community norms (Mwiturubani, 2010).

Contrasts to the formal institutions, the informal ones are not deliberately structured at one moment rather they grow through continuous interaction in response to the prevailing situations. Sokile (2005) argued that informal institutions evolve slowly and inherently. The author adds more that they are deeply linked to the local societies, rooted and interlinked with the existing norms, beliefs, traditions, folklores and tales. Also, Ostrom (1990) in her view sighted that usually in governing common pool resources the local resource regulation relies on locally structured rules that fit a given circumstance formed through local inventions and agreements.

The informal institutions in Tanzania have been used since pre-colonial period where matters associated with resource use were governed by informal rules (Sokile et al, 2003). During this period the customary societies were governed by community-based initiatives that were very dynamic and sensitive to changes. Sokile (2003) point out that these initiatives were always changing due to interactions of varieties of groups during peaceful times as well as during conflicts, war and conquest, the effect of distance trade, movement of population to mention a few. This study by Sokile (2003) adds more that the increase of stress in the use of resources and internal rivalries in these societies exercised the dynamics within the customary rule system.

During the colonialism, the colonialists did not abruptly discourage the informal water management system until when the water demand increased along with the goal of the colonialists. Sokile et al (2003) point out that it was in the period of the colonial economy that the effort to tackle water problem started and it was in 1923 where the Water Ordinance was formed. This indicated the commencement of the statutory water laws in Tanzania. It is obvious that some of the systems used during the colonial period are quite operational, others have been abandoned while others have been modified (Hugins, 2000).

At the grass root level, the informal arrangements are more elegant. Sokile (2005) pointed out that informal arrangements are superior to the formal ones at the boundary with the formal setup at the lowest level of institutional arrangements. Since the lowest level of the formal institutions in Tanzania settings is the village level, then it is obvious that informal institutions are dominant at village and ward level.

The villages select their representatives to form the councils through the village assembly of all adults. The councils tend to operate through the committees bestowed with the duty to handle the village affairs. These committees are three which are finance, economic and planning committee and the social service and self-reliance committee. Water management falls under the social service and self-reliance committee. According to Sokile (2005), the functioning and strength of the village

committee strength vary from village to village and their particular involvement in water-related matter varies according to water availability and demand for water resources.

Other informal institutions that aid in managing water resources are the households. They play an important role in the management of water resources through participating in the establishment of the informal rules that defines and governs the day to day water uses. It is through these rules that rewards and punishment to the water users are provided. The rules also encourage paying for water services as an indication that household recognizes the scarcity and value of water.

2.4 Formal Institutions Governing Natural Resources in Tanzania

The formal institutions refer to the rules that dictate the access, the control and management of natural resources and which are supported and imposed by the state (Leech et al, 1999). There are numerous written or codified institutions that play an important role in the governance of natural resources in Tanzania including the constitution, judiciary laws, organized market and property rights (Mowo et al, 2011).

Juma and Maganga (2005) point out that there is a recommendation of closely involving the district council and local authorities governing water. This because these authorities protect ward and village water resources, make by-laws for managing water, resolve disputes and offers expert advice to water users. In this regard, the district level organ forms the part and parcel of formal water resource management structure.

Formal institutions are more suited for the management of the natural resources because they have the ability to rise from the existing bureaucratic structure and also because of the authority vested to them by the state (Shyamsundar et al. 2005). Local government for instance which is the formal institution at the local level, have the capability of reaching the community at the grass root level and be successful in mobilizing the natural resource users through joint action arrangements in making rules and resolving conflicts (Girmay, 2006).

According to research conducted by Komakech (2014) found out that village government plays an important role in governing water resource. Researcher notified that local government structure in Tanzania is definitely formed and for some time it village government has been the major state-related organization for overseeing affairs at the local level. The village government is supported by hamlet committees and by functional committees with the functional committee at least in theory composed of the environmental committee responsible for managing natural resources within the village (Komakech, 2014).

Also, there is a ward which is made up of several villages which also play an important part in water governance. It is not specifically created to manage water but has a considerable influence in the management of water. Each ward has a Councilor which is prominent in the village matters including water resources management. The Councilors represent community members that put them into power through an election in the district council. Owing them to their electorate the councilors and seeking to please their voter's councilors always interact with the formal and informal institutions and thus influence water management (Mwiturubani, 2010).

2.5 Moving from Collective Ownership to Property Rights Assignment to Create Economic Efficiency

Access to water resources in developing countries has been a national and international concern for almost a century (Nemarundwe, 2003). The researcher adds that in southern Africa, for instance, there has been the clear move from state-managed water resource management regimes operated during the colonial period toward the dispersed and community-based institutional arrangements. This change from centralized and state driven resource management to the decentralized one is focused on getting the institutional right (Nemarundwe, 2003).

There have been various ideas on water resource management. Some of these ideas support collective ownership while others do not. One of the controversial ideas was provided by Evans and Appleton (1993) that there is accumulated evidence showing that if communities are well supported have the ability and willingness to manage their water resources collectively. Collective ownership implies that the water

resource is owned jointly through agreements that ensure benefits for the members. According to Blaikie (2006), in a collective ownership, the common properties are presented by a special case that the governing institutions are customary and informal. Ostrom (1990) point out that when water resource is owned collectively, its allocation is governed by simple rules grounded in a system of all individuals provided with water in an equitable way. Moreover, the author adds that in some places collective ownership provides water for free or at a subsidized rate. Such ownership does not have an agent who has the exclusive right to alienate the resource though most of the time it creates the inalienable collective rights (Ostrom, 1990). Moreover according to Ostrom, Gardner and Walker (1994) collective ownership institutions are made up of individuals with their own self-lust which in turn can cause collective action problems to the joint owned resource in term of appropriation (allocation of flow) and building and maintaining the stock basis of the resource system that is provision.

The main barrier to the joint ownership of the resource is that individuals tend to free-ride on the efforts of others toward accessing the common good. Demsetz (2008) point out that free-riding takes place when there is disutility from determination and when it is difficult to monitor and enforce an individual's determination. In this circumstance, it is very hard to ascribe rewards and punishment that give an individual group member with the motivation to set the determinations for public good management. Moreover, collective ownership is weak in term of financial resource and management because it is hard to collect resources and organize efforts for governing the use of resources (Demsetz, 2008).

The community can continue owning the resource by cautiously limiting the use of the resource in question to the socially optimal allocation. Demsetz (2008) argue that in this situation it is likely that every member of the community who basically are the resource owner can reach an agreement of restraining the rate of which they use the water resources. Each one of them can agree to curtail his or her right. However reaching to such an agreement is associated with the large determination of choosing, organizing, negotiating and entering into such agreement of limiting the use of water resources (Demsetz, 2008). The theory associated with these

determinations is the transaction costs theory. Ivanovic (2004) argues that the costs of transacting are associated with decision making on the use of the resource, administering and rules enforcements and the costs of making the decision about allocation of usage rights. The researcher augments more that different transaction costs are generated by varying levels of uncertainties and allocation of decision-making power differences (Ivanovic, 2004). An interesting argument was made by Musole (2009) that these costs are the berries to easy private and public decision making because they are related to providing and securing information about what is available, making the transaction, monitoring seller and buyer compliance and adjusting to drastic and unexpected circumstances.

The transacting costs act as a causal factor to the utilization of the non-market methods of exchange and expenses that deviates from the social value of good to be exchanged. If the costs of transacting are high more parties to an exchange will be forced to appeal to the informal restraints in order to shape their transaction (Musole, 2009).

The governing structure that minimizes the costs of transacting is the best one (Frija, 2010). This is because the economic efficiency is improved with the low transaction costs by altering the production costs and increase output, better specialization and more trade facilitation. It is through this insight that the property rights are assigned to the water resources. Assigning property right with clearly defined control and ownership of water resource can reduce the transaction costs associated with information search, negotiation and monitoring (Coase, 1960). These property rights will lower uncertainty, risk and they limit the individual freedom of action which causes individuals behavior to be predictable and increase the value people assign to a resource (Frija, 2010).

The property rights are vital components of the institutional structure of the economy. Komakech (2014) argue that the property rights are the ability to call upon collective to defend one's assertion to a stream of benefit. They are composed of the package of rights for accessing, withdrawing, managing, excluding and alienating. They define the association between individual or groups with regard to the usage of

the resource and the profit generated by this resource use. Therefore having the property right is to have the ability to get some authority system of safeguarding your interest against the interest of others (Komakech, 2014).

It is argued by Moran (2003) that property rights have to be generally acceptable in the community and not just that are so ordained by the government. The researcher argues more that these property rights are explained by their characteristics including divisible, exclusiveness, transferability, duration, quality of the title and their flexibility. At any situation, if some of these features are changed the benefit of incentive-based approach for common pool resources management may be reduced (Moran, 2003).

Musole (2009) argue that by divisibility it implies the degree that rights can be portioned such as dividing surface and ground rights for water. Exclusivity covers the idea of security and explains the capacity of restraining the gain and right of others to use the resources. Transferability covers the easiness of the owner to trade, gift or bestow the property right. Duration covers the length of property right existence such as expiration at the end of each year or validity in perpetuity. Quality specifies the details and specification of the property right including legality and formalization. Flexibility refers to the changes accommodating the ability of property right in relation to the resource use and situations of the resource owner (Musole, 2009).

It is also argued by Komakech (2014) that property right means the right for the owner to consume and generate income from the resource. Also sometimes it is stated as the right to use and is a vital feature of resource governance by being able to exclude others from using the resources in a legal way. Being able to exclude others from the resource use in a legal way have significant influence in the way that the resource is allocated. This is because the resource user rights structure the motives of an individual carrying out productive activities that are associated with the use of the resource in question. The use rights also influence the undertaking of investments that increase or enhance resource value but also determine as if to trade or grant it for other uses (Komakech, 2014).

If the property rights are totally assigned they directly cover the externalities and thus connect the personal motives with the social purposes of resource use. Frija (2010) point out that decision about investing and use of the resources can be quickly made when the resource is owned singly or by a limited number of owners. The researcher adds that the optimal allocation can be reached when the property rights arrangements are subject to the right of transferring the resource, low costs of transacting and that adjustment to the alterations of price and costs can take place quickly and flexible (Frija, 2010).

Exchanging of property rights tends to generate vital information for alternative resource uses and opportunity costs which in turn promotes efficiency in resource allocation and uses. This is because the resource will flow toward the resource-use with the highest values and thus the social benefits allied with the use will be maximized. Truthful one of the most vital advantage of property rights is its ability to form the basis for exchanging or transacting among the parties and solve the problem of resources in an open access (Frija, 2010).

In his study conducted in Pangani River Basin Komakech (2014) commented that specific resource use and their allocation affect the efficiency of resource use. The increasing competition over water use put extra demand on the water institutions and their ability to cope with the competing claims. One way of reconciling is assigning property rights to water users which will grant them permits to use water. He added that although water resource as a property might provide users with some benefits but property right will offer them security over that benefit stream.

Demsetz (2008) points out that without property rights for controlling water resource uses then every person is entitled to use water for various purposes. It is more likely that the overuse of water will result because individuals pursue to exploit the value of their communal rights in costs that are borne by others. The stock of water will be diminished too quickly. It is, therefore, important to establish property right for the case like this. According to Besley and Ghatak (2010) forming the property rights will answer the problem. The researcher pointed out more that these property rights can be privately held where the resource is sold to an individual or collectively held

where in most cases the efficient use is not likely to be achieved (Besley and Ghatak, 2010).

Without the exclusion rights to the open access water resource, the free rider problem is likely to happen as there is no individual or group that is motivated to invest in restoring or conserving water resource (Libercap, 2006). When property right is introduced to open access water resource, the capacity of excluding some people that do not fit the specified criteria is introduced. The right of excluding signifies that the one that can minimize the transaction costs effectively are the one that can exclude at low costs. Moreover, the rights to exclude others from water resource use minimize the costs of safeguarding the right also minimizes the uncertainties related with owning those rights (Libercap, 2006).

The water resource ownership that is provided through property rights is either though private, communal and public or state ownership (Demsetz, 2008). In private property right the whole community acknowledges the right of the owner in excluding others from exercising private rights of the owner. In communal ownership, the community refutes the state or individual inhabitant the rights to affect any person in exercising the collectively owned rights. With this ownership, the use of water resource is limited to members of the common group. The state or public ownership of resource empower the state to exclude anyone from resource use as long as accepted political procedures are followed to determine who may not use the state-owned water resource (Demsetz, 2008).

In communally owned water resources not only that community members are able to exclude outsiders from the use of water but also they are capable of controlling and regulating water use by members. Moreover the incentive problem associated with any individual member not willing to undertake suitable water conservation measures or investment can be overcome by the whole community group to view those investments as a public good and use communal tax authority to finance the investment costs (Libercap, 2006).

In private ownership, the property right of owning the water resources is allocated to an individual or cooperate entities although state or the community may impose

some formal or informal constraints to these rights. If there are few restrictions on private property rights the motives for an individual to invest in water resources become strong (Libercap, 2006).

In general, incentives that affect economic behavior, costs and reward of decision making and the bounds under which the decisions on resource use are made are all affected by property rights (Musole, 2009). The property rights may be held by some forms of government which may optimize the resource use or they may be held by private or cooperate entities. This argument goes exactly as with the argument made by Coase (1960) that for social optimality, it does not count who owns the property right, all that count is that someone owns. This is so provided that the property rights are well defined and individuals involved were able to transact with one another to allocate property rights efficiently.

2.6 Property Rights Enabler of Utility Maximization and Willingness to Pay for Water use

Economic principles suggest that for water to be supplied and allocated at an efficient level to users, setting of average price level that reflects the marginal cost of supplying water and a uniform volumetric water tariff should be imposed on the users (Whittington, Davis and McClelland, 2003). By doing so, water users will opt to consume water at a level that their willingness to pay for an extra unit of water (marginal benefit) matches the price of water. In a reflection of the income available for spending in particular good and the price set, individuals tend to consume the quantity of good that maximizes total utility (Whittington, Davis and McClelland, 2003).

Water users (Consumers) always make rational economic choices of water uses that maximize their total utility which is a property of a good that enables it to satisfy human wants. Banda et al (2004) pointed out that utility is the subject of individual choices that cannot be precisely quantified or measured in absolute terms rather can be measured ordinally rather than in absolute terms. The researcher pointed out more that the price that the consumer is willing to pay or a commodity is the subject of the utility gained from it and not the commodity itself (Banda et al, 2004).

Total utility is the sum of the benefits obtained when someone consumes a certain good. Banda et al (2004) state that the more the consumption of a commodity the more the utility is gained until an individual income and the price of the commodity become the limit to the utility obtained from consumption. Setting price to water resource use limit the use of water for an individual. This is because the individual will be forced to use water until up to the level that the marginal utility of using water resource equals to the price of water. In turn, water pricing will lead to efficient water use as well as water resources conservation.

The notion of maximizing utility is a way of stating vital economic problem since people always have wants that exceed available resources to satisfy those wants hence they have to choose. In the process of choosing, they attempt to make maximum benefit possible they can get by maximizing total utility. Property rights, therefore, help people to make these rational choices over the use of resources (Dinner and Subramanian, 1997).

Meinzen-Dick and Ro Segrant (1997) pioneered that pricing water is a simple and powerful tool for providing motivation for efficient resource use. The researcher adds that accurate resource pricing demonstrates the economic or shortage value of the resource that can be utilized to make choices by users. Water pricing is not easy because water users consider water as a free good. Pricing it will create higher transaction costs and induce inefficient water use. Pricing must be preceded by property rights assignment to define the ownership and control of the water resources (Dinner and Subramanian, 1997).

In open access water resource everyone can access it for free at zero prices but at this price, people will consume water until zero marginal utility is reached. They would do so because the marginal utility of water is greater than its price thus people would drive more utility from purchasing water than they would lose parting with even a shilling. If water price is Tshs 0 one will continue using water so long as marginal utility derived from it is greater than Tshs 0 (Hellengers, 2006).

For the case of common ownership of water source, each water user will individually maximize his own utility function arising from water use given his constraints and

the actions of other users. Since in this kind of ownership, basically the water resource is not owned by anyone then water will be used inefficiently. This is because consumers are never satiated and as long as water is free and not owned by anybody users will always prefer greater quantities of water irrespective of the utility they will gain from using such water.

Price can be introduced and be applied in water resource after defining its ownership through property rights. The property right will certainly ensure efficient use of water resource. This statement is supported by Holden and Thoban, (1996) who argued that once property rights are defined and the costs of transacting are low the resource will be used in a most efficient manner and in a way that the society welfare will be maximized. This is because property rights provide an incentive for the owner to set fees for the use of the resource. These fees help to determine how the resource is used efficiently.

Property rights are the mechanism to increase the total utility of the population. According to Demset (2003), the clarity of owner of water property rights, the clear water rights, and the implementation of the water resources property right system will lead to water users to optimize consciously the allocation of water resources in the utility maximization principle, which will improve the efficiency of water use.

The value of water resources can be viewed from direct and indirect consumptive utility perspectives. This is because it yields direct consumption benefit such as water for human consumption or as input in the production of other goods that are ultimately consumed. Kuriyama, (1998) point out that since there is no market existing for environmental goods such as water, its value is indirectly obtained from people willingness to pay or willingness to accept compensations for changes in the quality or quantity of water.

Also, the similar argument on the valuation of the water resource was made by Agudelo (2001) that water is not properly priced because there is no physical place exist that true value of water can be revealed through the act of buying and selling. In view of this Moffat et al (2011) provide one of the ways of valuing water resource through the use of WTP. The researcher claimed that WTP for water can be done

directly by questioning individuals how much they will be willing to pay for improved water services. this can also be done indirectly by observing behaviors associated with water use like quantity used, travel times to the collection point, water quality perception and assessing the consumer responses to varying characteristics of improved water services (Moffat, Motlaleng and Thukuza, 2011).

The major purpose of the economic concept of willingness to pay is determining the sum of money the consumer will be willing to pay for goods or services. It is the quantity that must be drawn from person's income while holding the utility constant. According to Maciak (2011) in essence, willingness to pay which is the maximum amount an individual is willing to offer for goods or services is based on socio-economic status and personal preferences attitudes estimates the value residents place on a resource.

Similar to any other goods water has value to the users (Rogers, Bhatia and Huber, 1997). This value of water is clear when people are willing to pay for it. According to Whittington (2003), the willingness of people to pay for a service is a vivid sign that the service is valued. It is generally accepted that there is variation in the value placed in water by the users depending on when, where and how it occurs. Van Der Zaag and Savenije (2006) argued that the differences in the views of the water are wide and it cannot be anticipated that people attach the same value of water at any one time in any one place. The economic value of water, therefore, is measured by adding many individuals willingness to pay for water.

The basic economics entails that the price of service should be at least as high as the cost of providing the service. According to Rogers et al (1998) for sustainable and efficient water use the tariffs should match not only the cost of supplying water but also the opportunity costs as well as the economic and environmental externality costs. If the costs are less than that then water will be under-priced. Moreover according to Anderson (2010) the utilization of water will be efficient if price set for the users to pay matches the marginal cost to the society.

From the economic efficiency view the price of water has to reflect the marginal value of water or reflect the opportunity costs whereas from the viewpoint of

reasonable revenue collection the water price have to reflect the willingness to pay of the users (Chandrasekaran, 2009). In order to assess the value people place on the water, understanding of local environmental attitudes and preferences that influence consumer willingness to pay is required.

Since there is no market mechanism that exists to put a proper price on water services, then its value should be determined using the individual willingness to pay. The WTP is used to put the value on good or services that no market-based price mechanisms are in existence (Moffat, Motlaleng and Thukuza, 2011). The equation representing the willingness to pay is borrowed from the study carried out by Banda et al (2004), which assumed that the willingness to pay for water that the willingness to pay for water is built on the maximization of utility from consuming water service (Q).

Water service (Q) is used as an argument for the individual utility function *U(X, Q),* where *X* represent the vector of water services. An individual aim is to maximize utility *U (.)* with the given budget constraint $PX = M$ where M is income and P is the vector of market price.

Suppose that Q is provided the solution to the total utility maximization function can be presented as X_i (*P, M, Q*).

Also according to the study conducted Whittington, Davis and McClelland (2003) the willingness to pay for water is the subject of the price of other goods rather than water, the price of water, income, social economic characteristics of households and expected increase or decrease in water as perceived by the people.

$$WTP = f(P_x, P_w, I, S, d) \quad \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Maximum willingness to pay for water is the subject of the entire variable in the demand function except for the price of water itself.

World Bank (2007) stated that proper water pricing is a way for the water utilities to manage and allocate present water supplies efficiently. In this way it will be likely to create income for maintaining water services, therefore cost recovery and economic

efficiency should have high priority in the design of water utilities. Instead of depending on government subsidies, sustainability of the water service will depend on the fees collected from water sales and therefore on the willingness to pay of users.

For the water projects to be sustainable, it is imperative to understand values placed in the different level of water services (Agudelo, 2001). This is because water users will utilize water provided that extra cubic meter of water surpass the costs so incurred. According to Van Der Zaag and Savenije (2006), the efficient approach of using water in the most valued uses is through making relevant price configurations that encounter various political, social and economic objectives in different circumstances.

Alternative economic schemes including water metering programs whereby consumers are charged per unit volume used, as well as a revenue neutral tax or additional level should be in place. These reduce consumption and fund infrastructure projects that will improve efficiency. High level of willingness to pay is reached when consumers obtain increased social values from water services (Moffat et. al, 2011).

When community members treat water as an economic good they will be willing to pay for its provision contrary to when they regard it as a public good. According to Jimson (2001), WTP for water services increases with the increase in income and as older the person gets. Moreover larger families are reluctant to pay for water services but also the more people they become educated the lesser they become willing to pay. Jimson, (2001) point out that this might be spurred by their regard of water as the entitlement that should be provided by the government.

2.7 WUA Relevant to Willingness to Pay for Water Resources

Many countries have formulated, empowered and transfer water use permits, formally water rights and water management imperatives to Water User Associations (WUAs). In Tanzania also the importance of WUA is recognized. URT (2002) point out that comprehensive legal and institutional framework for the sustainable development and management of water resources which follows principles of

commercialization is important. Such institution is water user associations and normally functions at the local level.

Several studies show the positive relationship between water user associations and willingness to pay. Increased level of willingness to pay for water services can be reached when water sources are owned by water user associations and that WUA increase emphasis on collecting water fees as well as the awareness to water users on the importance of paying. Also, they provide framework and structure for water allocation. This, in turn, helps to decide about how and for whom water will be allocated and at what costs so as to ensure economic accessibility to clean water.

One of the studies was done by Rosen and Strickland (1998) in Kazakhstan. The study looked at the Shu water user association which is one of Kazakhstan oldest registered WUA in the effort of addressing irrigation water management at the local level. The study points out that before the WUA was formed, farmers did not bother to pay the cooperative though they still considered the arrangement as unsatisfactory. But after the formation of WUA, each day the hydro-technician opens water at the diversion point and records amount of water supplied. Farmers also are in agreement that only the hydro-technician will open the gates for the individual farms or will approve the opening. This allows the farms to get a satisfactory amount of water for the crops and permits the allocation of water fees by the WUA (Rosen and Strickland, 1998).

Another study was conducted by Koppa (2008) in the newly formed Canal irrigation cooperative in Dharoi Irrigation project at Gujarat. The study wanted to identify the ability and willingness to pay for water based on water productivity of the farmers. The study found out that there is financial practicability of the Canal WUA as it was able to obtain enough funds for covering regular and emergency costs. The financial viability is the result of equitable water distribution, water supply that is reliable and the use of suitable water charges.

According to World Bank (2008) Governments find that by including WUA in managing water projects and collecting fees at the grass root level exploit the ability of the community members to influence their neighbors to pay. Likewise, since the

association managed systems are consumer oriented they are more likely to deliver better services and influence people's willingness to pay. Water user associations are important elements of any initiative for rural water-use efficiency (Winters & Yusuf, 2007).

A study conducted in two regions of Tanzania (Dodoma and Singida) found out that water user associations are autonomous water provider at the local level. The study stipulated that autonomous providers guarantee better and reliable water fee collection. Moreover, autonomy offered by WUAs assures that funds collected for operating, maintaining and replacing water schemes will not be used for other purposes and when needed for repairing will always be available (Water Aid, 2005).

Another study was conducted by water Aid in Malawi. The study found out that community-based water provision is effective at small scale level. It revealed also that poor operational of public water utilities in Malawi has stimulated communities to form water user associations as their solution. The community management especially water user associations is effective, particularly in small-scale water service provision. It has possibilities of offering different alternatives, guarantee the sustainability of facilities and increase wellbeing and livelihood benefits a good water supply project can offer (Water Aid, 2005).

Based on the stated ability and willingness to pay it is expected that WUA will be able to cover operation and maintenance expenses from tariffs and also cover costs of replacing parts like pumps and pipe sections. The capacity to cover these expenses is subject to the society economic conditions and it is not likely to be applicable to every case (URT, 2006). The government will benefit the most when the water user associations are formed because the transaction costs of collecting fees will be placed to the local bodies.

According to Tremolet (2002) community-based water management reduces costs since local resolutions are less expensive. Community operated services are more suitable to local circumstances and the possibility of saving costs is high. The study states government built systems costs twice as much as the community water supply systems. The savings from community run systems results from involving

smallholders formally. The study reports that some communities are willing to pay the higher amount if the profit will be reused to other community ventures (Tremolet, 2002).

It is suggested by Ngana (2010) that with efficient revenue collection, increasing community awareness on financial commitment needed to sustain water system and willingness to pay improvements in relation to performance in fund collection will be resolved. The author argues that this is because sustainable financing safeguard community awareness on the ongoing expenses and the financial commitment to sustaining water systems. Operational and maintenance costs are enriched by funding mechanisms where users pay for their water supply systems through contributions (Ngana, 2010).

From these studies, it can be concluded that WUAs are created to coordinate day-to-day management of different uses of the water resource. The importance of WUAs is better understood if the scarcity of water is considered and the inefficiencies associated with its water use. This is because WUAs are in a better position of setting and applying water pricing as a means for managing use and allocation of water. Application of water price makes water users to aware of the water scarcity, thus respecting water uses.

When water resource is respected and being paid for, it is an indication that it is valued. This will improve the efficiency of its utilization. Water pricing provides incentives to users to rethink on their uses, encouraging a shift to more efficient uses (Speelman, 2009). Water user associations, therefore, help in providing incentives for efficient water resource use through setting and applying water price. It is through these payments for water resources that ensure the survival and sustainability of the water user associations. WUAs, therefore, influence the water user's willingness to pay for water through setting appropriate costs that cover the value of water, ensure reliable water supply to users and adhere to formal and informal rules that govern water use.

2.8 Other Institutional Arrangements Governing Water Resources

Institutional arrangements are basically the governance structures for water management involving three key elements which are water laws, policies and water administration (Agyenim, 2011). In this case, they comprise statutory laws and regulations, policy framework, by-laws of the District councils and self-regulation by both explicit and implicit rules and norms.

Water law refers to various water rights administrative regulation or the implementation mechanisms (Agyenim, 2011). They provide the framework for governing water system and are the foundation for attaining enhanced governance system. According to Gupta (2004) Water law exists in diverse context and differs from state to state, yet water laws in various part of the world appear quite similar addressing common issues including ownership, rights, and responsibilities, non-compliance mechanisms and liability at national level as well as equitable and reasonable utilization (Gupta, 2004).

There are various laws and regulations that govern water use in in Tanzania. For instance, there is the united republic of Tanzania constitution which acknowledges the responsibility of every citizen in protecting natural resources. The Article 27 of the constitution stipulates clearly state that it is the responsibility of every citizen to protect the united republic of Tanzania natural resources, property of Tanzania, state authority property, all properties jointly owned by people and also respect another citizen's property (URT, 1998).

Also the water resource act of 2009 instruct that country's water is a public resource trusted in the state with the president acting as the trustee of the resource on behalf of the people. The act stipulates that a person that reallocate, stores divert, stores, extract or uses water for other purposes apart from domestic uses to get water permit from the Basin water body. The act allows people with legal access to land to use surface water for domestic chores without the permit (URT, 2009).

The land act, (1999) also trusts all the rights for water resources to the government. It allows substantial utilization of water to the occupier or owner of land for domestic and small scale agricultural purposes. Also, the local government's law (1999)

stipulates function and various tiers of the government in the supply and management of water. It states that supply of water and facilities maintenance is the role of district local council in collaboration with ministry responsible natural resources. The act allows different levels of government to plan and implement development endeavors according to the identified local priorities (URT, 1999).

Tanzania also has various policies that provide structure for governance of water services. Firstly, there is a water policy entailing the national water vision stating where the state wants to be within a specified period. It determines how the state wants to deal with competing goals and objectives and form the basis for resource use. According to Agyenim (2011), the policy defines the shared responsibilities at the region, state and local level for dealing with water. It covers water use priorities, water prices, centralization or decentralization the participation and coordination with other policies.

URT (2002) knows that water is a limited resource which is under pressure and becomes scarcer. The policy promotes the integrated approach to water resource management through building and enhancing water management and complimenting the service delivery aspect of water resource development. It sets the key values in managing water with the aim of creating an inclusive structure for promoting ideal, sustainable and equitable development and utilization of water resources for all Tanzanians (URT, 2002).

The national environmental policy recognizes some of the challenges that face the country. One of these challenges is the inadequate access to quality water for the rural and urban population. With this regard, the policy supports the technological improvement as well as the institutions for sufficient charging of water. This is done in the reflections of the value of water and thus enhances efficient and safe water use (URT, 1997).

Policies and Laws are enforced at different administrative levels. Water administration involves policy organization for resource management and the implementations for delivery management. Thus formal organizations, organizational

procedures, pricing, finance and accountability mechanisms are the concern of water administration (Agyenim, 2011).

There are various institutions concerned with water resources governance. One of them is the ministry of water and irrigation that has the role of policies and strategies, coordinating plans and mobilizing financial resources for water projects as per national priorities. There is also the national water body that advises the ministry, coordinate, oversee and facilitate the undertakings of the basin water boards (WEMA, 2011).

The basin water board is financial and administratively independent. It is funded through water user fees and is accountable to the national water board. The water users participate in managing water resources through representation on the board. The board has duties of ensuring water allocation, providing water rights, monitoring water uses, imposing conditions on water rights and resolving water use conflicts. They also control the quality of water, provide permits for discharging and impose pollution control principles (WEMA, 2011).

Also, there are catchments as well as the sub-catchment committees. These are also free entities that are funded from water user fees to conduct activities as they are provided by the basin water board. Finally, there are Water Users Associations which are the officially created bodies that get their affiliation from the water users and undertake their roles in a specific area. The expenses of the association will be obtained from fees collected from members (WEMA, 2011)

Despite the long list of the state recognized institutions like local government and water user associations there is also a variety of civil society institutions. They include faith-based organizations and schools which determine how people arrange their lives in accessing and using water (Franks et al, 2013).

2.9 Gender and Economic Accessibility of Clean Water

Gender is not the mere difference in sex between male and female, rather is a difference in roles, rights and responsibilities between men and women. According to UNDESA (2013), gender does not only mean being men or women rather how their qualities, behaviors and identities are determined through the socialization process.

The gender difference is associated with power inequality, access to options and access to resources. The unequal positions of men and women although can change over time but they are influenced by various factors such as economic, culture and taboos, historical and religions.

In developing countries, women mostly are responsible for finding and collecting water for various domestic uses. These uses include drinking, washing, cooking and cleaning. Once girls are old enough they also join this effort of spending immeasurable hours trying to get this basic life necessity. Women and girls walk miles carrying heavy burdens or wait to get water for hours and pay unreasonable prices. This work of fetching water is back-breaking and consumes time and a lot of energy and money (IFAD, 2007).

Inadequate clean water locks the community particularly women in poverty circle as they fail to join schools or earn an income as it would be the case when there is enough accessible clean water. UNDESA (2013) point out it is acceptable for women to have a leading role in managing water in order to increase their access to water.

The study conducted by IFAD (2007) revealed collecting water for domestic uses is generally perceived as the role of women and girls in almost every developing country. If it happens that water is not adequate then it is women and girl's duty to find an alternative source. Also, the must care family members suffering from waterborne diseases resulting from consuming unclean water. Clean water available close to homes decreases women's workload and time spent in fetching water. This time, could be utilized in other productive activities. Most of the time women are therefore interested in water management initiatives that assure them adequate supply. They are also interested in using water efficiently (IFAD, 2007).

The WBWDRT (1993) conducted a study on the demand for water in different rural areas with the emphasis on determinants and policy implications. The study postulated that because women in developing countries face the hardship of fetching water they will place importance on improving water service and be more willing to pay than men. The study found out that women were more willing to pay than men

however the study admitted that it was not clear how gender was the determinant of the indicated willingness to pay in the area of study.

Another study conducted by Mezgebo and Ewnetu (2014) in order to find out the household willingness to pay for water in urban areas of Ethiopia. The study realized that female-headed households are more willing to pay for improved water services than their male counterparts. The study attributed this to the fact that female are responsible for fetching water and are directly affected by water associated problems.

Contrary, a study was made by Mugabi and Kayaga (2010) on the attitude and socio-demographic factors determining willingness to pay and the real paying behavior. The study assumed that since women perform household errands that need water then they will obvious be willing to pay for water. However, the study realized that men were strongly intending to pay their water bills quickly than women. The study implied that the reason for women to pay for water because they are dealing with water-related chores may not be valid at all.

2.10 Education and Efficient Water Resource Use

There is the need for people that understand the presence of world beyond where they live and work so that they can appreciate the influence of history and culture in their present actions. People that are capable of evaluating, thinking, speaking and documenting effectively the technical and non-technical water management initiatives are needed. Such skills are obtained when people have adequate education level (Lockus and Gladwell, 1999).

Educated citizen implements informed and sustainable water uses options which usually lead to efficient exploitation of water resources. Better community-based choices that affect social, economic and environmental welfare are influenced by educated citizens. Education increase economic status of families, raise life conditions and improve the probability of economic and social wellbeing. Individual and national implications are carried by increased education (McKeown, 2002).

Education raises people's awareness on the most appropriate ways to use water resources such as paying for water. By raising community awareness on efficient water use, as offered when people are willing to pay, it is possible to create a culture of water conservation and demand management in suppliers and users. The culture of conserving water is one of the most efficient ways to use water, but such culture takes place in educated society.

Improving water consciousness of water users and the capabilities of all that are responsible for water management within the area can be challenging that require education programs instituted to all level of society. Water consciousness at the grassroots level can be fostered through all level of education and can ensure sound handling of scarce water resources. The need for people to be educated is urgent when people themselves are part of the water distribution system as is the case of domestic water supply. Only when users understand the need for conserving water they will be interested in water management including paying for water to attain economic efficient use (Lockus and Gladwell, 1999).

The study conducted by WBWDRT (1993) on the demand for water in different rural areas with the emphasis on determinants and policy implications found that better-educated households members are more willing to pay than uneducated ones. Another study was conducted by Khan et al (2010) on Hayatabad Town, Pakistan to estimate the willingness to pay to improve the quality of drinking water. The study found out that awareness and education level significantly determines households willingness to pay for improved drinking water.

Other studies provide contrary results which do not reflect what is expected to be offered by an increase in education regarding resource management. Bamimore et al (2015) conducted a study to evaluate factors that influence compliance with the payment of improved household water supply service in Akinyele, Nigeria. The result of this study indicated that education level has no effect on the willingness to pay for water, thus has limited contribution to the efficient water use as conceptualized in this study.

2.11 Income and Water Use

Income is one of the primary forces determining water use. Mini (2013) argues that income and water use are highly associational. With this regard, the motivation to conserve water should be given to higher income customers since they are higher water users. Focusing on higher water user groups will facilitate water savings and equitable water expense allocation among user groups.

Access and use of water services depend on and can be modified by Income. Increase or decrease in Income modifies the choice of livelihood strategies that have a positive or negative impact on water consumption. Measuring consumed water and increasing water price are important regulating devices of decreasing water utilizations. Nevertheless, they have the risk of excluding low-income groups from basic water services. The willingness to pay bids should, therefore, be positively associated with income and the costs of getting water from the existing sources (Whittington, Davis and McClelland, 2003).

Household income is a significant factor that affects the willingness to pay for water. This was found through the study conducted by Banda et al (2007) in the attempt of analyzing the likelihood of a household to pay for improved quality and quantity of water services in South African rural areas.

2.12 Conceptual Framework

The figure 1 bellow is the conceptual framework of this study. It is based on the notion that water points are subjected to the institutional arrangements being collective ownership or public private partnership. These arrangements determine how the resources is owned and accessed. The collectively owned water resources are subjected to overuse and depletion as basically the resources is not used in a most efficient way. The collective ownership of water resource is accompanied with high transaction costs of reaching agreements on how to use the water resource.

The public private partnership ownership of water point leads to the economic accessibility of clean water. This is because this kind of ownership is composed of strong institutions that lower the transaction costs involved in reaching agreements

on how to use the resource. These institutions are property rights, rules, regulations and the agreed norms on how to use water resource.

These institutions play an important role in shaping the incentives and human behavior on how to use water resources in an economic efficient manner. The minimum transaction cost offered by these institutions drives people to pay for water which is an indication of efficient water use. When community members are willing and pay for water, they will restrict themselves from unnecessary and excessive uses of water and hence economic water use. Moreover, income generated from water use will maintain water source and thus guarantee sustainability. If people are willing to pay for water, it is an indication of the value of water.

Figure 1 shows that property rights which reduce transaction costs incurred when water points are owned collectively provide incentives for allocating water in an economic efficient way. This is because property rights exclude free riders by introducing the price for water resource use. By excluding free riders it is possible to assign the price to the water uses. Property rights that are well defined and backed up by informal rules lead to efficient water use.

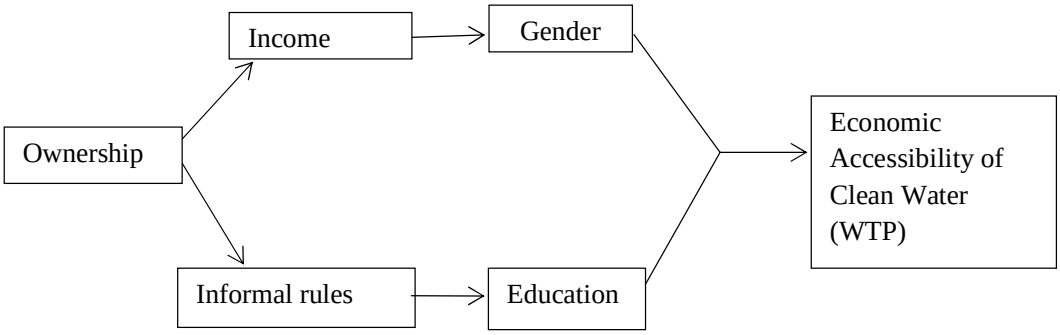


Figure 1: The conceptual framework

As indicated in figure 1 above, income contributes to the economic accessibility of water. When people have an adequate income they have the ability to pay for water services. This ability to pay for water assures them to access water at a price set by water providers. Moreover, the increase in education to the community members leads to the efficient use of water. This is because education increase knowledge of

the community members and therefore they will understand the value of water and importance of using it efficiently. The figure also shows that gender plays an important role in the economic accessibility of water. Women are most of the time involved in domestic activities that involve water use. Therefore they will be more willing to pay for water and they will be using water efficiently to avoid frequent fetching and reduce income spent in the water.

Out of figure 1, one modal was theorized to be used in the analysis. In this modal, the economic accessibility of clean water was conceptualized as the willingness to pay for water (WTP) which is the function of property rights, informal rules, income, education and gender.

WTP = f (G, E, Y, P, I)……. (2)

Where:

WTP = Willingness to pay for water services

G= Gender

E=Education Level

Y=Income

P=Property rights

I=Informal rules

This model was tested to find out which factors are influencing the willingness to pay for water.

$$WTP = a + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + B_5X_5 + u \ldots\ldots\ldots\ldots\ldots (3)$$

2.13 Summary

When water resource is owned collectively it will not be used in a most economic efficient way because there is high transaction costs associated with excluding free riders and reaching agreements on sufficient amount of water to be used. Property rights reduce the transaction costs of owning water points collectively. Informal rules

have a great contribution on economic use of water resources by defining the day to day water allocation and providing the foundation for the property rights to function well. Both property rights and informal rules provide the incentives for efficient use of water by introducing water pricing and allocate water to those that value it the most and are willing to pay. Paying for water is an indication that water is valued and will be used efficiently.

Income provides the community members the ability to purchase water and pay for improved water services. When people have the adequate income they will be willing to pay for water and they will use water efficiently. Moreover, the increase in education level increases the community awareness on the importance of conserving water and paying for it in order to cut unnecessary uses and improve the water supply system. Also, women are more willing to pay for water and conserve it than male because they are mostly involved in carrying domestic activities that involve water use.

CHAPTER THREE
RESEARCH METHODOLOGY

3.0 Introduction

In this chapter, the view of the researcher is expressed to clarify the reason behind the choice of the methodology used in this study. The main purpose of this chapter is to present the methodologies adopted in this study. The chapter describes the design of the study, the methods, and techniques employed to sufficiently collect and analyze data that explains the objectives of the study. These designs include the explorative design that explains the explorative part of the study, the explanatory, descriptive and triangulation of method design.

The chapter also describes the area that the study was conducted, the sampling techniques that were used in selecting the sample as well as the sample size that was used in this study. The sources of data and methods of collecting them were also discussed. These methods are the interview, survey questionnaires and focus group discussion. Moreover, this chapter shows method and steps that were used in analyzing the collected data.

3.1 Research Design

The research design is like the comprehensive map that leads the researcher to reach the research objectives. It is an intangible structure within which the research is done (Adam and Kamuzora, 2008). It is a rational arrangement that joins the observed data to the study's early question and eventually to its conclusion. It is like a plan of getting from here to there, where here refers to initial questions to be researched and there refers to findings and conclusion about these questions (Yin, 2005). Almost the same argument was made by Chamwali (2007) that research design is the preparation of circumstances for gathering and scrutinizing data in a way that aims to join relevance with research purpose and economy.

The research design used in this study was case study based on Yin (2005) as applicable to Mlali ward because it is supple in data collection and analysis, and because it offers depth and breadths of the study variables. Yin points out that case study is empirical inquiries that investigate contemporary phenomena within real life

situation when the boundary between phenomenon and context is unclear and multiple sources of evidence are used. This study went beyond the quantitative statistical results and provided the understanding of factors affecting willingness to pay for water. The study used qualitative and quantitative data which according to Tellis (1997) helps to explain the process and results of the phenomenon by completely observing, reconstructing and analyzing cases under research.

According to Yin (ibid), the research design for the case study is categorized as exploratory, descriptive and explanatory designs.

3.1.1 Explorative design

The research started on Saturday of 5th July 2015 whereby the researcher left to Mlali ward to familiarize with the study area and to carry out the prior introduction to village government. The researcher observed that various water points present at the study area. Moreover, the researcher noted that there are numerous hamlets each having at least one public water tap as well as the private water taps installed to households. The explorative design was used at the beginning and at the time researcher went to Mlali ward to determine whether it is feasible to conduct the study. According to Heir et al (2003), the explorative research is used to develop a better understanding, find new insight, to find out what is happening, to ask questions and to assess phenomena in a new light. It major at acquainting with a research topic or new study area little that is known. In his exploration, researcher began with the rationale of conducting research at Mlali ward and direction even though some of the initial assumptions later were proved wrong. The rationale for conducting this research at Mlali ward being the presence of many water points but still there is the persistence of clean water scarcity. This same degree of rationale and direction underlie an exploratory case study like Christopher Columbus on his exploration of the New World (Yin, 2005). The researcher has to go collecting data at villages of Mlali and return every day for three weeks.

3.1.2 Descriptive design

The descriptive design is usually planned to measure features described in research question. It depicts the precise profile of individual situation or event. This design intends to portray some features of a person or group that the researcher aims at

gathering data from before the real data collection starts (Sounders et al, 2003). In this study description of individual characteristics such as marital status, sex, education level, economic activity and level of income were described. Also, the phenomenon such as willingness to pay for water and its contribution to the economic accessibility of clean water was discovered in this study. This goes in line with the statement by Yin (2005) that descriptive design track down arrangements of interpersonal actions over time, describe subculture that hardly has been studied and learn new phenomena. This kind of design also is supported by Kothari (2004) who stated that descriptive design aims at describing features of specific individual or group.

3.1.3 Explanatory design

This study also used the explanatory design which basically is concerned with effects one variable has on the changes of another variable. The design is used when there is the necessity of showing that one variable defines the values of other variables. According to Cooper and Schindler (2003) in explanatory studies the researcher uses theory or at least hypothesis to account for forces that caused the certain phenomenon to occur. In this study the explanation of how sex, education level, Income, ownership of water resource and informal rules governing water use affect community member's willingness to pay for water was conducted. This tally with an explanation provided by Yin (2005) that the aim of the analyst should be to pose the challenging explanation for some set of events and show how such explanations may relate to other circumstances. Therefore the research was explanatory as the causal relationship of variables was explained.

3.1.4 Inductive study design

In this study, the inductive design was used whereby the researcher began by collecting data relevant to the Water Point Institutional Arrangements and Collective ownership in Mvomero District. After the substantial amount of data was collected, the researcher looked for patterns in the data and worked to develop a theory that explains those patterns. This is supported by (Soiferman, 2010) that researcher taking inductive approach begin with a set of observation and then move to general propositions from particular experiences. In other words, researcher moves from

data to theory or specific to general. This design was used because it is comprehensive and suitable where little or nothing is known about the study phenomenon (Silverman, 2004).

3.1.5 Triangulation of method design

In this study triangulation, which is the mixing of the different method to study the same phenomenon was used. According to Perone and Tucker (2003), triangulation is the blending of qualitative and quantitative data in the study to give it a broad and a deeper perspective. In this study, the qualitative data were collected through interview with key informants and focus group discussions with people at the water point. The quantitative data were collected through survey questionnaires. Triangulation of method was used in order to have multiple sources of evidence essentially providing multiple measures of the same phenomenon and increase the validity of the results. The use of this design is supported by Yin (2005) who stated that "Any finding or conclusion in any case study is likely to be much more convincing and accurate if it is based on several different sources of information, following corroboratory mode". Moreover, Silverman (2004) point out that the use of triangulation for the purpose of validating the findings has been seen as philosophically problematic, but the critics for this technique do not dispute its validity from augmenting the findings.

3.2 Description of the Study Area

Morogoro region is made up of six districts including Mvomero where the study was carried. The district borders Handeni district to the north, Bagamoyo district to the east while Morogoro municipal and Morogoro rural districts border Mvomero to the south. Kilosa district borders Mvomero to the west (Liberio, 2012). The district has a total area of 7,325 square kilometers that are divided into 4 divisions, 17 Wards and 101 villages administratively (Liberio, 2012).

From all these 17 wards the study was specifically conducted in Mlali ward which is situated at the center of Morogoro region about 18 kilometers southeast of Morogoro town. The size of the ward is about 288 Km^2 and according to the latest census of

2012, there were 19,623 people living in Mlali ward (URT, 2012). The ward has a total of five villages which are Mlali, Mkuyuni, Kinyenze, Kipera and Vitonga.
Biophysically, the agro-ecological zone of the ward is made up of lowlands and river valleys ranging from 520 to 760 meters above sea level (URT, 1997). The climatic condition of the area is sub-humid with bimodally distributed rainfall. Mid-march until late June is characterized with heavy long Masika rainfall while short rains of Vuli fall in November to January. The average annual rainfall is 890 mm and the mean annual temperature is 24° Celsius (Below, 2010)

Mlali is the center with rapid population increase accompanied by many social and economic activities like cultivation and selling of crops and vegetables. This has led to high water consumption at an increasing cost. Water supply in Mlali is done through the gravity water scheme. In general, water is scarce. This water scarcity is a serious resource and environmental concern and there is a possibility that water is being consumed at a rate exceeding what efficiency criteria would dictate especially when externalities are taken into account.
Mlali Water Body as an entity owning water points has to charge a fee to the water users. These funds are then used for operation and maintenance of the scheme as well as to increase the number of water points. Giordano and Villholth (2007) points out that water supply delivery to the households and other end-users are best provided by autonomous entities organized as utilities delivering defined services to customers for a fee. All of these are possible only if water users are willing to pay for water services.
Crop production is the major economic activity and source of livelihood in the study area. Main crops that are grown for food include rice, maize, sweet potatoes, cassava, vegetables and plantains (Lalika, 2007). Also, the cash crops cultivated include cabbages, vegetables and fruits which are sold to the increasing populations of Morogoro town and Dar es Salaam. Other economic activities practiced apart from agriculture include livestock keeping where people keep chicken, cattle, goats and sheep (Amanzi, 2011). Diversification of economic activities is also common to other activities such as petty trade, casual labor and employment in rural areas (Amanzi, 2011).

Mvomero district specifically Mlali ward was chosen for this study. This is because there is a water project that consists of 20 working water points in the ward that provides water to the community members. There is no particular study that has been conducted to assess collective ownerships and institutions arrangements in these water points and thus making the possibility of providing the sample that is representative and relevant to the study.

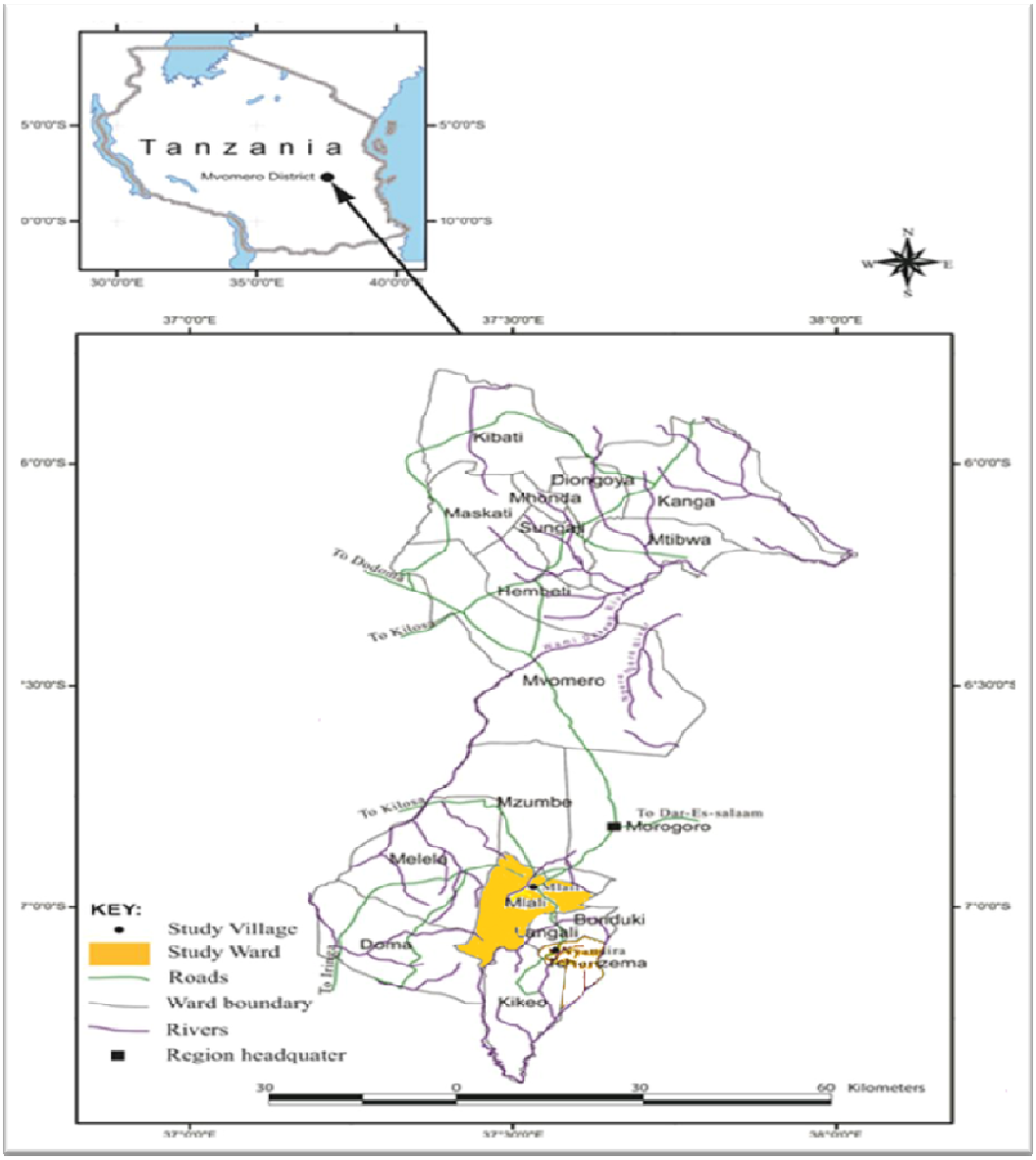


Figure 2: The map of Mlali ward

3.3 Sampling Design

Sampling design means the technique or process used by the researcher in choosing the items for the sample (Kothari, 2004). The researcher used purposive sampling techniques in this study to select ward and Villages that have water points. Although the procedure of purposive sampling did not provide an entirely random sample it was considered to be the most efficient procedure for obtaining a representative sample of the population in terms of the variables considered important for the study. The simple random technique was used to get sample size from the targeted population.

3.3.1 Purposive sampling

In this type of sampling, researcher purposively selects a specific unit of the universe for creating a sample on the ground that the small mass they so choose out of huge one will be a re[presentation of the whole (Kothari, 2004). Purposively sampling was applied since it permits the researcher to select respondents that have information that illustrates some features or process of interest to the study. The purposive sampling was employed to sample respondents for interviews; the following key informants were drawn WEO, VEO and District water engineer and village water committee members.

3.3.2 Random sampling

Random sampling is a method of choosing sample which each sample combination has an equal chance of being selected and each element in the population has equal possibility of being included in the sample (Kothari, 2004). Simple random sampling technique was employed to select 100 respondents at various water points; the sampling technique was used to avoid bias in collecting information from water users. The list of all water points was obtained from the Ward executive Office.

3.3.3 Snowball sampling

This is non-probability sampling procedure used when the researcher is not sure if respondents have relevant data of the study but the researcher knows few of them that have (Adam and Kamuzora, 2008). Snowball sampling refers to the method designed to yields a study sample by reference made by people that know of others

that have some features that are of interest to the researcher. In this study community knowledge on people having knowledge on water points were put into practice to recommend and select village water committee members, village water engineers and wards water body members.

3.4 Sample Size

The whole population could not be subjected to research. Instead, the sample to represent the whole population was taken. According to Zikmund (2003) if the sample is satisfactory it will have the same features as the population. The sample size consisted of 100 respondents selected from Mlali ward. The sample of 100 respondents was perceived to be adequate because was neither too small nor too large. According to Hair (2006) small or very large sample has a negative impact on the statistical test because either the sample is not big enough to make the generalization or too big to reach the conclusion.

Moreover, Tabachnick and Fidell (2007) point out that for regression analysis a sample of N>50+8M is adequate where M is the number of independent variables. The study has five independent variables and the researcher selected those respondents randomly to provide information through survey questionnaires. The respondents have different demographic and socio-economic characteristics.

3.5 Data Collection Techniques

No information source is better than the others (Yin, 2005). When gathering information for this study of Water Point Institutional Arrangement and Collective Ownership in Mvomero district, a major strength was the opportunity to use many different sources of evidence that helped the researcher to obtain multiple measures of the same phenomenon that added validity to this scientific study. In that respect, the following data collection techniques were used; survey questionnaires, Interview and focus group discussion.

3.5.1 Survey questionnaire

The questionnaire is made up of questions printed or typed in a certain order on a form or set of forms (Kothari, 2004). Questionnaires are supplied to respondents that read, understand and reply the questions in a space designated for the purpose of the

questionnaire. Respondents are expected to answer the questions on their own (Kothari, 2004). The method was used to gather data from water users. Questionnaire method was chosen because deemed to be an appropriate method of collecting enormous data from a huge number of respondents in a short time and low cost. In this study, both closed-ended questions, as well as the open-ended questions were employed to gather data from 100 water users.

The questionnaires were designed in English and then translated into Kiswahili, to make them easily understandable by respondents in the study area. The questionnaires were distributed to the respondents found at the water points so that they can read them, understand and fill the answers in the space available after each question. In some cases where respondents were not able to read and understand the questions then face-to-face interviews with respondent were done where the questions were read aloud as it appears in the question paper and probed in a non-leading manner and responses obtained were recorded by the researcher in an order related to questions.

3.5.2 Interview method

The interview guide was prepared to direct the two ways systematic conversation between the researcher and the respondent. A total of twenty interviews were undertaken. These interviewees were composed of both male and female members. The respondents interviewed were twelve village water committee members, one water project secretary, one ward executive officers and four village executive officer. In the District level, the interview was conducted by District water engineer who is in charge of the service provision for various wards found in Mvomero.

The interview was conducted after the completion of a questionnaire survey administered by the same researcher. While the survey questionnaires were concerned with gathering information about ownership of water points, formal and informal rules governing water points, willingness to pay and economic accessibility of clean water, the interview was conducted in order to get an in-depth information of the study and to supplement data gathered through questionnaire method. The use of interview to gather information in Mlali ward is supported by Silverman (2004)

who argued that the strength of qualitative interviewing is the opportunity it provides to collect and rigorously examine narrative accounts of social worlds.

3.5.3 Focus group discussion

Focus group discussion is a form of an interview with a group of 6 to 10 people controlled by a moderator in a lightly arranged discussion on different topics of interest (Greenbaum, 2000). Two groups were led to a participative and lively discussion by the researcher who introduces the topic to them. Focus group discussion was carried in order to collect quickly data from large participants. It was also conducted because it is natural and allow built up from the response of other members. In this study focus group discussion was used to gather information on water point ownership, formal and informal rules, willingness to pay and the economic accessibility of clean water. The use of use of focus group discussion to capture qualitative data is supported by Silverman (2000) that if one aims at exploring life histories of people or everyday habits then qualitative methods are the favorite. The qualitative methods used in this study to obtain people's habit toward economic accessibility of clean water in the selected villages.

3.6 Data Analysis

Data analysis which always comes after data has been collected consists of examining, categorizing, tabulating, testing or otherwise recombining both quantitative and qualitative evidence to address the initial proposition of a study (Yin, 2005). After enough data has been collected then the questionnaires were put into groups, edited to detect errors and omission of unwanted information. Data entry started on 10th September 2015 using the Statistical Packages for Social Sciences (SPSS) version 18. The software was used to help to code and categorize a large amount of narrative text collected from open-ended interviews and from the questionnaires.

Qualitative data was also collected through interview and focus group discussion. A thematic content analysis was used to analyze qualitative data generated by interviews and focus groups. Content analysis was used to help to reduce the volume of recorded information that represents some characteristics of the research. In this

aspect conceptual analysis which creates the basis for occurrence and importance of concepts and phenomenon in a text was used. Also, a relational analysis which examines the relations among concepts and situations were applied. According to Silverman (2004), Data analysis techniques suitable for analyzing interview data are equally applicable for use with focus group data.

Data collected through survey questionnaires were summarized and coded. A computer Programme of Statistical Package for Social Sciences (SPSS) version 18.0 was employed for this data analysis where relationships between variables were shown. Both descriptive and inferential statistical analyses were used in the study. SPSS was used to compute descriptive statistics such as frequencies and percentages. Inferential statistics such as multiple linear regression models was also used to analyze the quantitative data.

3.6.1 Analysis of Factors Leading to Economic Accessibility of Clean Water

The economic accessibility of clean water will be achieved when people are willing to pay for water. In order to identify factors that influence the willingness to pay for water services in Mlali, data collected for this study were analyzed by using a multiple linear regression model. This model was appropriate in determining the factors which had significant influence to the willingness to pay for water services. Five variables were regressed in the equation in order to determine their significance influence they have on the willingness to pay. The multiple linear regression models expected to answer the theoretical explanation in Section 2.9 which assumed that when people are willing to pay for the water they value the water resource and they will use it in an economic efficient way.

Multiple linear regression was to establish the relationship between the willingness to pay and the independent factors that affect it. These independent variables are Gender, education level, income, property right and informal rules governing water use. Multiple regressions were used due to its ability to explore associations among variables and thus are ideal for exploring real-life inquiries questions. In this regression, all independent variables were subjected into the equation

simultaneously. Independent variables were then evaluated using its predictive power over and above that offered by other independent variables.

The linear regression equation was constructed based on borrowing what was written by Pallant (2011), in order to analyze variables by using SPSS. The equation formed was such that

$$WTP = \beta_0 + \beta_1 GEN + \beta_2 EDU + \beta_3 INC + \beta_4 PROP + \beta_5 INF + u \ldots\ldots\ldots\ldots (4)$$

Where;

WTP	=	Water user willingness to pay for water
GEN	=	Gender (Sex of respondent with 1= Male and 0=Otherwise)
EDU	=	Education level (1= if had not attended any level of education, 0= if Otherwise)
INC	=	Income
PROP	=	Water point ownership (1= if fetching water from MWB owned water point and 0= otherwise)
INF	=	informal rules for water use (1= if there is water rationing and 0=Otherwise)
β_1 to β_5		Coefficient of the n^{th} Predictor
u		Random error term

3.6.1.1 Description of the Variables

i) Dependent variable, the willingness to Pay

Willingness to pay for water influences individual in accessing and use of water resource in an economic efficient way. In order to get a single member who is willing to pay, respondents were asked to respond to the question asking if were willing to pay for the amount of water they are getting. They were required to answer yes if they are willing and no if they are not willing to pay.

3.6.1.2 Independent Variables for Willingness to Pay

Gender (GEN)

Gender was presented by Sex which is a biological difference between male and female. This is measured on a nominal scale. In order to analyze sex, a dummy variable was introduced with 1 representing male and 0 otherwise. It is assumed that a positive relationship exists between WTP and female respondents because they are the ones who take care of domestic chores which involve the use of water. Hence they will be more willing to pay than their male counterpart.

Education Level (EDU)

Attending to formal school equip people to understand better the consequences of using water inefficiently. Moreover, education creates awareness, stimulate self-confidence, motivation and positive attitude. So it was assumed that people with higher formal education are more likely to value water and be more willing to pay for it compared to less educated people. This is due to the fact that increases in education level increase individual's level of knowledge on the importance of paying for water and power of defending claims to water resources management. Therefore, the educated will be more willing to pay than the illiterate.

Education level was measured in ordinal scale that was grouped into illiterate, primary education, secondary education, tertiary education (vocational), University (undergraduate) and university (graduate). For analysis, dummy variables were introduced with 1= if had not attended any level of education and 0 = otherwise.

Respondents Income (INC)

The state of having an Income affects individual ability to access and use water resource in Mlali. It was assumed that those with higher income are expected to be more willing to pay for water resource than those who have little or no source of income. The increase of income increases individual willingness to pay for water resource by increasing the ability to pay whenever using water resources.

In order to measure income, the respondents were asked questions and the ordinal measure of the total income earned per year was developed. These questions were based on respondent's occupation; type of crops produced and the amount of income

earned from additional activities. Then the total income earned was computed by simply summing up the amounts earned from these sources.

Property Rights (PROP)

The property rights were conceptualized by the ownership of water resources. When water resources are owned by well-organized formal institutions such Mlali water Body, community members have the guarantee of having access to water. People who pay the water bill or water fee to this institution have the power to claim for water service they pay for. Also, the institution has the responsibility of influencing people to pay for water in order to have funds for sustaining the project and conserving water sources. In this situation, it was assumed that when water points are owned by Mlali Water Body community members will be more willing to pay so that they have access to water than when water points are owned collectively.

Water point ownership was measured in ordinal scale with answers for ownership being grouped as the Mlali water body, Community, Village government and private operators. For analysis dummy variable with value '1' was assigned to water points owned by Mlali water Body or '0' if otherwise.

Informal Rules Governing Water Use (INF)

Informal water rules help in day to day management of water resource use. They are the powerful tool in managing water use in the rural area since they are accepted and respected by all members of the society. With this regard, it was assumed that presence of water rationing as informal rules governing water use will increase the community members' willingness to pay for water. Rationing also will increase the efficient use of water through reducing unnecessary uses. Water rationing was measured by the nominal scale of "Yes" to indicate the presence of rationing and "No" if there is no rationing. The dummy variable with value 1 was assigned for the presence of water rationing or 0 if otherwise.

3.6.2 Multicollinearity Test

Before the regression was conducted the multicollinearity which is the relationship between the independent variables was checked. It is said that the multicollinearity exists when there is a strong correlation between two or more predictors in a

regression equation. The multicollinearity is undesirable because if it is included in the regression equation would lead to instability of the regression model (Bryman and Cramer, 1993).

Multicollinearity was evaluated using the Tolerance and Variance Inflation Factors (VIF) estimated for each independent variable in the regression equation. Independent variables tested for multicollinearity agreed with the assumptions, which means that there was no multicollinearity and that the model was fine. This is the argument of Mtelevu and Kayunze (2014) that the Tolerance value of less than 0.1 and VIF above 9 suggests a problem of multicollinearity.

3.7 Research Quality Issues

The validity of the research implies that how well the research instrument allows the researcher to hit the center of research objective. It is understood as the degree to which an explanation correctly depicts the social phenomena it refers (Silverman, 2004). To ensure the validity of this study, data were collected from water users from four different villages. This ensured that the presentation of views from the whole ward.

Reliability implies the level of constancy that cases are assigned to the same category by various observers or same observer in different occasions (Silverman, 2004). Reliability aims at ensuring that if later investigator follows exactly the same process as stipulated by the early investigator in conducting the same study all over again, the later investigator will reach the same findings and conclusion (Yin, 2005). To ensure reliability in this study three data collection methods were used. These are the interview, focus group discussion and questionnaires. Moreover, the questionnaires were pretested first to ensure the common understanding of the questionnaires among the respondents before the actual field.

CHAPTER FOUR

PRESENTATION OF FINDINGS

4.0 Introduction

The main objective of the study was to examine the institutional arrangements and collective ownership of water points in Mvomero District of Morogoro, Tanzania. The study was conducted in Mlali ward. This chapter is, therefore, going to describe the results of the study in accordance with the objectives. The chapter specifically attempts to Gender, Education level and income of water user in relation to efficient water use. Moreover the presentation of the institutional arrangements for water use, ownership of water sources and rules governing water use and their influence to the willingness to pay for water services has been done.

4.1 Gender of Respondents

The study sample comprised of both male and female respondents. Table 4.1 below shows that female respondents were 72 % of all respondents while male respondents were 28 %. The study findings imply that females are mainly involved in fetching clean water at the water points for various domestic consumption purposes. Few male respondents at the water points as shown in the table are forced to fetch clean water mainly as income earning activity since they have to sell water to other people that are not able to fetch water at the water points.

Table 4.1: Sex of Respondents

Sex	Frequency	Percentage
Female	72	72
Male	28	28
Total	**100**	**100**

4.2 Education level of respondents

The education level of respondents was categorized into six groups which are informal education, primary education, secondary education, tertiary education (vocation), university education (undergraduate) and university education (graduate). Table 4.2 below show that majority of respondents (58 %) have attained primary education. The table further indicates that 19 % of respondents have not attained formal education, the amount which is equivalent to the respondents that have

attained secondary education while 4 % of respondents have attained tertiary education.

Table 4.2: Respondents Level of Education

Education Level	Frequency	Percentage
Informal education	19	19
Primary education	58	58
Secondary education	19	19
Tertiary education	4	4
Total	**100**	**100**

From the table 4.2 above it can be noted that no respondent was found who have attained university education as undergraduate or graduate found at the water point. Education increases people's knowledge and changes their attitudes positively toward water resource use. In turn, this helps in determining how the villagers manage the water resources. Education creates awareness and positive attitudes towards resource use. From the data obtained in the study area, it is clearly that the level of education is low. This implies that this community with such low education level will have limited knowledge on how to manage and use water resource in an efficient way, thus more stress on these resources.

4.3 Income Level of Respondents

From the data obtained in the study area, the income level of the respondents was obtained. The reflection on income distribution among the researched population is vital for analyzing water uses and as well as the willingness to pay because income influences them greatly. From the survey questionnaire, it was noted that respondents earn different levels of income per year with a relatively high level of dispersion. In average the respondents earn an income of 1,239,790 Tshs per year. The high average annual income for the households could be the results of participation in agriculture as well as the diversification of other economic activities.

As it was noted that respondents have varying level of education attained ranging from informal education and primary school level education. Others though few, have attained above secondary education level. These differences in educational

attainment could also explain the divergence in income levels between the respondents.

4.4 Sources of Water in Mvomero District

Mlali ward is faced with water shortage especially during dry season. As a result, the district council has rehabilitated the existing water points and builds several new ones so as to promote the availability of clean water. Currently, there are 27 water points, all of them are functioning. A water project was started with financial assistance from World Bank. The project was designed to serve four villages. Villagers will access water from these water points for domestic purposes.

Four kinds of water sources were discovered in Mlali. They are River, wells as well as private and public water taps. People using water from the private taps are mostly located in the area close to the main water supply pipes. Collective taps are found in the areas with a high population like at the Centre of the town where people perform economic activities like restaurant cooking, selling local beer and around the marketplace. Collective water taps also were found in the area that people cannot afford to connect private water taps in their houses. Water from private and collective taps is used for cooking, drinking and other domestic chores. It was also found out that river water and wells were present but they are not frequently used unless there are high water shortages. If there is no water shortage the water from wells and river are used mainly for irrigation, washing clothes.

Respondents revealed that water from private and collective taps are considered clean and people prefer to use it the most. Water from River and wells are considered unclean and are mostly used during the dry season or during water shortage periods. This is because this kind of water is considered not safe and clean.

It was found that some people were able to install water taps at their homes for private use. But other people residing near these taps tend to fetch water there instead of fetching at the public water taps. Information from the data collected also show that the majority of people get clean water as they perceive from public water taps.

"*Few people have installed water pipes in their homes but the majority of them get water from water public water taps that are currently under village government but soon they will be handled by the community. Sometimes people are forced to fetch water from river and wells"* (WEO, Mlali).

Respondents also revealed that houses connected with private taps access water all day every day contrary to those depending on public water taps, river or wells. Distance to the source and time needed to collect water limit them from frequently fetching water. They added that distance force them to fetch water less frequently may be once or two trips per day.

4.5 Ownership of Water Resources

Data from the study area indicated that water resources are owned differently depending on the type of source. It was found that private water taps are owned by private or individual households. The owner has control over the use of water at the tap but also has the responsibility of amending whatever damages occur at the tap. Also, there are collective water points that owned by the village water committee. Community members that fetch water at these collective water taps are responsible for overseeing, controlling and repairing the water tap in case of minor damages.

It was found out that both private water taps, as well as the collective water taps, are part of the gravity water project that has been rehabilitated by the district council under the financial assistance from the World Bank. This project is owned by the Mlali Water Body that comprises of members that have been elected from respective villages through village meeting. Other members of the water body include water technicians, ward executive officer, and village executive officers.

The results from questionnaire survey as indicated in table 4.3 below shows that 13 % of respondents claimed that water resources are owned by community members, 54 % revealed that water resources are owned by water body. The table further shows that 26 % of respondents pointed out that the water resources are owned by private households while 7 % notified that water points are owned by village government.

Table 4.3: Water points ownership

Ownership	Frequency	Percentage
Water body	54	54
Private household	26	26
community	13	13
Village government	7	7
Total	**100**	**100**

Results revealed that majority of the respondents (54%) state clearly that water resource they use is owned by the village water body. This is because they fetch water at the collective water taps which are part of the water project. Despite the fact that the project is owned by water body but since the project has not yet completed then it is still under the supervision of the village government. The project will be returned to the water body once all the construction and rehabilitations has been completed.

Since these sources are currently owned by the village government until the rehabilitation project is completed, sometimes Mlali people are faced with water shortages. The water shortage problems that currently takes place in Mlali might be due to the failure of the government to provide equitable water supply. According to Ringler and Wang (2010), the government generally lacks the capacity to ensure effective water administration, especially at the local level.

Table 4.3 above also indicates that about 26 % of the respondents revealed that water resources are owned by the private household. This is due to the fact that those households that are connected to the private water taps have a control the taps. It was found out that tap owner is capable of supplying water to the neighbors by setting agreements with them on how to fetch water and the contribution of water bills.

Moreover, about 7 % of respondents revealed that water resources are owned by village government. This might be due to the fact that community members do not fully understand and recognize the Mlali water body as the authority responsible for domestic water supply. Also about 13 % of the respondents pointed out that water points are owned by the community. This is because of the presence of wells and

rivers that are free of access and no one seem to manage and control them except for the community members through the use of informal rules.

It was found out at the time the study was conducted that there are river and wells that are commonly known as “Visima vya Mdundiko” that are accessed freely. These sources are not usually used since its water is perceived as not clean. They are used mostly during dry seasons or at the time of water shortage. Both river and wells are commonly owned. Any community member can access water at these sources freely. Through interview conducted, interviewee pointed out that it is much difficult to protect river and wells compared to the protection of water taps. This is because any community member can use water at the wells or river as he/she pleases. These uses are not sustainable because resources that are used commonly induce inefficient use due to strategic interactions between users.

These findings go in contrary to the statement provided by Yacoob (1990) that community ownership is flexible to suit water supply structures that meet local needs and applying it will lead to sustainability of rural water schemes.

4.6 Rules Governing Water Use

Accessing domestic water from a tap is an indication of getting connected to a formal water supply system. Through interview conducted at the study area, it was realized that access to domestic water supply is regulated by Mlali Water Board (MWB). MWB is a public institution in that it has statutory and legal responsibilities for the provision of water to all users. Its activities are restricted to Mlali ward. It is the water user association of individual water users at Mlali and undertakes water related activities for their common good. The MWB operates under government formal rules and policies that stipulate ways in which water resources can be allocated in an efficient manner. Also, the MWB operates under the customary laws and practice related to water management leading to efficient water use. This is so because water uses in an area under the control of a WUA are recognized lawful water use.

MWB helps in forming suitable motivation arrangements for encouraging water users to perform activities with the high advantage but also consider community agreement or power structures by explaining their rights over the use of water and establish the boundaries within which they have to operate. These rules also have the

role of providing legality or constraints and limit to water provider which reduce the transaction costs of self-enforcing rules.

Mlali water Body implements the formal rules as they are provided by the government statutory bodies. One of the rules that the MWB is implementing is through allowing water users to participate fully in determining rules to access water, facility maintenance and allocating water. This is clearly stated in the water policy that facilities for supplying water and sanitation are not properly operated, maintained and are unsustainable if there is no active participation of beneficiaries (URT, 2002).

The MWB is formally recognized as user association responsible for supplying water in Mlali village. From the interview conducted it was found that other roles of MWB are the collection of water use fees from users and protecting water infrastructures in collaboration with water users. Other purposes included rationing water to the villages as per timetable which will reduce conflicts between community members in relation to the joint use of a water resource.

Another role of MWB is to use the collected water fees for sustain the project. These roles of the Mlali Water Body goes in line as the 2002 water policy stipulation that water user association is the lowest suitable management level responsible for managing allocated water resources.

The focus group discussion revealed that formation of Mlali Water Body was one of the conditions that were provided by the World Bank as the major sponsor for the rehabilitation of the water project. Community members of Mlali then agreed to form MWB to fulfill the required condition but also to have an entity that has the purpose of managing, distributing and conserving water from water intake used jointly by users who are the community members. All community members are supposed to have a voice in this body to ensure water allocation and management is appropriate to the physical conditions and demographic character of their area although it is not always the case in Mlali.

Through interview conducted to the village of the four villages, they revealed that they are not members of the water user associations. Furthermore, the majority of them they are not even sure if there is a water user association present at their

villages. They argued that even if Mlali water Body is present as a water user association, it have a very limited role in the water management. This is supported by Komakech (2014) that WUAs formation procedures are hindered by the unclear registration process and some registered users do not feel that associations are valid.

Apart from interview and focus group discussion also the survey questionnaire was conducted regarding knowledge and presence of water user association in Mlali. The result from survey questionnaire matches those from the interview. Respondents of the survey questionnaire provided answers that are as presented in table 4.4 below that 17 % of respondents when asked if they are members of water user associations in Mlali ward agreed while 83 % of respondents notified that they are not the members of water user association.

Table 4.4 Membership of water user association

Member of WUA	Frequency	Percentage
Yes	17	17
No	83	83
Total	**100**	**100**

The results indicate that people in Mlali have no knowledge of the presence of water users associations despite its major role in enabling the community to participate in water resources management. This is because people were not fully involved in the formation of the Mlali Water Body since it was just a condition imposed by the World Bank that in order for the water points to be rehabilitated the water body has to be formed also. The findings go in contrast with statement pointed out in URT (2010), the objective of establishment of Water Users Association is to ensure that water resources are managed primarily by the users themselves within their areas of jurisdiction.

Regardless of the presence of MWB which is the legal water user association regulating water uses, this water entity is not strong in Mlali. Instead, most of the water resource allocation related issues are controlled by the informal rules. It was found out that there are unwritten but active informal rules and through water resource management instruments in Mlali. These rules play a vital role in

influencing access to water because they are flexible and have the ability to accommodate changes. This ability to detect and accommodate changes is needed in Mlali due to its increasing water uncertainty.

One of such informal rule is the application of water rationing, especially during dry seasons. This rationing is often applied as a mechanism to ensure that water is equally distributed to the people of all villages covered by the project. It was found out that there water technician who opens and closes the gate valve to direct water to the appropriate village as per agreed timetable.

Another informal rule involves collective actions where men and women who join to work collectively in building intake structures and installing pipes. This is supervised by the informal social networks such as hamlet water committee which ensures that each household participates in full but also receives adequate water at the water point.

The information regarding informal rules was obtained through Interview. The interviewee provided vital information concerning these rules. They notified that villagers develop and enforce rules that help to govern water use. Some of these rules are passed from generation to generation. These rules have evolved and have been used over time. Some of the rules are collectively developed through agreement by villagers through village meetings. These meetings are normally conducted under the facilitation of village and ward executive officers.

The informal rules have grown over time and operated in the safety of the community by creating the sense of ownership, commitment and responsibility among water users. This in return adds to the efficient water use especially preventing water resource degradation, improving water supply condition in terms of quantity and quality.

It was found that there are norms such prohibiting bathing, washing clothes and utensils in the water points. They are related to general hygiene around the water point. They specify and control water amount fetched and rate of water collection. Moreover, these rules they specify the uses to which water is subjected to and at

what time. The rules point out of villagers that can use a particular water point and their associated responsibilities. Moreover, they define fines and punishment for defaulters and point out modalities for the election of committee representatives.

Some other common norms that are used in Mlali as mentioned by the respondents are such that children are not allowed to play at water point and Taps are to be closed after every use. Moreover, livestock should not be kept at water point yard or wash any kind of vehicle. They also point out that water points have to be regularly cleaned by people using it. Also, the rules clarify that payments must be made through contribution and therefore members must contribute water fees whenever fetching water. These rules are actively applied in Mlali. They are backed by village government and social norms that govern water access. If a person fails to abide by the rules and regulations is being punished by the village government.

Community members know these rules and they use them very well to control water uses although they are not generally written. In case a person breaks these rules, water committee brings him or her to the village government to be penalized. Among the penalties that commonly mentioned by community members include repairing the damage caused or paying the fine in a monetary term that can reach the value of 50,000 or more depending on the damage or destruction caused.

Not only was that interview conducted in Mlali but also survey questionnaire. Respondents were asked if there any informal rules governing water use that they know of. The result obtained from questionnaire survey as shown in table 4.5 below indicate that 76% of the respondents said that informal rules were present. On the contrary, 22 % of the respondents claimed that informal rules were not present. Only 2 % of the respondents were not aware if the informal rules were present or not.

Table 4.5: Presence of informal rules on water use

Informal Rules	**Frequency**	**Percentage**
Yes	76	76
No	22	22
Don’t know	2	2
Total	**100**	**100**

It was also found out that day to day water allocation is governed through local water management practices. The motivation of setting these practices originates from the acknowledgment of the vital role played by water in supporting the livelihood of people in Mlali. These rules then serve as instruments to reach the results of efficiency by controlling access and water resource use. These informal rules are active and they contribute to achieving positive outcomes for water use and resource governance. They are crucial in water resource management to Mlali community.

4.7 Mvomero District Water Users' Willingness to Pay for Water Resources

Mvomero District Councils in association with the donors (World Bank) have provided the Mlali community with water supply scheme. The financial assistance for the scheme has been started by the World Bank after the request made by Mlali community through the District council. It was a requirement for the Mlali community to show their capacity to withstand the water schemes through contributions by the members before beginning of the project. Community members have to contribute 2000 per household so that to get the initial requirement of five million.

Respondents assured that they have not started paying for water but they will have to pay 20 Tshs per 20 liters of water. They pointed out that the cost of 20 Tshs is reasonable to them because they will be buying few buckets for drinking purpose only and use River or wells water for other purposes like washing and bathing. Few respondents were having the thought that the costs should be reduced. They claimed that the cost was expensive to them. They proposed the cost to be reduced because they don’t have reliable sources of income apart from subsistence small-scale farming. They argued that they do not earn much cash with this type of farming.

The majority of respondents, however, appealed that the price of 20 Tshs is reasonable to them and they are capable of paying it. It was found out that although some respondents claimed the cost to be reduced, the management committee revealed that this cost is too low to cover operations and maintenance costs. The committee proposed the increase of water charge to cover those costs and to raise the morale of the attendants since they get 20 percent of the income collected.

Respondents claimed that the price of 20 Tshs was set by management committees and then was discussed in the village meeting. They notified that this water charge of 20 Tshs was decided by the district council but they are still willing to pay it. Community members were only involved in discussing and agreeing to this price that has been set. Management committees notified that cost recovery was the main factor taken into consideration by district council when setting this water charge.

It was also found out that some community members prefer paying water bills per month instead of paying per 20 liters. They perceive water bills as cheap and acknowledged that paying per bucket would cost them more. These community members have been connected with private taps at their homes and are required to pay 1000 Tshs per month although most of them are willing to pay even more if there is reliable water. The owner has the option of supplying water to the surrounding neighbors who has to contribute the bill payments as per agreements are known to all users of his/her tap.

From the questionnaire survey conducted in these villages, the results obtained indicate that even though there is no enough water available to the villagers in a regular basis but the majority of them about 62 % are willing to pay while the remaining 38 % are not willing to pay for water as indicated in table 4.6 below.

Table 4.6: Willingness to pay for water

Willing to pay	**Frequency**	**Percentage**
Yes	62	62
No	38	38
Total	**100**	**100**

Respondents revealed that they are willing to pay the amount set by Mlali water body of 20Tshs. Results obtained from data collected indicate that Mlali community members attach different value for accessing water. Most of them know the

importance of water pricing as a way of getting clean water and they are willing to pay in order to access water.

Nevertheless, the majority of respondents argued that the water fee of 20 Tshs is not satisfactory to guarantee them a reliable water supply. They pointed out that the amount is too small if the water project is to be implemented successfully. This observation goes in line with the statement provided by Whittington, Davis and McClelland (2003) that water has value to users that are willing to incur costs of paying for it.

When asked about the amount that they think it is satisfactory to pay for water services, their responses have the different degree of variations. These responses are as indicated in table 4.7 which show the amount that people are willing to pay if there is reliable water supply apart from the amount set by the Mlali water body.

Table 4.7 shows that 4 % of the respondents were not willing to pay any amount of money even if there is an improvement in supply and reliability of water services. This implies that these people view water as a public good that has to be provided for free. The free provision of water is not desirable as it will fail to provide incentives for efficient water use and conservation of water resources. This is because at the high level of water consumption there is no price for water. High level of water consumption means that more good is consumed and therefore inefficiency result. The above observation goes hand in hand with the argument by Kessler (1997) who believes that accessing resource freely results to its excessive use and that charging leads to sustainable and economic uses.

Table 4.7 below also shows that 17 % of respondents are willing to pay 20 Tshs which is the amount set by Mlali water body. It was thought that since this is the amount that respondents are used to then most of them would be willing to pay it but it was found that is not the case. This might be the implication of what was noted that respondents were not involved in setting the water price, rather they were just told that they would be paying such amount.

Table 4.7: Amount people are willing to pay for reliable water supply

Amount	Frequency	Percentage
0	4	4
20	17	17
25	6	6
30	10	10
50	43	43
70	14	14
100	3	3
300	2	2
500	1	1
Total	**100**	**100**

Interesting result found as shown in table 4.7 above is that majority of respondent about 43% were willing to pay 50 Tshs per bucket of twenty liters. This amount is amount is huge twice as much as the amount set by Mlali water body. Respondents revealed that as long as there is enough and reliable water supply, paying that much amount is reasonable. The implication of this finding is that the marginal utility people get from consuming a bucket of water at a price of 20 Tanzania shillings is higher than the price. This will cause increased water consumption at a rate that is not efficient. This is because people will continue consuming water until the level that the marginal utility of consuming a unit of water is equal to the price of water. This is as pointed out by Rogers et al (2004) that users will utilize water until the benefit of using the extra cubic meter exceeds the costs incurred.

The table 4.7 above shows that another small portion of respondents has their views also on the amount they are willing to pay if water resource is reliable. About 14 % of them are willing to pay 70 Tshs per bucket. Also about 10 % are willing to pay 30 Tshs while about 6 % are willing to pay 25 Tshs. Moreover, there were 3% of respondents that were willing to pay 100Tshs per bucket. The table above further shows that 2 % of the respondents were willing to pay 300 Tshs while 1 % revealed that they are willing to pay 500 Tshs per bucket.

The general picture that can be generated from these findings is that people in Mlali are willing to pay for water service. They are willing to pay an even higher amount of money than the amount set by the Mlali water body. Therefore for sustainability

and efficient water use considerations, the price set by Mlali water body will have to be reconsidered.

As mentioned before that those individuals that are connected to the private water taps in their homes they have to pay a water bill of 1000 Tshs per month. When they asked if they are willing to pay more if water services become reliable, the majority of them agreed. They revealed that they are willing to pay an amount of 4500Tshs per month instead of the current rate of 1000Tshs. Again this raises the issue of reframing water price in Mlali to cover the real value of water supplied to people.

It was found that currently, people fetch any amount of water they want because the price is low and people misuse water. Respondents revealed that if the price for water will be raised they will be forced to reduce the consumption of water because they will not be able to pay for water. The majority of them revealed that with that increase in price they will be able to fetch about five to ten buckets of water per day. This is a sign of efficient water use since the majority of them currently they fetch water as they please since the water price is low.

Respondents in Mlali through survey questionnaires revealed that a threshold amount of water to be fetched by household should be set. If household fetches water within this threshold an agreed water fee should be applied to them. When they are asked about the quantity that they think should be allowed as the maximum to be fetched by household within the agreed threshold their answers varies as indicated in table 4.8.

Table 4.8 below indicates that majority of the respondents about 48% agree that a flat rate of 50 Tshs should be set to Mlali water users. This amount should be used to all households that if they fetch water within this agreed amount they should pay this amount. If at any moment they exceed this agreed amount then they should pay a new amount per unit increase of the quantity of water fetched. They pointed out that this amount of 10 buckets will ensure that each household has enough amount of water that is enough to sustain the basic domestic activities.

This amount is equivalent to 200 liters of water. The amount is higher than the amount stipulated by water policy that for domestic water supply in the rural area the basic level should be safeguarded year round of 25 liters of potable water per capita per day through water points (URT, 2002).

Table 4.8: Maximum units of water to be fetched per day

Maximum buckets per day	**Frequency**	**Percent**
10	48	48
5	25	25
15	19	19
20	2	2
30	2	2
No limit	4	4
Total	**100**	**100**

Other respondents about 25 % revealed that this threshold quantity of water should be 5 buckets which are equivalent to 100 liters. There is also the group of respondents about 19 % which argued that the quantity should be 15 buckets. Only 2 %e said that the quantity should be 20 buckets while also other 2 % of respondents revealed that this quantity should be 30 buckets.

From the results shown in Table 4.8, there are about 4 % of the respondents who revealed that there should be no any limit in the amount of the water fetched per day. These respondents most of them undertake economic activities like running restaurants and selling local beer. These activities consume a lot of water. Hence putting a limit on water use would cost them more as they will be required to pay more per unit increase in the amount of water fetched.

It was noted also that setting this threshold level of water fetched would reduce the potential misunderstandings and conflicts that would rise at the water points. This is because if there is no such limit an individual can decide to a huge amount of water and hence reduce the possibility of others to get water. This is the case since at the water point, water users are served in a first in first out principle. Thus if an

individual has many water containers has to fill all of them first before another individual start to fill.

By putting the limit on the quantity of water fetched ensure that community members will carry minimum water containers and therefore each member will be assured to get water in a minimum possible time. The time that will be used to wait until one individual fill the containers will be minimal. In this case water conflicts among users can be avoided by limiting the quantity of water fetched at the water point. This is because it prevents excessive water usage and fetching at the water points.

Respondents revealed that a water fee should be placed upon the water quantity fetched beyond the threshold amount. The amount that should be charged per unit increase in water fetched should be set to limit unnecessary water use and encourage efficient water use. Respondents were asked amount that they think it is satisfactory for that purpose. Their answers were varying.

The majority of the respondents, however, revealed that the amount should be 100 Tshs per bucket of water fetched. With this increase in price, water users will be forced to stay within the set limit of the amount of water to be consumed per day. Staying within the threshold amount of water ensure that water is used efficiently and that water resource is conserved in Mlali.

4.8 Factors Leading to Economic Accessibility of Water

Based on the inquiry raised from the theoretical review, economic institutional arrangements proved to be the influencing factor for willingness to pay for water. When people in Mlali are willing to pay, they certainly value water and they will use it in an economic efficient way since paying for water limit some unnecessary use of water. Paying for water signifies that water is valued and that people recognize the value of it. Mlali Water Body has set a price of 20 Tshs per bucket of water and people are willing to pay this amount of money. This will bring about the economic accessibility of water and the use of water will be efficient.

In the study, a multiple linear regression model was used to determine factors that influence the willingness to pay for water services in Mlali. Willingness to pay for

water was assumed to be influenced by gender, Education level and income. Other factors which thought to influence willingness to pay for water were Property right and informal rules governing water use. The multiple regression was then conducted and the linear regression model was statistically significant (F-value = 68.00%; p-value < 0.001). The significance of the model indicates that the modal could be used to predict the variables under the study.

Moreover, the regression results show multiple correlations of R = 0.698. This means that the independent variables used in the regression model were associated with the dependent variable by 69.8%. The multiple coefficients of determination (R^2) obtained were 0.487, which is regarded as the strength of the dependent variable to explain the fitness of the model. This means that the independent variables entered in the model had the ability to explain the variation in the dependent variable by 48.7 %. It implies that regressed factors have shown strong influence to the willingness to pay in Mlali by 69.8% while the independent variables which were included in the linear regression model have shown a weak relationship with the dependent variables by 48.7 %.

Table 4.9: Multiple regression estimation results for factors influencing WTP for water services

Independent Variable (X)	**Beta (β)**	**Std. Error**	**t-value**	**p-value**	**Collinearity Statistics**	
					Tolerance	**VIF**
Constant		0.116	-0.431	0.668		
Gender	-0.024	0.107	-0.261	0.795	0.839	1.192
Education	+0.170	0.102	1.892	0.062	0.889	1.125
Income	+0.362	0.000	3.777	<0.001	0.780	1.282
Property rights	+0.249	0.086	2.895	0.005	0.968	1.033
Informal rules	+0.331	0.088	3.759	<0.001	0.924	1.083

R = 0.698, R Square (R^2) = 0.487, Adjusted R Square (R^2) = 0.437

Table 4.9 above shows that some independent variables are statistically significant while others are not. The statistical significant of the factors is recognized by looking on the P-value as shown in the table. The P-value shows whether the variables which were included in the Linear Regression model were statistically significant or not. If

the variable was not statistically significant (P>0.05) it means that the variable involved do not influence willingness to pay for water. If the variable was statistically significant (P<0.05) it means that the factor has the influence on willingness to pay for water. Moreover, some variables have positive coefficients while others have the negative coefficient of explanatory factors Beta (β). This is the indication that some variable has a positive influence on willingness to pay for water in Mlali while others have a negative influence.

The result of the regression is as shown in Table 4.9 above that factors which were assumed to influence the willingness to pay for water in Mlali, three out of five were found to be statistically significant. Those variables were income, ownership of water point and informal rules governing water use which were significant at p<0.05 significant level. This implies that these variables have an influence on the willingness to pay for water services.

4.8.1 The Impact of Income

Income is a continuous variable which was captured though the total annual income of respondent. The regression analysis result shows that income had a standardized coefficient of β = +0.362 which was statistically significant at p<0.05 level of confidence. The positive regression coefficient implies that income and willingness to pay for water were positively related. The regression results on income as indicated it table 4.9 above imply that an increase in household total income by 1Tshs increases the willingness to pay for water by 0.362. This is because with the increase in income earned the water users find it easy to afford the fees that have been set for purchasing water. These findings are the same as those reported by Banda et al (2006) on the study conducted in South Africa that there is a positive relation between willingness to pay and household income.

4.8.2 Impact of Informal Institution

The informal rules were measured by the presence of water rationing. Respondents were required to answer Yes if there is water rationing and No if there is no rationing. The results in table 4.9 above show that presence of informal rules governing water resources use had a standardized coefficient of β = +0.331 which was statistically significant at p<0.05 level of confidence. The result indicates that

having water rationing as opposed to not having water rationing result to an expected increase in willingness to pay for water by 0.331when holding other variables constant. The positive regression coefficient implies that presence water rationing as informal rules governing water use is positively related to willingness to pay. The informal rules define the day to day water resource use in Mlali. They are strong and respected because they facilitate equitable water allocation to the villages that make Mlali ward. Due to that reason, water users will be motivated to pay as they know that with rationing they will surely get water services.

4.8.3 Property Rights

Property rights were conceptualized based on who own the water point where respondent fetch water. This could be the MWB owned water point or other sources. The regression analysis result indicates that the ownership of water points has a standardized coefficient of $\beta = +0.249$ and is statistically significant at $p< 0.05$ level of confidence. This implies that fetching water from water points owned by Mlali water body, as opposed to other sources, result in an expected increase in willingness to pay by 0.249 when holding other variables constant. The positive regression coefficient implies that water point being owned by Mlali water body is positively related to willingness to pay for water. This implies that Mlali water body influences more people to pay for water than it could be the case when water point are owned by village government or collectively by the community. Mlali water body owning water resources means that emphasis will be made on collecting water fees. This is through putting water personnel at the water points to ensure that more revenue is collected whenever people fetch water for various uses. This is also done by collecting water bills at the end of each month for those individuals that have private water taps at their houses. The more the fee is collected ensures that users get constant water supply for their uses.

It was found out that not all the variables that were thought to influence willingness to pay for water were statistically significant. Some of them were not. The regression tables 4.9 above shows that two variables estimated in the model were not statistically significant. These variables are gender and the level of education. This means that these variables have no any significant influence on the willingness to pay

for water services and therefore they do not contribute to the economic accessibility of clean water. This observation complies with the statement provided by Hokby and Soderqvist (2001) that income has the positive relationship between WTP while other household's socio-economic characteristics account for variations in WTP responses.

4.9 Economic Institutional Arrangement of Water Resources in Mvomero District

Through interview conducted it was found out that Mvomero district council is directly involved in water management. The council is entrusted to make appropriate by-laws for specific issues water issues. The council also establishes institutions and confers specific responsibilities and functions with respect to water use and management. It was also found that the district council is working in collaboration with village governments which is responsible for ensuring water resource in the respective area is properly managed through formulation and enforcement of by-laws in collaboration with communities and other stakeholders. The village government also has made the village water committee purposely to ensure that it keep a close eye to water points. The committee responds by supervising people who have been placed at the water points to supply water. Moreover, the committee prepare village meeting to enforce rules.

The village water committee is informal in the sense that it is not identified as relevant structures in the water policy but they are important structures for improved water allocation. The committees are active due to the prevalence of water allocation issues in Mlali. In cases where these committees do not succeed to resolve problems, they often seek help from government at village or ward level.

The government in Mvomero recognizes the need to improve economic efficiency and restore order and rationality over water use. It has entrusted the water resource use to the Village water committee. The village water committee acts as locally created water institutions and help to manage water sources that are owned collectively. These are well and the river which is not managed by Mlali water body. The committee manages these resources because people do not use them frequently and they are not willing to pay for its water. Moreover, every community member

utilizes them as they desire thus the village government intervenes by managing them through the committee.

Moreover, it was found out that public water taps are located at different hamlets. Each one of the taps is overseen by the hamlet committee that is made up of chairman, secretary and accountant. The accountant is responsible for collecting the fee from the people fetching water. Once money has been collected the accountant brings the money to Mlali Water Body to be banked. Member of the committee that oversee each of the collective water taps is selected through the hamlet meetings. Individuals with private water taps are responsible for managing their taps. Also, they have to pay directly the water bills to the Water body which is the users association that oversees water related matters.

Although Mlali Water Body is responsible for managing water resources as the formal water User Associations and the local units of self-governance, it was found out that the village government plays even a major role. People in Mlali do not even recognize Mlali water Body as water user association. Even the process that was undertaken during the formation and registration of the association is not clear.

This justifies the findings that were found through survey questionnaire which indicates that majority of the respondents acknowledged that water points where they are fetching water owned by village government and only a few of them revealed that water points are owned by the Mlali Water Body. This also reveals that the role of the water body is not clearly understood by the water users since the process of forming the association is not known.

Table 4.10: Source of water in the study area

Where do you fetch water	**Frequency**	**Percentage**
Public Water tap	48	48
Private water tap	35	35
Well	12	12
River	5	5
Total	**100**	**100**

The results from table 4.10 above as obtained from survey questionnaires indicate that majority of the respondents about 48 % get water from public water points. Also about 35 % of the respondents get their water from the private water taps that are

connected to their homes. These two sources of water are the result of the water project that is managed by Mlali water body. Water from these sources is considered clean and is the preferred source of water. It can be clearly noted from table 4.10 above that about 12% of the respondents get water from wells and about 5 % from the river. This is because the policy of paying for water has not yet started to be implemented as the water project has not been completed to be rehabilitated. Respondents revealed that if the paying for water would have been started most of them would fetch water from wells and river as water from these sources is free.

Although people are willing to pay for water it is just only a few of them because most of them fetch water from the sources that are collectively owned. As it has been found out that people are more willing to pay when water resources are owned by Mlali water body and that most of the resources are collectively owned, this is an indication that there is still a long way to go as only a few of the water points are being paid for.

CHAPTER FIVE
DISCUSSION OF THE FINDINGS

5.0 Introduction

This chapter discusses the results presented in chapter four. The chapter provides the detail discussions of the findings from the sample of respondents in Mlali ward of Mvomero district. It provides the deep analysis of what was theorized during literature review, how information was captured and the findings obtained with regard to Gender, education level, income, contribution of water points ownership have on the economic accessibility of clean water, contribution of rules on economic accessibility of clean water and the influence of willingness to pay for water services on economic accessibility of clean water.

5.1 Contribution of Water Points Ownership on Economic Accessibility of Clean Water

The first objective of this study was concerned with determining the contribution of water points ownership have on the economic accessibility of clean water. Also, the hypothesis number one of the study hypothesized that water point ownership has a positive contribution to the economic accessibility of clean water. The information about ownership of water points was obtained through the survey questionnaire. The question number 14 in the questionnaire was meant to ask respondents on who own water points where they get water. The results which were obtained are presented in table 4.3 which indicates that wells and river are owned collectively. Any community member can use them as he/she pleases since they are not owned by any particular person or association. These findings confide with the findings by Ostrom that for the management of common pool resources users should be left to create their own system of management because they can enforce mechanisms that are better that restrictions imposed by outsiders with little understanding of local conditions. However, these findings of Ostrom are different from those in Mlali because the study by Ostrom was concerned with the management of forest resources. Also, the transaction cost theory by Coase argues that high transaction and enforcement costs will result if communal owners were to try to devise rules to reduce the externalities of their mutual overuse of water.

The common ownership of water resource results to overuse and degradations as the resources are considered public goods and that are not owned by any individual in society. Everyone has access to them and could use water as pleases without economic use considerations. When the resource is owned collectively, there is no any incentive for conserving. People would misuse it to justify and satisfy their short term needs. Moreover, collective ownership does not guarantee the certainty of the future availability of water resource. Therefore, people will tend to over consume water currently for the fear that in the future there will be no water. This is the same as North said that common ownership is inefficient because basically the resource is owned by nobody until is captured and everybody engages in an unproductive race to capture these resource before others do.

Moreover, the results obtained as indicated in table 4.3 shows that 48 % of households get water supply from public taps while about 35% get it from private water taps connected to their houses. Both of these sources are owned by Mlali Water Body which is the water user association. The introduction of property right in Mlali has helped water resources to be owned by Mlali water body. This ownership has helped to provide the basic economic incentive system that shapes water allocation in all the villages of Mlali. The ownership helps MWB to make water allocation decisions that consider the economic use of water resources.

The ownership of the water points by Mlali water body is as pointed out by Ostrom that users should take care of monitoring and sanctions themselves or entrust this to someone accountable to them. However, she warns that this monitoring and sanctioning can be costly. This was found to be in contrary with the transaction cost theory as discussed on page 10 that assigning property right to the collectively owned water resource reduces the transaction cost associated with negotiating and enforcing agreements over the use of the resource.

With the single owner of the resource, the transaction costs are lower and thus the commitments for efficient water use are enforceable. The introduction of the property right as stipulated in the transaction cost theory has the capacity to incentivize efficient level of resource use. The ownership of water points by MWB,

therefore, benefits society by minimizing costs that are associated with unregulated water use. Ownership of water points by MWB introduces the incentives to use water in an efficient way. One of the incentives is water pricing as it is the case in Mlali that a price of 20 Tshs per bucket has been introduced. When water is well priced its use will be economic efficient. The willingness to pay for water is only possible if water resource is owned privately.

The information on the willingness to pay was captured by assuming that when water resources are owned by formal water use institutions such Mlali water Body, community members will be more willing to pay for water. The community members were asked to mention who owns the water point where they fetch water in question number 14 in the questionnaire. For analysis, a dummy variable with value '1' was assigned to water points owned by Mlali water Body or '0' if otherwise.

The regression analysis result as indicated in table 4.9 shows that ownership of water points has a standardized coefficient of $\beta = +0.249$ and is statistically significant at $p<0.05$ level of confidence. This implies that fetching water from water points owned by Mlali water body, as opposed to other sources, results in an expected increase in willingness to pay by 0.249 when holding other variables constant. The positive regression coefficient implies that water point being owned by Mlali water body is positively related to willingness to pay for water. This is the implication that Mlali water body influences people to pay for water than it could be the case when water point are owned by village government or collectively by the community.

When Mlali water body owns water resources it means that more emphasis will be made on collecting water fees. This is through putting water personnel at the water points to ensure that more revenue is collected whenever people fetch water for various uses. This is also done by collecting water bills at the end of each month for those individuals that have private water taps at their houses. The more the fee is collected ensures that users get constant water supply for their uses like for domestic purposes. These findings are as the discussion pointed out in the transaction cost theory in page 12 that economic allocation and use of water occurs when the water resource is owned either privately or collectively provided that property rights are allocated and are clearly defined.

Ownership of water points enables MWB to exclude water users that do not fit the established agreements such as paying for water. The exclusion reduces the free riders that they might misuse water. It leads to the application of water pricing which is only possible under resource ownership provided by the property rights system. This is because if anyone can just use water from water point then no one will have the incentive to conserve water or invest in water point improvements and thus there will be no efficiency in the allocation of water. This is the transaction cost theory suggesting that when property rights are clear and that transaction cost are low the economic agent can bargain to achieve the Pareto optimal allocation of the resource.

Mlali Water Body has a role of conserving water resource and regulating water resource utilization by ensures availability of water in adequate quantities and qualities to sustain domestic purposes of people in Mlali by regulating the flow of water at the water point. This limit amount of water that is drawn from the catchment area and ensure that people from all villages covered by Mlali water body receive an equitable amount of water. This consistently safeguards the amount of water used and ensure quality water is delivered to people of Mlali. This is not the case when water resources are owned collectively.

5.2 Impact of Rules on Economic Accessibility of Clean Water

The second objective of this study was based on assessing the impact of informal rules on the economic accessibility of clean water specifically in Willingness to pay. This objective was hypothesized on the hypothesis number two assuming that informal rules have a positive impact on the willingness to pay for water services. Both formal and informal rules have a significant impact in managing the allocation of water at the water point to users by addressing many issues like quality, rights and pricing to water services delivery.

The formal rules that were found to be active in the management of the water resources are the village government, customary laws and the water user association commonly identified as the Mlali Water Body. Knowledge of MWB was known by asking the respondents about their knowledge on water user association in question number 15 in a questionnaire. Also, the question number 16 asked them if they were

members of the association. The answers provided were interesting as they acknowledged that they hardly know the water user association. This poor knowledge explains the reason that most of them are not members of the association as presented in table 4.4 which indicates that only 17% of them are members. This implies that although the WUA is present as the formal institution to manage water in Mlali but it doesn't ensure that water resources are managed efficiently.

The village government plays an important role in the management of water resource. It has formulated the environmental committee which apart from other environmental related activities has the great role of overseeing water sources, especially in the catchment area. The village government has the role of managing wells and river which are used jointly by Mlali community members. Moreover, the village government has the role of resolving conflicts related to the joint use of water resource among community members and punish water users that violate the water use practices that are agreed by all users including failure to pay when fetching water. These findings are not in accordance with what Ostrom said that local community has considerable autonomy to change local rules, so there is no problem of someone else imposing an inefficient set of rules on them.

The transaction cost theory in page 10, however, postulates that institutions that regulate transaction always matter when there are transaction costs. Water points provide water which is highly valued in Mlali such that the lack of rules concerning accredited uses will lead to misuse and overconsumption. This was the case as observed in Mlali where there is a water user association which is a formal institution that regulates water use.

These formal rules contribute greatly in the efficient use of water. They put into place community agreement by explaining their rights over the use of water and authority structures which establish the boundaries within which the authorities operate. By doing so they set an incentive to develop a market-based mechanism to supply water for domestic purposes. These rules also back up the property rights that provide the water resource ownership in Mlali. This goes in line with the statement

by Ostrom that rules provide mechanisms to back up local monitoring and sanctioning efforts.

Moreover, there are informal rules that are also active in managing water resources. The same question number 17 in the questionnaire which asked the respondents how they organize themselves to protect the water point if they are not the member of water user association revealed interesting responses. It was in these results that informal rules governing day to day water allocation in Mlali were identified. These rules are developed through mutual agreement of the community members and they are effective in water resource management in the study area. These rules are community norms, hamlet water committee and village water committee and Water rationing.

The informal rules determine access to water resource and point out the modality of allocating and using water at the water point. They are flexible so as to meet the changing situations of water availability and uses as water availability situation in the study area is highly uncertain and unpredictable. This is as North point out that the informal rules are rooted in local communities and are fitted in particular circumstance through creativity and consensus. Again informal rules are supported by the collective action theory that collective management relies on the strength of community norms. The rules serve as mechanisms to achieve outcomes of sustainability by regulating access to and use of water resources which leads to efficient water use.

It was assumed that presence of water rationing as informal rules governing water use will increase the community members' willingness to pay for water. The informal rules were measured by the use of water rationing where respondents were required to answer Yes if there is water rationing and No if there is no rationing as per question number 10 in the questionnaire. It was assumed that water rationing will increase the efficient use of water through reducing unnecessary uses. Dummy variable with the value 1 was assigned for the presence of water rationing or 0 if otherwise. The regression analysis results as presented in table 4.9 shows that presence of informal rules governing water resources had a positive standardized coefficient and statistically significant at $p<0.05$ level of confidence. The results

indicate that presence of informal rules governing water resources impact positively the willingness to pay for water and that having water rationing as opposed to not having water rationing results to an expected increase in willingness to pay for water by 0.331 when holding other variables constant.

Informal rules increase the WTP and ensure equitable water distribution. It influences efficient water use because defines day to day water resource use in Mlali. The rules have been agreed by all community members which are the water users. They have to pay the agreed amount whenever they obtain water as per the schedule. Due to that reason, water users' will be motivated to pay for water services as they know that with rationing they will surely get water services. This is as transaction costs reveal that when informal rules comply with the formal rules the incentives both they create will tend to support each other. This interaction reduces transaction costs of maintaining and protecting the resource.

5.3 Influence of Income on Economic Accessibility of Clean Water

The objective number three of this study was aimed to determine the contribution of income as one of household socio-economic characteristics on the willingness to pay for water services. It was assumed that the increase in income increases an individual willingness to pay for water resource. This is through increasing the ability to pay whenever using water resources. Income which is a continuous variable was measured though the total annual income of respondent. In order to capture the total income, respondents were asked questions as marked in the questionnaire from question 6 to 12 and the total income earned was computed by simply summing up the amounts earned from different sources. The average income of the community members was computed and it was found that on average the annual income earned by individuals in Mlali is 1,239,790 Tshs.

Also, the regression analysis was conducted to establish the relationship between income and willingness to pay for water. The analysis result as indicated in table 4.9 shows that income was statistically significant at $P<0.05$ level of confidence. The results imply that income and willingness to pay for water are positively related. An increase in Total Income by 1 unit (Tshs) will increase by 0.362 the willingness to

pay for water services. The state of having an Income affects individual ability to access and use water resource in Mlali at the price set to 20 Tshs.

The implication of these findings is that as income increases, so does the clean water consumption because people will be having the capacity to pay. This has a positive impact on the efficient use of water because more people will be able to pay for water services that will be provided by the water user association. This also means that people will avoid the use of the river and well water that are not controlled and they are perceived to unclean and contaminated. Low income will force people to use of unclean water because it is free.

5.4 Influence of Gender on Economic Accessibility of Clean Water

The objective number four of this study was concerned with analyzing the gender influence on the willingness to pay for water services. It was hypothesized that gender contributes positively on the willingness to pay for water services. It was assumed that because women are more involved in the domestic activities that implicate the consumption of water and also because they are meant for fetching water then they will be more willing to pay for water than men.

In order to analyze sex, a dummy variable was introduced with 1 representing male and 0 otherwise. The regression results as presented in table 4.9 indicated that sex is not statistically significant at five percent level. The explanation for this outcome is that being male or being female has no significant contribution to the willingness to pay for water. This might be attributed to the fact that female are the most questioned respondents and therefore, no distinct variations in the dummy to effectively depict the significance of the variable.

5.5 Influence of Education Level on Willingness to Pay for Water Services

The objective number five was checking on the influence of education level on the willingness to pay for water services. This objective led to the hypothesis formulation that education level has a positive impact on the willingness to pay for water services. Attending to formal school equip people to understand better the consequences of using water inefficiently thus it was assumed that people with

higher formal education will be more willing to pay for water compared to less educated people. This was not the case in Mlali.

The information on the level of education was captured by asking the level of education that respondent has reached in question number 4 in the questionnaire. The results as presented in table 4.2 shows that majority of the respondents have just earned the primary education or have not attended formal education at all. This implies that their involvement in the management of water resources is limited because in section 2.10 that educated citizen implements informed and sustainable water uses options which usually lead to efficient exploitation of water resources.

Moreover, the relation between education level and willingness to pay for water services was established through regression analysis as indicate in table 4.9 which shows that education level of the respondent is statistically insignificant at five percent levels. The results imply that being educated or uneducated has no contribution to the willing to pay for water in Mlali. Community members with relative higher knowledge were expected to be more willing to pay for water and to have more efficient water use potentials because they have information that water shortage is likely to happen if not used efficiently. With this knowledge, educated people in Mlali were expected to be more willing to pay for water, but that is not the case as the outcome of the finding implies that education does not increase the efficient use water.

CHAPTER SIX

SUMMARY, CONCLUSION AND POLICY IMPLICATIONS

6.0 Introduction

This chapter provides the summary, conclusion and policy implications of the study. The summary part describe briefly how water points are owned, rules governing water allocation and use as well as the willingness to pay for water in Mlali. Conclusion presents some of the concluding remarks related to the research results while policy implications present the way forward based on the study findings. This part also will present the limitation of the study and will also propose the area for further research to be conducted.

6.1 Summary

This study explored water point economic institutional arrangement and collective ownership. The study was based in Mvomero district in Morogoro region of Tanzania, specifically was conducted in Mlali ward. Interview and focus group discussion were analyzed by content analysis. Data from survey questionnaire were analyzed using the SPSS software. The study also investigated the factors that influence willingness to pay for water use in Mlali which is an indication of value people put on water use.

Property rights and how they reduce transaction costs associated with water use was discussed. The property rights assignment and how they lead to the economic accessibility of clean water and conservation of water resources are explained in this study. The study also analyses formal and informal rules governing water use and their contribution to the economic accessibility of clean water. It also explores the impact of income, education level and gender on the willingness to pay for water services so as to get the real picture of how people values water resources in the study area.

The multiple regression was used to estimate the factors that influence the willingness to pay for water services in Mlali. The results from this regression indicated that some of the variables have the influence on willingness to pay while others have no any significant influence. It was found that income, ownership of

water points and informal rules governing water use have a positive influence on the willingness to pay for water. The influence of gender and education level on the willingness to pay also was checked and the result showed that they have no any significant influence on the willingness to pay in the study area.

6.2 Conclusions

In conclusion, the study illustrates the role of property right in the economic use of water resources in the study area which was one of the objectives of this study. Property rights reduce transaction costs associated with water use than it could be the case when water points are owned collectively. The property rights assignment excludes the free riders that are not willing to pay for water. The exclusion leads to the economic accessibility of clean water and conservation of water resources because paying for water avoids unnecessary uses of water. In Mlali, the water points are owned by MWB which is the water user association. This has induced the incentive to use water efficiently as the body excludes community members that are not willing to pay the water fee.

Another objective was concerned with analyzing informal rules governing water use and their contribution to the economic accessibility of clean water. Water rationing in Mlali ensures that all villages covered by the water project get water. The rationing also acts as the water use control because every village gets water on a specific day and at agreed hours. Water rationing lead to efficient use of water as community members are limited to use water for unnecessary uses. The informal rules also promote cleanness at the water points hence increase accessibility of clean water. Hamlet, where the water point is located also, is an informal rule that governs water use. The hamlet has the role of forming a committee that has the function of collecting water fees and handle it to the water body. Also, has the role of managing and protecting water point through setting by-laws and enforce norms that are agreed by all members.

The village government plays a major role in efficient water allocation and conservation of water source. It has created the village environmental committee that majors in the protection of the water sources. Also, there is Mlali water body which

is the formal water user association that is responsible for water allocation. Mlali Water Body allocate water through the public water taps located in almost every hamlet of Mlali and through private water taps installed to the households. However, only a few people have access to water in these sources. The majority of them get water from river and wells. Also, there is overlapping of water committee and Mlali water body since their roles are not clearly understood.

Income enables community members to pay for water services. The increase in income influences the economic accessibility of clean water by enabling them to acquire improved water services such as clean water. Moreover, women are more involved in the collection and utilization of the domestic water than men. However, being male or female has no significant contribution on the economic accessibility of clean water.

The level of education in Mlali is low. The majority of the community members have achieved just primary education or they have not attended any formal education. This low level of education, however, has no any significant impact on the economic accessibility of clean water or the willingness to pay for it.

6.3 Policy Implications

The goal of the national water policy is to make sure that communities become legal owners of rural water supply schemes and that institutional structure will be reviewed in line with the new roles and responsibilities. The policy stipulates that communities will be empowered to initiate, own and manage their water schemes including water wells through legal registration of water user entities. This has been done partially in Mlali because Mlali water body as a water user association has been registered. Nevertheless, there is also the water committee which is mentioned in the constitution and is supported by power. The role of these two institutions is no clear and sometimes there is an overlap between them. Policy and law have to harmonize them so that the efficient use of water is reached.

Moreover, the policy points out that the mechanisms to ensure entities are accountable to water users and that water users meet their obligations will be established. This also has not being done therefore government should make sure that

the overall process of forming water user associations is known to the community member. Mechanisms should be built to ensure that this process is participatory and those community members are fully involved. This will ensure that these user associations are accepted, respected and recognized as a legal entity by the community members.

Also, the policy does not recognize the role played by informal rules in the management of water sources. These rules, however, are very important in addressing water scarcity problems as well as aiding in day to day allocation of water in rural areas. The policy should, therefore, build a mechanism to accommodate the informal rules so that they complement the formal one in the effort of addressing efficient water use.

The water policy addresses the importance of appropriate principles and procedures for managing the quality and conservation of water resources by application of economic incentives and pricing for water to be gradually built into the management system as a strategy for demand management and water conservation. This has been done in Mlali by introduction and application of the water fees of 20 Tshs per 20 liters of water and people are willing to pay it. This will limit unnecessary water use to community members. However, the mechanism should be put in place to target high-income earners so as to ensure equal use of water between users because users with high-income would use more water at the expense of the lower income earners. Therefore the increase in the price of water will lead to the economical water use as long as the poor are subsidized.

Also, the government should strengthen the water user associations and grant them water rights easily so that they own all water resources. By doing so the management of the rural water projects will be enhanced, the willingness to pay for water in this projects also will be increased and hence attainment of access to water in the economic efficient way. Also, policy should consider the strengthening of water rationing. This is because the rationing increases the efficient and appropriate use of water but also people are more willing to pay for water when there is an increase in water rationing.

6.4 Limitation of the Study

Among of the limitation is that the findings from limited sampled water users in Mlali is used to generalize the results for all other water users in Mvomero District but unfortunately they were not involved in this study. The study assumes that the limited sampled water users were the fair representation of the rest of the users of homogeneous characteristics in cultural and social- economic status.

Moreover, it was noted that some of the water users do not keep data on the amount of water they consume per day, this lead to the possibility of providing inaccuracy data to the researcher which sometimes can affect the results. However, the researcher was careful. The data collected from water users provided useful information for data analysis, presentation of results and making recommendations to improve the economic accessibility of clean water.

The researcher faced a hard time in locating some of the key respondents who have the deep knowledge and understanding of the water project that takes place in Mlali. This was so because at the time that research was conducted community members were harvesting their crops. This was challenging since these respondents would go to their farms early in the morning and return at evening. Extra efforts have to be made so that their information is obtained though only a few of them were interviewed.

This research was being sponsored by VRLIOUS program. This necessitated the completion of research activities in time regardless of the fact that it was difficult to interview some of the key informants. This caused to get some of the information that is not accurate such as information on water people fetch and use per day as this required the respondents to have accurate information on the volume of water they use.

6.5 Areas for Further Research

The recommendations for further studies have been put forth as alternative ways for improving water service delivery in the rural area. With such regard, this study can be broadened to cover the whole country given resources availability to cover the study of water point economic institutional arrangements and collective ownership as

this area was not properly covered by this study. This will show the results in different regions with different characteristics rather than confine the study in a small area.

The study considered only five empirical variables which are sex, marital status, education, income, ownership of water resource and informal rules governing water use. Other research should consider more variables such as household size, age and location of water point. Moreover, this study used cross-sectional data, other investigations are recommended to use the longitudinal data.

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APPENDICES

1. Questionnaire

Introduction

Dear, Sir/Madam

My name is Mshana Elieneza Samwel, pursuing Master degree of Project Planning Management at Mzumbe University. I am here to acquire information on the research titled “Water Points Economic Institutional Arrangements and Collective Ownership in Mvomero District”. You have been randomly selected to answer this questionnaire and this is purely an academic study and therefore all information will be treated confidentially. The study will also be helpful in finding concrete measures on those factors that will be identified.

SECTION A. GENERAL INFORMATION

1) Name …….. (Optional)

2) Village…….. (Please fill)

Encircle the relevant answer

3) Gender

i. Female

ii. Male

4) Level of education

i. Informal

ii. Primary

iii. Secondary

iv. Tertiary vocational

v. University- undergraduate

vi. University – graduate

5). Marital Status

i. Single

ii. Married

iii. Widow

iv. Widower

6). Occupation

i. Agriculture

ii. Business person

iii. Employee

7). If the answer is (i) in six how many units of crops produced per season (Please fill)

……

……

8). If the answer is (ii) in six what commodities do you sell

……

……

9). what is the amount of commodities do you sell per day?

……

……

10). If the answer is (iii) in six, what is your amount of income per month

……

11). If you are employed, do you have any other additional activities (please mention)

……

……

12). what is the amount of income earned from these additional activities in question 12?

……
……

SECTION B: PROPERTY RIGHTS

13) Where do you fetch water?

……

……

14) Who owns the water point?

……

……

SECTION C: RULES GOVERNING WATER USE

15) What do you know about water user association?

……

……

16) Are you a member of water user association?

……

……

17). If you are not a member of water user association how do you organize yourself to protect the water point?

……

……

18). If someone is caught destructing water point, what do you do to them?

……

……

19). Are there any informal rules governing water use that you know?

i) Yes ii) No

20). is there water rationing in your area?

i) Yes ii) No

SECTION D: WILLINGNESS TO PAY

21) Do you have enough water to use?

……

……

22). with this amount of water you are getting, are you willing to pay for it?

i) Yes ii) No

23). If yes, how much are you willing to pay per unit?

.....

.....

24). If the volume of water is to be increased, how much are you willing to pay to get water per unit?

……

……

25). with the amount you are willing to pay, how many bucket of water will you fetch per day?

……

……

Section E: Economic Accessibility of Clean Water

1. What amount of water units should be fetched per day?

2. What price should be charged per unit increase of water fetched per day?

Thank you for your cooperation

2. Interview Guide

Interviewee	
TECHNOLOGICAL (water technician, DWE, management entity)	
number of water points	
what kind of schemes?	
age of the schemes?	
how many are functional/non-functional/in need of repair?	
History of breakdowns/repairs Which water points have broken down in the past and got repaired?	
installer	
who funded	
price	
FINANCIAL (VEO, WEO, management entity)	
Cost-recovery: How? One time contribution? Fee? The same for every pump? Collection? How determined? Revenue per day/month/year?	
Financing installation, operation, maintenance and repair?	
OWNERSHIP (management entity, WEO, VEO, VC)	
How did they decide on the kind of scheme? Were the villagers or local representatives consulted in the decision-process? In which way? Were there for instance public meetings? If yes, how many?	
Willingness to pay: Do you want to pay for water? Why not? Can you pay? What do you think is a fair fee? How do you want to pay? Per bucket? Once a year/month/week? When wouldn't you be willing to pay?	
Is there a good revenue collection? Does everybody need to pay?	

ELIENEZA MSHANA CURRICULUM VITAE (CV)

PERSONAL DETAILS

Full name:	Mshana Elieneza Samwel
Date of birth:	11st June 1987
Place of birth:	Kondoa/Dodoma
Sex	Male
Marital Status:	Single
Nationality:	Tanzanian
Postal Address:	P.O. Box 1681 Dodoma
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E-mail Address:	mshanae2012@gmail.com

PROFESSIONAL/ACADEMIC QUALIFICATIONS

S/N YEAR INSTITUTION(S) CERTIFICATE/AWARD PERFORMANCE

1. 2014-2016 Mzumbe University Master's Degree of Science in Project Planning and Management GPA

Upper Second 3.7

2. 2008-2011 Institute of Rural Development Planning Bachelor Degree in Environmental Planning and Management GPA

Upper Second 4.0

3. 2006-2008 Njombe Secondary School Advanced Certificate of Secondary Education Division three:13

4. 2002-2005 Aya Secondary School-Tanzania Certificate of Secondary Education Division One:12

5. 1995-2001 Ntenga Primary School – Tanzania Certificate of Primary Education Pass

PERSONAL SKILLS AND COMPETENCES

Languages: - English - Fluent in both Speaking and Writing

-Kiswahili - Fluent in both Speaking and Writing

Computer Skills: -MS Office {Microsoft word, Excel, Power Point and Internet}

FIELD WORK / PRACTICAL EXPERIENCE/ EXTRA CURRICULUM ACTIVITIES

1: 2011-2014: Project Director at AICT Pahi Student Centre

2:28th June to 19th August 2010- Field Attachment at Kondoa District Council with successfully conducting entrepreneurship trainings to groups of people in Kondoa villages

3: 2008- Part time teacher at Aya Secondary school

Researchers Conducted

1: Research Project for Master's degree and successfully determined Water Point economic Institution Arrangement and collective Ownership Right in Mvomero District

2: Research Project for undergraduate degree and successfully determined Factors Affecting Adoption of Efficient Solid Bio-fuel Technologies by Households in Pahi ward, Kondoa district.

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I the mentioned person below do certify that the information given above are correct to the best of my knowledge.

ELIENEZA SAMWEL MSHANA