Addis Ababa University
School of Graduate Studies
College of Development Studies

The Challenges and Opportunities of Multiple-Use Water Systems (MUS): A *Case Study from Goro Gutu and Meta Woredas of East Hararghe Zone, Oromiya Regional State*

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The Challenges and Opportunities of Multiple-Use Water Systems (MUS): A *Case Study from Goro Gutu and Meta Woredas of East Hararghe Zone, Oromiya Regional State*

A thesis submitted to the school of graduate studies of Addis Ababa University in partial fulfillment of the requirements for the degree of MA in Development studies

By: Eyerusalem Fithawok

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SCHOOL OF GRADUATE STUDIES

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Title

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DEVELOPMENT STUDIES

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ACRONYMS

AAU	Addis Ababa University
CSA	Central Statistical Agency
CSO	Civil Society Organization
DAs	Development Agents
FAO	Food and Agricultural organization
FGD	Focus Group Discussion
FTC	Farmers Training center
GDP	Gross Domestic Product
GIS	Geographical Information System
GOs	Governmental Organizations
ha	hectare
HCS	Hararghe Catholic Secretariat
HHs	Households
IRC	International water and sanitation center
IWMI	International Water Management Institute
km	Killo Meters
m	Meters
MDGs	Millennium Development Goals
MoFA	Ministry of Foreign Affairs
MoWR	Ministry of Water Resources
MUS	Multiple use Water Systems / Services
NGOs	Non Governmental Organizations
PRODWAT	Water, Poverty, and Productive Uses of Water at the Household Level
RiPPLE	Research-inspired Policy and Practice Learning in Ethiopia and the Nile region
SNNPR	Southern Nations Nationalities and People's Regional State
SPSS	Statistical Packages for Social Scientists
SSA	Sub-Saharan Africa
UAP	Universal Access Plan (Program)
UN	United Nations
WaSH	Water Supply, Sanitation and Hygiene
WSS	Water Supply and Sanitation

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ABSTRACT

Ethiopia is known for being a water tower in the continent. It has a considerable potential of 110-120 billion cubic meters of surface water and 2.6 billion cubic meters of ground water. Inspite of such potentials, it is one of the countries with small proportion of water tapped for domestic as well as productive activities. Recently different interventions against this challenge in the water sector started to emerge. MUS approach is one of them. It is a new concept introduced in the water sector. MUS is understood as "a participatory, integrated and poverty-reduction focused approach in poor rural and peri-urban areas, which takes people's multiple water needs as a starting point for providing integrated services, moving beyond the conventional sectoral barriers of the domestic and productive sectors" (Moriarty et al, 2004). Various interventions were there by societies and other organizations to actualize the MUS concept on the ground. Application of de facto MUS and upgraded and planned MUS are some of the interventions. The study focuses on upgraded and planned MUS. The main objective of the study is to assess the challenges and opportunities of multiple use water systems (MUS) in Goro Gutu and Meta woredas of East Hararghe zone. Samples were selected from two kebeles from the two woredas.

Both primary and secondary data were collected using various techniques like survey questionnaire, key informants interview, focus group discussion and other instruments like visits of sites and informal interviews. Secondary data were collected from review of published and unpublished materials from concerned organizations. The collected data were coded in SPSS. Descriptive statistics, including tables of percentage distribution, frequency distribution and others were used for the analysis of the coded data. Figures (charts) were also used for more illustrations.

The findings of the analysis showed that the MUS facilities existing in the selected kebeles provide services for households who are accessing water for both domestic and productive activities. The result of the data analysis also showed that attitude of households to MUS is positive as majority of them are appreciative of the benefits others and themselves captured in their lives as a result of the establishment of the MUS facilities. More over, there is great aspiration of non user households to get chance to use the MUS facilities as beneficiaries in order to bring about monumental changes. However, there are some challenging situations to these MUS systems in the target woredas. These include reduction in the amount of water of the developed springs, unsafe water from the springs, simple damage of some parts and others. Solutions were suggested from the point of view of respondents, different stakeholders and researcher. These and other information were used to make concluding remarks. Basing the facts obtained from the data analysis, some recommendations were made.

CHAPTER ONE: Introduction

1.1. Background to the study

Ethiopia is one of the largest countries in Africa, covering a land area of 1.13 million km^2. It is the second most populous country in Sub-Saharan Africa (SSA), next to Nigeria and the third in the continent. The third population and housing census of Ethiopia conducted in 2007 showed the total population of the country as 73,918,505 of whom 37,296,657 persons (50.5%) are males and 36,621,848 persons (49.5%) are female (CSA, 2008). With regard to the total population of the country on place of residence, it was found from the same literature that 61,953,185 persons (83.9%) live in rural parts of the country where as the remaining 11,956,170 persons (16.1%) live in urban parts of the country.

Ethiopia is a country known for its huge resource potential. MoFA (2007) stated that Ethiopia is a country that is richly endowed with huge manpower, arable land and natural resources. However, much of its potential is not yet exploited. Out of the sixty percent of its landmass which is known to have the potential for agricultural development, only 15 percent is said to have been developed. The benefit of the country from the extraction of its mineral resource potential is not that much significant. The situation with the water resource, one of the abundantly found resources, in the country is not an exception. Various literatures substantiated this fact.

Efrem (2006) stated that Ethiopia is the water tower of Africa. Yalew (2006) also indicated that the country has a considerable potential of 110-120 billion cubic meters of surface water and 2.6 billion cubic meters of ground water. These vast water resources of the country offer potentials for irrigation, hydroelectric generation, livestock production, fishing, and other domestic uses including water for drinking, cooking, cleaning, washing clothes and others. Notwithstanding all these potentials, the country faces a real shortage of potable water. It is one of the countries having the lowest per capita stored water availability in the world (Seleshi, 2007). Such lack of access to safe water has been obstacle for the livelihoods of the people in Ethiopia in different ways. According to Degefa and Tesfaye (2008), problems related with access to water have brought illness to family members and livestock, waste of time and labor spent in fetching water and problems in irrigating farms and intensifying agriculture. It was at the worst level in early days. This worse situation of the water supply and sanitation sector in early days has shown some betterment as a result of the efforts of the government and other stakeholders who are involved in development works in the country. However there are still large proportions of the individuals who do not have access to water and sanitation in the country. The report of MoWR in 2007 noted that about half of the total population of the country does not have access to clean water, and the sanitation situation is

extremely lower. RiPPLE news letter issue No. 3 also showed that the current national level water supply access is 52.5% with the urban and rural coverage of 82% and 46.39%, respectively.

As a response to this serious situation, different governmental, non governmental and other international organizations started providing more support to the water sector. They were incorporating water supply while implementing development works and conducting research works. For example, MoWR (2007) stated that the government of Ethiopia is providing incremental support to leverage the development of the sector through the allocation of resources. Furthermore, the government endorsed the implementation of Universal Access Plan (UAP) and sets some targets related to the water sector in the Millennium Development Goals (MDGs). Different Non Governmental Organizations (NGOs) have also started introducing different water management systems and approaches. Multiple Use water Systems (MUS), is among the water management systems and approaches which are introduced by different NGOs to the water sector to alleviate problems existing in the sector. MUS is the focus area of this research. It is a concept introduced in the water sector recently. It is an approach for providing water services by considering multiple water needs of societies and trying to meet them. This study tried to assess the challenges and opportunities of multiple use water systems (MUS) in Goro Gutu and Meta woredas of East Hararghe zone with the aim of examining the MUS in the target woredas, the challenges these systems are facing and see prospects of systems in the future.

1.2. Statement of the problem

As discussed earlier, MUS is one of the water management systems introduced by different NGOs with the aim of integrating multiple water needs of societies. These multiple water needs incorporate the water needs of societies for domestic activities (like drinking, cooking, washing clothes, cleaning and others), for productive activities (like irrigation, watering cattle and others) and for other functions and roles (like flood protection, groundwater recharge environmental flows and ecosystem functions and others). In order to implement MUS on the ground, different approaches have been followed by societies and other implementing organizations. These include de facto MUS and upgraded and planned MUS. The first is the most common one and it is practiced in most parts of the developing countries and the latter is a new approach emerging in the water sector.

As the name indicates, de facto MUS are systems that are developed for a single purpose but which are eventually used for multiple purposes by users. While practicing this, people are found switching single use water systems to multiple use systems by making illegal moves like illegal connections to piped water systems or altering allocation schedules (Smits et al,

2008). Irrigation schemes designed to irrigate crop lands but are used for watering cattle or irrigate backyards is a very good example of de facto MUS. The upgraded and planned MUS are systems that have been built for multiple purposes. These include single use systems that are upgraded to multiple use systems and water facilities that are originally planned and implemented for multiple uses. Such MUS are built considering people's multiple water needs and to satisfy these needs in an integrated manner.

Interest on Multiple Use water Systems and Services (MUS) is increasing in the world as well as in Ethiopia. Smits et al (2008) indicated that a growing number of organizations have been undertaking a range of activities on multiple-use systems, ranging from conceptual and empirical research to piloting multiple-use services delivery and policy advocacy. As stated by Adank and others in 2008, there is also a growing interest on MUS in Ethiopia. Many organizations incorporated MUS in their development works. Several implementing organizations, mainly NGOs, have been implementing and upgrading water systems that do not only cater for domestic water use or irrigation but rather address the multiple demands of communities (Adank et al, 2008). The same report cited as an example the multiple use water systems existing in the Ido Jalala and Ifa Dhaba kebeles of Goro Gutu woreda of East Hararghe Zone. In the former case, domestic water supply services were upgraded to enable small-scale irrigation, while in the latter case, irrigation services were upgraded to also cater for domestic water use. There are also multiple use water systems (MUS) in some other kebeles of Goro Gutu and Meta, target woredas of this research. This research on the assessment of the challenges and opportunities of multiple use water systems in Goro Gutu and Meta woredas of East Hararghe zone is done with the hope that assessing these aspects of MUS in early days of its emergence in the water sector would help to make good adjustments to it as needed and to come up with the best approach.

Research works have been conducted basing various aspects of multiple use water systems (MUS). Studies by Adu-Wusu et al (2008), Furihata (2008), Khawas and Mikhail (2008) and Dominguez et al (2008) are some of them. Background paper of the first research work of Adu-Wusu and others in 2008 was done with the aim of examining the experience of communities in Sisal, West districts of Ghana in using multiple use dams. Background paper of the second research work of Furihata in 2008 was done with the aim of assessing the multiple functions of water management in Paddy fields in Asia monsoon region. Background paper of the third research work of Khawas and others in 2008 was focusing on description of how the MUS by design process and application of related micro irrigation technologies impacted a community in the middle hills of Nepal. The fourth research work of Dominguez and others in the same year was done with the aim of showing evidence of how families manage water in rural areas of Colombia and how this reality has been ignored by

national policies and regulations. There are also few research works in Ethiopia with regard to MUS. Some of them are research done by Adank and others in 2008 to provide better insight in the costs and benefits of multiple use water services and the one done by Slaymaker and other in the same year to come up with micro-evidence from a survey of 1500 households in Ethiopia on economic impacts of improved access to water supply and sanitation (WSS).

However, researches dealing specifically with the challenges and prospects of multiple use water services (MUS) in Ethiopia that could give clear insight on the situation in the country and on how to go further on it are lacking. Therefore, this research that focuses on the assessment of the challenges and opportunities of multiple use water systems in Goro Gutu and Meta woredas of East Hararghe zone is assumed to fill the existing gap on MUS studies in Ethiopia.

1.3. Objectives of the study

The general objective of the study is to assess the challenges and opportunities of multiple use water systems (MUS) in Goro Gutu and Meta woredas of East Hararghe zone, Oromiya regional state.

Specific objectives of the study:

- Describe the performance of the existing multiple use water systems in the target woredas
- Find out the attitude of different households towards multiple use water systems and the MUS approach
- Identify the major bottlenecks to the systems existing in the area
- Come up with the possible solution to the problems and future prospects of the systems from the point of view of different stakeholders (communities, researcher and other administrative officials)

1.4. Research questions

- How is the performance of multiple use water systems (MUS) in the target woredas?
- What is the attitude of the different households in the woredas towards the existing multiple use water systems (MUS) and to the MUS approach?
- What are the problems that hinder the proper functioning of the existing multiple use water systems (MUS) in the woredas?
- What are the possible solutions to the existing problems and future prospects of the systems?

1.5. Significance of the study

Since the study is on the assessment of multiple uses of water services (MUS) in Goro Gutu and Meta woredas, it will give an insight on the situation of MUS in the study woredas in particular. The study is believed to be used as support document for the long term action research of this research's sponsoring project i.e RiPPLE (Research inspired Policy and Practice Learning in Ethiopia and the Nile region). It can also be significant in that it can provide interested readers with general information about MUS and information about the existing potentials and challenges of multiple use water systems in the target woredas. It also pinpoints some possible solutions to the identified problems. As a result, it could be used as a guide to the different stakeholders (governmental and non governmental organization) to take actions. It will also give direction for further researches. Finally the material could be documented to be used as a reference material for other researchers.

1.6. Scope of the study

The scope of the study is limited to undertake the assessment of multiple use water services (MUS) in Goro Gutu and Meta woredas. The sample size is also limited to 125 households (HHs) in the selected kebeles of the two woredas due to time and money constraints. The other constraints this research has faced includes shortage of documents specific to the area of study, unavailability of officials in the target woredas due to other engagements, unwillingness of some stakeholders to provide information, unwillingness of target communities to respond to the survey questionnaire due to boredom with frequent and redundant surveys, again unwillingness of individuals to assemble and perform group discussions, shortage of transport access and other facilities like photocopy, internet services and others.

1.7. Organization of the thesis

This thesis contains 6 chapters. The first chapter has 6 parts that give background to the study by elaborating some facts about Ethiopia and the water sector in general, some clues about MUS and the gaps identified, the general and specific objectives of the study, research questions, scope and significance of the study showing the relevance and limitations of the research, respectively.

The second chapter shows the results of review of relevant literatures. Its sub sections have topics dealing with water and poverty, water and livelihood, functions of water, definitions of MUS, historical growth of MUS, Ethiopia's experience on MUS and some empirical studies made on MUS in other parts of the world and in Ethiopia in particular.

The third chapter gives background to the study area by discussing issue on location and physical characteristics of the study area, demographic characteristics of the study area, socio-economic characteristic, agro-ecology, basic facilities found in the target area and water facilities found in the study area

The fourth chapter explains how the sampling, data collection and data analysis were conducted in its respective subsections. The fifth chapter is the results and discussion part that discusses on background of sample households, performance of MUS facilities in the study area, Attitude of households towards the MUS facilities and MUS approach and challenges, solutions and opportunities of the existing MUS facilities in the study site and the six chapter is the conclusion and recommendation part which gives concluding remarks basing the findings of the study.

CHAPTER TWO: Review of literature

2.1. Linkages between Water, Poverty and Livelihoods

World Bank (2006) cited in Munir (2008), stated that poverty has multiple dimensions, changing across spatial, temporal, and human scales. At an individual and household level, poverty is hunger or a lack of food to meet basic nutritional needs; lack of or low quality shelter; not being able to go to school and being illiterate; being sick and unable to afford basic healthcare; being unemployed and living only one day at a time; lack of access to clean water, good grazing, fishery and productive land and water resources; powerlessness, lack of representation and freedom from want and fear. At the institutional level, poverty is characterized by low wages, inability to invest in education, health, water, physical infrastructure, agricultural/rural development; and low quality of governance and ineffectiveness of service delivery in human development.

Butterworth and Moriarty (2003) also showed that around the world, hundreds of millions of men, women and children live in extreme poverty. Their poverty is multi-faceted: besides lacking money, they have limited access to education, suffer from poor health, have little political weight, and are vulnerable to all manner of external shocks like droughts and economic crises. In addition, they have access to very limited resources (natural, physical or financial) in particular they typically suffer from limited access to water – both of safe quality and adequate quantity. The water supply coverage and sanitation situation of rural poor is very low. This would get worse when it becomes in the case of Sub Saharan Africa. For example as cited by Haregewoin and Emebet, (2002), water supply coverage in rural areas of Ethiopia was only 24%, with almost 40% of existing rural water supply schemes known to be non-functioning, at any one time.

It was also found that water supplies provided to households, and particularly the poorest (children and women, who are found disproportionately amongst the poorest), have a huge potential to impact on poverty, Butterworth and Moriarty (2003). On the other hand, an improvement of the poverty situation of the poor rural households may enable them to have good control and access to water. UN (2002:14) cited by Hope et al (2003), talks of raising the social and economic status of the poor so that they can then pay for their water services. This implies that there is backward and forward relations between water and poverty.

There were and still are great many efforts from different governmental and non governmental organizations that tried to impact on poverty through their development works by incorporating the water sector in their interventions. IWMI (International Water Management Institute), Water Aid, IRC (International Water and Sanitation Center), FAO (Food and Agricultural Organization) and Pump Aid are some of organizations who have

incorporated water interventions in their development works and who are working against poverty.

Water can have impacts on poverty while it improves livelihoods. This is because water is base for livelihood of majority of people all over the world. The term 'livelihood' refers to the means of living for individuals, groups or communities. As Butterworth and Moriarty (2003) stated a great many of these poor men and women in urban, rural and peri-urban settings base their livelihoods on small-scale cropping, livestock keeping, agro-processing and other micro-enterprises. In many of these activities, an adequate water supply is a crucial enabling resource: as a resource used in or necessary for the activity itself; as a provider of time (by reducing time spent in collecting water); or as a key element in improved health that enables people to do work. Faués, et al. (2008) also substantiated this fact. They said that for many people, especially in rural areas where agriculture is at the core of livelihoods, water represents both a basic need and an important production asset. They also said that in agriculture, it offers security and allows farmers to plan their investments without fear of crop failure. Clean and affordable access to water relieves the burden from women and girls who have to spend a considerable amount of time in fetching water. Access to a source of water to water animals or for small productive activities can have an important impact on the economy of the household, in places where water is scarce.

Haregewoin and Emebet (2002) also stated that water is a livelihood issue for about 20% of the population and about 12% of pastoral communities, who live in environments with less than 600mm of annual rainfall. Water is a health issue for approximately 69% of the population, who do not have access to clean potable water. The same literature stated that lack of water and inadequate water management cause inefficient use of land for agricultural purposes, contributing to soil erosion, low productivity and to food insecurity. Therefore access to adequate quantity and good quality of water by poor rural households, whose livelihood is dependent up on it, is monumental in order to bring about significant changes in their lives.

2.2. Functions of water and how they are addressed

Adank et al (2008) stated that people require water for a wide range of activities essential to their livelihoods. These include domestic, productive and other activities. Domestic activities include drinking, cooking, washing, cleaning and others where as productive activities include backyard gardening, irrigation, livestock keeping, processing of agricultural products and small-scale industrial activities like beer brewing and brick making. In addition to the domestic and productive uses of water, there may be other non- consumptive uses, which are

also referred to as functions and roles. Furihata (2008) indicated on his research that fisheries in irrigation schemes or flood protection associated with irrigated paddy cultivation are some of the examples of non consumptive uses of water systems. These could be generally referred to as multiple functions of water that would result in multiple benefits.

Even though, water has multiple uses and multiple benefits, these uses and benefits are often not addressed in an integrated way. The traditional approach to basic needs like WaSH, excludes water for productive activities within the household (Raschid-Sally, 2008). This domestic water use is known as it mainly leads to an improved health situation with respect to water, sanitation and hygiene related diseases. On the other hand, an approach basing productive uses of water mainly through irrigation projects mainly focus on irrigation sub sector but excludes the domestic sub sector. This approach can result in direct economic benefits (income generation) and improved diet leading to increased food security (Moriarty et al, 2004). If the two approaches have been integrated, more benefits would have been harvested.

A number of individuals and organizations have begun to understand that previously implemented approaches for providing water services to the poor, whether as water, sanitation and hygiene (WaSH) services or as irrigation services, are imperfect. This is because they focus on limited aspects of livelihood and they could not clearly pave the way to understand fully the relationship between rural people, their multiple livelihood strategies and water. As indicated in Butterworth and Moriarty (2003) various water sub-sectors have not given sufficient attention to the fact that their paradigms, norms, and models do not cater to the needs of a large number of their 'clients', and thus fail to achieve the impact on poverty that they could. When these approaches fail to address the real needs of the poor, it is mainly of those women and children who are going to be highly disadvantaged. Experience also showed that one can not harvest the fruits of water by intervening in specifically to one of the sub sectors either domestic or productive sector and neglecting the other as the two sub sectors are inseparable. Failing to recognize multiple uses will lead to failure to capitalize on the multiple benefits in terms of poverty reduction, and can even have a negative impact on sustainability (Adank et al, 2008).

More recently, in the last decade or so, and in reaction to these failures, new approaches have emerged based on a more holistic approach to working with water and a more context

sensitive (Butterworth and Moriarty, 2003). The introduction of Multiple Use Water Services (MUS) is one of the approaches that are made to be applicable to reduce the above mentioned failures. It is a new concept emerged in the water sector. This approach considers and tries to meet the multiple water needs of communities. Van Koppen et al. (2006) noted that the Multiple Use water Services (MUS) concept has emerged from efforts to create a more extensive and inclusive vision of water services that attempts to understand and address the multi-faceted need for water at the homestead.

The approach having such big outcomes, to study the various aspects of it would be monumental. It is also good to assess the challenges the approach is facing and the prospects of such systems in the future in its early days of emergence before they get serious. If the problems are identified as early as possible it would be easy to make some adjustments as needed and knowing the prospects of such systems also leads to the decision whether to go further on it or not. So these and others make assessment of the challenges and opportunities of the MUS facilities in the target woredas (Goro Gutu and Meta woredas) relevant.

2.3. Definition of Multiple-Use Water Systems (MUS)

MUS is not a specific type of technology or system, but rather an approach to, or even philosophy of, water services provision (Smits et al., 2008). It is defined in different literatures. But in general terms, MUS can be understood as "a participatory, integrated and poverty-reduction focused approach in poor rural and peri-urban areas, which takes people's multiple water needs as a starting point for providing integrated services, moving beyond the conventional sectoral barriers of the domestic and productive sectors" (Moriarty et al, 2004, Mikhail and Yoder, 2008). This implies that the MUS approach recognizes the multiple uses of water service provision and takes people's multiple water needs as a starting point and tries to meet those in an integrated manner.

Multiple Use water Systems could also be defined as developed springs having extensions composing multiple structures that could provide societies with multiple functions. The multiple structures mainly include structures of the system that are used for drinking, washing, irrigation and structure used for watering animals. The photos presented below are photos of components of the MUS facilities in the study site.

Figure 1: Componentes of MUS facilities in the selected kebeles

Structure used as source for drinking water

Source: Own survey

Structure used as washing basin

Source: Own survey

Structure used as source for watering cattle

Source: Own survey

Structure used as irrigation reservoir

Source: Own survey

2.4. Historical overview of the development of MUS approach

It is difficult to set some points of time to indicate when such MUS has been started to be practiced in the world. But various literatures indicated that it has been practiced long time ago. Traditionally the main purpose of the water sector was to supply people with clean, reliable and safe water to bring about improvements in health and well being of societies. However, some years back, it was understood that it is possible to harvest the fruits of the water sector and result in people's wider well being and livelihood improvements by integrating the multiple uses of water supply systems. It was also believed that integrating peoples multiple water needs could bring about monumental changes in eradication of poverty and hunger and gender equality. However, societies have been practicing MUS by applying different methods. De facto MUS are best examples showing the practice of societies to satisfy their multiple water needs. De facto MUS are systems that are developed for a single purpose but which are eventually used for multiple purposes by users. While practicing this, people are found switching single use water systems to multiple use systems by making illegal moves like illegal connections to piped water systems or altering allocation schedules (Smits et al, 2008). As cited by Desalegn (ND), most domestic water supply systems in rural and peri-urban areas in the developing world are being used for productive

purposes. For example, as the same author showed, the results of the household survey done in Shebedino woreda of SNNPR, Ethiopia indicated that the majority of the households use the available water from a single use water supply schemes for purposes other than domestic consumption. It is also stated in Noel (2008) that small-scale productive activities undertaken in and around the household (e.g., kitchen gardens, rearing of livestock, small businesses) require adequate quality and quantities of domestic water to operate. But such practice has not been given attention until it has started to be considered in different workshops and symposiums. Significant advances in the understanding of MUS at household level were made in January 2003 at the international Symposium on Water, Poverty, and Productive Uses of Water at the Household Level (PRODWAT) Butterworth et al. (2003).

As per the same report, in 2003, international symposia in South Africa and Colombia brought together professionals from both the domestic and productive water sectors, who continued and expanded collaboration in to the PRODWAT thematic group and also through the action-research project "models for multiple water use water supply systems for enhanced land and water productivity, rural livelihoods, and gender equity" conducted in 5 basins and 8 countries. Leaving the sectoral boundaries behind, the specific aim was to search together for a more integrated approach to water services delivery that contributes to the millennium development goals. They came up with the concept of Multiple Use water Services (MUS).

As Smits et al (2008) indicated the concept of multiple use services (MUS) has emerged as an alternative approach to providing water services over the last five to ten years. According to the same literature, the rational for taking this MUS approach as the best alternative is two fold.

1. It is expected to make comprehensive impact on multiple dimensions of poverty including health, food security, income and other aspects of livelihoods through access to water for both productive and domestic purposes.
2. It is expected to contribute improved sustainability and performance of systems at community level.

The above literatures indicate that it is not possible to point out the time people started to satisfy their multiple water needs. However, as it is clearly shown, it is in recent years that the MUS concept started to be advocated and implemented by different organizations as a best means of integrating and satisfying multiple water needs of societies in the world and a best approach for facilitating the interventions of different governmental and non governmental organizations towards poverty alleviation.

2.5. Ethiopia's experience on MUS

The concept of MUS is the new to Ethiopian and even to the world as indicated earlier. However with the understanding of its importance, different stakeholders like governmental and non governmental organizations (GOs and NGOs) are found promoting the concept through its implementation and conducting research works. There are different organizations incorporating MUS in their development works in Ethiopia. As an indication to this fact and as mentioned earlier there are studies conducted on MUS in Ethiopia like the one done on the costs and benefits of MUS by Adank and others in 2006. There are also upgrading of single use water systems to multiple uses and planning and implementation of multiple use water systems in the country. Adank et al (2006) cited as an example the multiple use water systems existing in the Ido Jalala and Ifa Dhaba kebeles of East Hararghe Zone. In the former case, domestic water supply services were upgraded to enable small-scale irrigation, while in the latter case, irrigation services were upgraded to also cater for domestic water use. This implies that interest on MUS in Ethiopia is increasing.

Desalegn (N.D.) stated that though the water supply and sanitation policy of Ethiopia does not clearly address MUS, it states the following: " the overall objective of water supply and sanitation policy is to enhance the well being and productivity of the Ethiopian people through provision of adequate, reliable and clean water supply and sanitation service and to foster its tangible contribution to the economy by providing water supply services that meet the livestock, industry and other water users' demand". So this policy states some points about domestic and productive uses of water. However there is a need to design policy which strongly touches the MUS concept and to create good situation in order to entertain its benefits.

According to Alemayehu, (N.D.), there exist enabling environments for MUS in Ethiopia. They are discussed as follows:

- **Policies and legislations:** the water resources management policy and strategy of the country indicates to ensure integration of water supply activities with other water related development activities focusing on self-reliance, community participation and management. The rural development strategy focuses on improvement of household income through intervention of household level agricultural packages including water based livelihood improvement packages. Flourishing of micro-enterprises is considered as one of the basis for development and poverty eradication being given all round support by the government.
- **Organizational set-up:** in addition to the water sectors' institutional structure, there is organizational set-up from the federal to the kebele levels for implementation of water,

sanitation and hygiene (WaSH) in integrated manner coordinating the water, health, education and finance sectors at all levels. The agricultural sector is also a part of this coordination at the lowest levels.

- **Coordination with donors and NGOs:** donors and NGOs play significant role in provision of rural water supply. There is a coordination forum for the government, donor groups and civil society organization (CSO) to harmonize intervention and move from project to program.
- **Decentralization:** as per the water resources management policy of the country water supply implementation and management is decentralized to the local level.
- **Micro credit and saving institutions:** there are several micro credit and saving institutions in most of rural areas of the country with adequate experience in credit service delivery with increasing understanding and involvement of the community to their services. The water policy and strategy also encourages self-financing of projects as mush as possible at the local level and participation of local financing institutions such as banks, rural credit services, etc, in the development of water supplies.
- **Existence of rural household level water infrastructures in hundreds of thousands throughout the country built for income generation purposes:** there are several hundred thousand of rural household level water infrastructures built by the agricultural sector for livelihood improvement purposes which have significant potential for enhancing domestic water supply through improvement.
- **Capacity built on household level water infrastructure constructions in rural areas for income generations:** the capacity built by the agricultural sector on the government, the private sector and community at the lowest administration level (kebele) could be utilized for enhancing the domestic use of water through multiple use approach.
- **Existence of water based agricultural package at household level:** this package is implemented by the agricultural sector and could be a good opportunity for coordination of the two sectors in the multiple use approach.
- **Existence of health extension package at household level, which includes safe water supply, sanitation and hygiene:** this package is implemented by the health sector and has become a good opportunity for coordination of efforts of the two sectors at the kebele level.
- **Human resource development:** the government and the private sector has focused on expanding education from primary to higher level with significant increase of graduates from middle and higher education. As well, trained development agents and health extension workers are assigned at the kebele level for technical advise of the households

in implementation of the above mentioned agricultural and health packages which could be a good opportunity for implementation of the multiple use approach.

2.6. Empirical studies made on MUS

As it was said in some previous parts of this research the concept of MUS is new to Ethiopia and to the world as well. Different researches and case studies have been conducted in different parts of the world basing various aspects of the concept. Thus the following two sub sections summarize some of the empirical researches reviewed on general aspects of MUS.

2.6.1. Studies made in other parts of the world

The background paper of the study done by Smits and others, in Honduras in (2008) tried to further characterize the existing practice of de facto use of rural water supply systems for productive purposes in the area. It was done through 14 case studies by analyzing its effect on people's livelihoods as well as on sustainability in service provision.

The objective of the study was to develop a better understanding of actual practices of MUS and its impacts on the livelihoods of users, as well as on the sustainability of rural water supply services. The study confirmed that productive use of rural water supply systems is common across systems and end users. However its scope differs between user categories.

The background paper done by Adu-Wusu, and others in (2008) tried to show the experience of communities on multiple uses of water in sisal west district Ghana. The multiple water needs of communities were satisfied by accessing water from the dams constructed by plan Ghana there. Plan Ghana constructed 8 dams in the district as a response to the request of its partner communities for the construction of dam facilities to make them able to support dry season farming and livestock watering. The dams were constructed after feasibility study was done.

By design the dams were intended for the irrigated farming, provision of water for livestock watering and fish cultivation with the expectation of improving the nutrition of the community members and provide additional income for them through consumption of produce and sale of surplus produce respectively. However it had been observed that some of the communities were using water from the dams for other activities that were not originally planned. These activities include washing of pots and pans, washing of clothes, and using water even for drinking and cooking even though they have been educated on the harmfulness of consuming water from the reservoirs. This and other similar studies show us that the practice of using single purpose systems for other unintended uses is common in many parts of the world. So, while designing and implementing water interventions careful

study has to be conducted with regard to the different livelihood aspects of the communities which the intervention is trying to address.

The background paper of the research conducted by Dominguez and others in (2008) on MUS in the rural areas of Colombia showed evidence on 'how families manage water in rural areas of Colombia and how this reality has been ignored by notational policies and regulations'.

As it was indicated the research was implemented in three phases:

1) Understanding the relevance of productive uses of water for poor rural families in Colombia was made
2) Analysis of the legal and institutional framework for water supply in rural areas was also made and
3) Policy advocacy to propose changes to these frameworks which are under the responsibility of the vice ministry of drinking water and sanitation, dependent of the ministry of environment, housing and territorial development in Colombia was made.

The findings of the research revealed that productive activities at the household level were found in all the settlements, the family income is correlated to using water for livelihoods and the government in Colombia is responsible for guaranteeing that public services are provided efficiently to people.

2.6.2. Studies made on MUS in Ethiopia

Research paper done by Van Koppen and others in 2006 is a paper produced basing the outcome of the joint work of the team of the action research project "model for implementing multiple-use water supply systems for enhanced land and water productivity, rural livelihood and gender equity". The objective of the project is to advance the millennium development goals by identifying and developing practical models, tools and guidelines for providing and up scaling improved water services that better meet poor women's, men's and children's needs in Ethiopia.

It was indicated that the interest in the concept and actual implementation of domestic-plus, productive plus, and multiple-use water services, which have existed since the 1980's, seem to be rapidly gaining momentum nowadays

The background paper of the research done on the assessment of the costs and benefits of MUS by Adank and other researchers in (2008) is another study done in Ethiopia with regard to MUS. It was done with the aim of looking at whether the benefits of multiple use services outweigh costs that they bring along and what the relationship between costs and benefits of multiple use as compared with costs and benefits of single use.

The study was conducted under the RiPPLE project with the objective to provide better insights in the costs and benefits of MUS. In the study the costs related to the provision of water services and benefits related to water use were analyzed for two cases in east Hararghe zone, Ethiopia. The two cases were in Ido Jallala and Ifa Dhaba

The results of the case study show that even in the worst case scenario the benefits easily outweigh the costs at household level as well as at system level. It further shows additional benefits of upgrading from a single use to multiple use outweigh the additional costs.

The background of the research conducted by Smits and others in (2008) on characterizing the MUS approach at community level is basing on the findings from case studies in 8 countries: Bolivia, Colombia, Ethiopia, India, Nepal, South Africa, Thailand and Zimbabwe. It tried to characterize key element of MUS at community level, and assessed performance through a review of the case studies in the 8 countries. Over 30 (groups of) villages, the different elements of water use, access and water services provision were assessed using both qualitative and quantitative methods.

The cases show that people almost universally use water for domestic and productive activities at and around the homestead, how levels of access can be provided by different types and combinations of technologies, and incremental changes made.

As it was indicated, the case study made in Ethiopia was done in one peasant association of 11 villages in Dire Dawa woreda (district). The main focus in study area was MUS pilots by NGOs in extremely poor areas with very low levels of access to services.

The findings of the case study in Ethiopia showed that the technologies used were communal piped systems with very few stand pipes. It also showed that users spent several hours for a round trip and others. The use of water was for domestic uses and few liters a day of grey water reuse for fruit trees.

Desalegn (N.D.) produced a background paper on the feasibility assessment of MUS done in Shebedino woredas of SNNPR with the objective of assessing and analyzing the existing MUS practice in the woreda.

It was found that majority of the households use available water from single use water supply systems for purposes other than domestic consumption.

In general the reviewed literatures dealing with different aspects of MUS in Ethiopia as well as those done around the world give lessons as they show the emergence of the MUS approach and its gaining consideration by different stakeholders, the importance of focusing

on it rather than on single purpose approaches, existing practices in different parts of the world, the situation of the existing practices with respect technology choice and others. These research reviews also indicated the possible areas for future researches to be conducted.

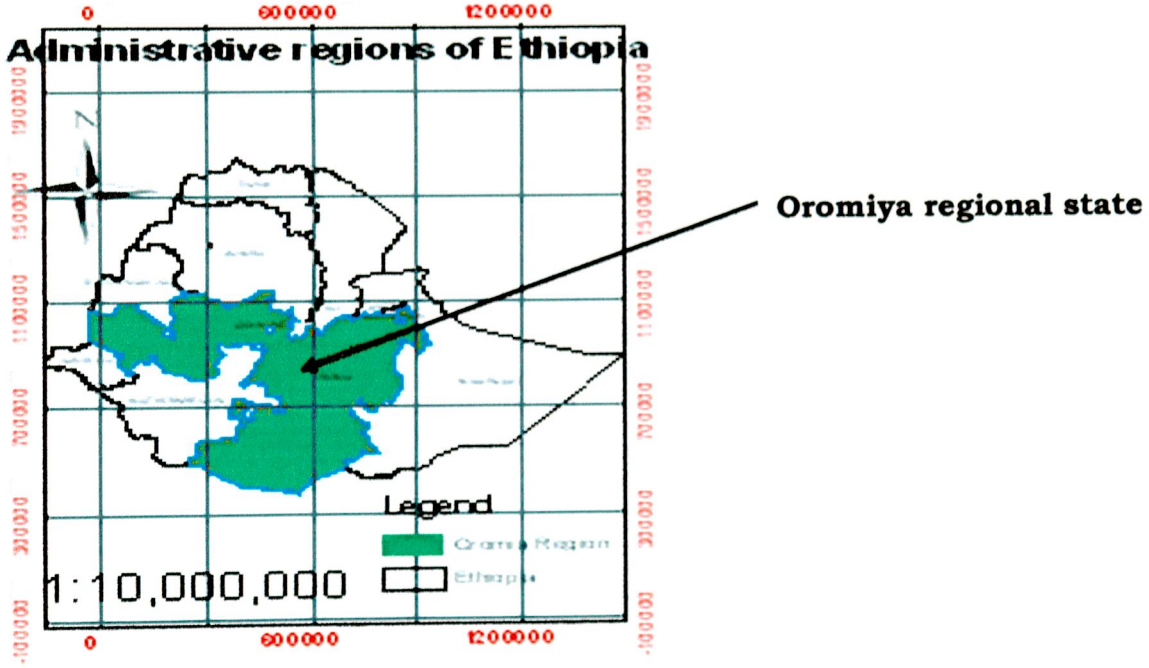
CHAPTER THREE: Background to the study area

3.1. Location and physical characteristics of the study area

3.1.1. Oromiya regional state

Oromiya regional state is one of the nine regional states of Ethiopia consisting of largest proportion of the total population of the country. According to the population and housing census conducted in 2007 in the country, the total population of Oromiya region is 27,158,471 persons, which is 36.7% of the total population of the country (CSA, 2008). According to the same report, the annual growth rate of population of Oromiya region was 2.9% between 1994 and 2007. Among the total population of the region 12.2% i.e 3,370,040 persons live in the urban parts of the country while the remaining 87.8% (23,788,431 persons) live in the rural parts of the country. The total number of households (HHs) in Oromiya region was 559,053. The average size of a household in the urban, rural and region in general are 3.8, 5 and 4.8 respectively.

Figure 2: Location of Oromiya regional state



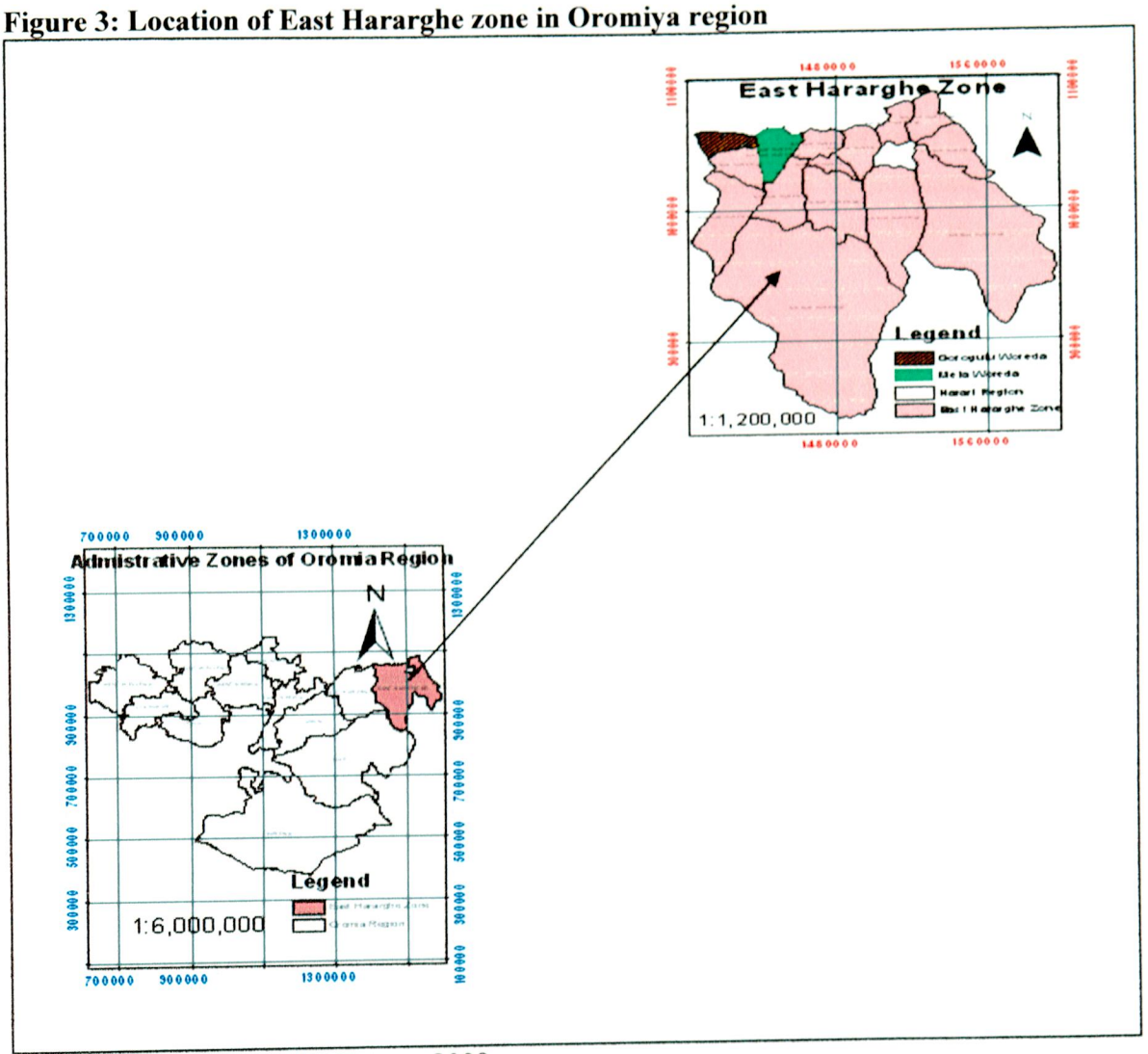
Source: GIS map made by Hassen, 2009

Figure 2, shows the nine administrative regions of Ethiopia. The shaded part shows the total land area covered by Oromiya administrative region. As it can be seen on figure above, Oromiya regional state covers the largest land area of all the nine regions in the country.

3.1.2. East Hararghe zone

Oromiya regional state is subdivided into 17 administrative zones. East Hararghe zone is one of them.

Figure 3: Location of East Hararghe zone in Oromiya region



Source: GIS map made by Hassen, 2009

Figure 2 shows the location of East Hararghe zone in Oromiya regional state. The zone is found in the eastern part of Ethiopia and is bounded by Dire Dawa administrative council to the north; Somali regional state to the north, east and southeast; Bale zone to the south and southwest; and West Hararghe zone to the west. The zonal capital Harar is located 510km to the east of the Ethiopian capital, Addis Ababa. East Hararghe is characterized by plateaus, rugged mountains, deep gorges and flat plains. The altitude ranges from 500 to 3,400 meters above sea level.

3.1.3. Goro Gutu and Meta woredas

As per the report of Oromiya Economic and Finance Bureau on July 2008, East Hararghe Zone has 21 woredas. Goro Gutu and Meta, the study woredas of this research are two of them. Goro Gutu, the first study site is found on the north west of East Hararghe zone and is bounded by Somali regional state to the north; West Hararghe zone to the west; and Deder and Meta woredas to the south and east respectively. The second woreda, Meta is also found on the northwest corner of East Hararghe zone. It is bordered on the southwest by Deder, on the northwest by Goro Gutu, on the north by the Somali Region, on the northeast by Kersa, and on the southeast by Bedeno. As it was seen on figure 2, the one colored red is Goro Gutu woreda where as the one colored green is Meta woreda.

According to the information obtained from Goro Gutu and Meta woreda agricultural and rural development office the total number of kebeles in Goro Gutu and Meta woredas is 30 and 51, respectively. Among the 30 kebeles in Goro Gutu, two of the rural kebeles serve as rural towns in East Hararghe zone (Karamile and Boroda towns) where as among the 51 kebeles in Meta woreda, three serve as rural towns in the zone (Chelenko, Kulubi and Goro Mute). The location of each of the kebeles in the two target woredas, Goro Gutu and Meta, is shown on figure 1 and 2 in the annex section.

3.2. Demographic characteristics of the study area

The total population in the two target woredas (Goro Gutu and Meta) is 143,896 (73,512 male persons and 70,384 female persons) and 252,185 (127,311 male persons and 124,874 female persons) respectively and the total number of households (HHs) in Goro Gutu and Meta woredas is 24,284 (22,666 male headed HHs and 1,618 female headed HHs) and 51,398 (25,974 male headed HHs and 25,424 female headed HHs) respectively. The religious composition in the two target woredas is Muslim, Orthodox, Catholic, Protestant and some individuals whose religion is not specified.

3.3. Land Holding

Goro Gutu woreda covering 53,123ha (531.23km^2) of land accounts 2.35% of the total land area of East Hararghe zone. Similarly the total land area of Meta woreda is 70,800ha (684.28km^2) which constitute 3.02% of the total land area of East Hararghe zone. Of the total land area of Goro Gutu woreda, 45.1% is cultivated land, 2% is grazing land, 9% is forest and wood land, 7.9% of the land is covered with bushes and shrubs, 19.4% is degraded land and 16.6% is used for social purposes (socio economic profile of the woredas, 2004/05). Similarly according to the same literature, it was found that among the total land of Meta woreda, 47.3% is cultivated land, 0.8% is grazing land, 5.2% is forest and wood land, 1.1%

of the land is covered with bushes and shrubs, 28.2% is degraded land and 16.4% is used for social purposes.

The average land holding in both of the target woredas (Goro Gutu and Meta) is as low as 0.37 and 0.5 ha.

3.4. Agriculture

3.4.1. Farming Practice

Because the average land holding in both of the target woredas (Goro Gutu and Meta) is as low as 0.37 and 0.5 ha, mixed farming (crop and livestock production) is practiced widely to diversify the sector. The agricultural activity in the woredas is characterized with peasant farming system, most of the time backward that mostly base on rainfall (socio economic profile of the woredas, 2004/05).

3.4.2. Crop and animal Production

According to the information obtained from the socio economic profile of the woredas (Goro Gutu and Meta) in 2004/05, in both of the woredas crop production is under taken by using rain fall during rainy season and irrigation water in some areas to produce crops but the share of land used to grow crops by using irrigation water is lower than that used for rain feed crop production.

According to the same report the cereal crops produced in the districts are sorghum, maize, wheat, barley, oats and teff. In addition to cereals crops produced, pulses and oil seed such as horse beans, field peas, ground nut, linseed and lentils are produced as to cash crops, chat and coffee are the two permanent cash crops in the woredas. Regarding fruits and vegetables sweet potato, potato, onion, tomato, carrot, red beetroot,... etc and banana, papaya, guava, mango, sugarcane are the major ones that are produced in the woredas.

With regard to the type of animals raised in the two woredas, the major animals raised in the study sited include; cows, oxen, donkeys, goats, sheep and goats. There is a practice of keeping chicken in both of the woredas. There are also some individuals who keep bees.

3.4.3. Vegetation and Wildlife

In the two woredas, there is sparsely distributed vegetation here and there. Small coniferous forest (birbirsa, gatra) woodland, acacia, shrubs and bushes as well as man-made forests are found here and there in the woredas. Because of their scattered nature, obtaining the area coverage is very difficult. However according to the information from the zonal natural conservation development desk, about 9% of the total area of Goro Gutu woreda was covered

by natural and man made forests where as 5.2% of the total area of the Meta woreda was covered by natural and man made forests.

There are no natural and man-made forests that are protected by the government and other organizations in these woredas. Similarly there are no parks, game reserves, sanctuaries and wildlife conservation area in the woredas. However, as indicated by local well known elders, there are some wild animals such as lion (rarely appear kin the area), leopard, spotted hyena, duiker and monkey in different parts of Goro Gutu woreda and there are also some wild animals such as spotted hyena, duiker and monkey in Meta woreda.

3.5. Agro-ecology

East Hararghe zone contains three agro-ecological zones, dega (highland elevations above 2,300m), woina dega (midland elevations between 1,500 and 2,300m) and kolla (lowland below 1,500m). The kolla (lowlands) occupies the largest area (62.2%), followed by woina dega (26.4%) and dega (11.4%). There is a direct relationship between rainfall amount and altitude and an inverse relationship between altitude and temperature (Degefa and Tesfaye, 2008).

Goro Gutu and Meta being woredas of east Hararghe zone share similar agro-ecologies like the zone even though the proportion varies. The agro ecology of the woredas falls in highlands (Dega), midland (Woina Dega) and low land (Kolla). The proportion of highland (Dega), midlands (Woina Dega) and low lands (Kolla) vary.

3.6. Infrastructural and social services

The two woredas are crossed by the main road connecting Addis Ababa and Dire Dawa or Addis Ababa and Harar. The road passes through the small towns in the two woredas like Karamile and Boroda towns of Goro Gutu woreda and Chelenko and Kulubi towns of Meta woreda.

With regard to the education and health facilities existing in the woredas, there are primary and secondary school facilities in the woredas. However there are better education and health facilities in the small town than in the other kebeles

When we come to the water supply in the two woredas, there is shortage of potable water. There are few springs in the lowlands, which make the availability of water a primary concern of communities there. More springs are found in the midlands and highlands, but many of these dry up from time to time. Increasing deforestation has aggravated the depletion of groundwater, contributing to water shortages. In response to this situation, a number of urban and rural water supply schemes have been constructed by governmental

(GOs) and non governmental organizations (NGOs) in the woredas. The development of potable water supply increases the welfare of the society by improving the workload of women and children. This would also contribute to the improvement in the productivity of the society (socio economic profile of the woredas, 2004/05). According to the same literature, the developed water supply facilities include taps, motorized deep wells, developed springs and distribution schemes in the district. Like wise 88% of the urban population and 22% of the rural population in Goro Gutu woreda have access to potable water and 37% of the urban population and 16.8% of the rural population have access to potable water.

The main market place in the two woredas, (Goro Gutu and Meta), are found in the small towns like Karamile and Boroda towns of Goro Gutu woreda and Chelenko and Kulubi towns of Meta woreda. There are well known market days in the week in both of the woredas where the marketers gather together from different kebeles of the woredas.

CHAPTER FOUR: Research methodology

The research followed a survey research strategy. The data is mainly collected from samples drawn from population, key informants and focus groups in the selected kebeles of the target woredas and analysis and conclusion was made based on the collected data. The research also followed a qualitative research approach.

4.1. Samples and Sampling procedure

As it was mentioned earlier, the research was conducted in two woredas (Goro Gutu and Meta woredas) of east Hararghe zone, Oromiya regional state. These two woredas were selected due to combination of the following three reasons. They are their familiarity to the researcher, Goro Gutu and Meta being target woredas of this research's sponsoring project RiPPLE and its partner, HCS (Hararghe Catholic Secretariat) and presence of MUS facilities there. Due to time and money constraints, only one kebele from each woreda was purposively selected. Staffs of RiPPLE and HCS were consulted while trying to select kebeles from each of the woredas and it was reached in to some kind of consensus to consider some basic aspects to pursue purposive selection of the target kebeles. Aspects like earlier age of construction and large number of beneficiaries of the MUS facilities and the MUS facilities being able to provide service for both domestic and productive activities were made basis for the purposive selection of the target kebeles. Individuals selected from locations fulfilling the criteria mentioned above are assumed good to provide information required on the challenges and opportunities of MUS. Thus, Ifa Dhaba kebele from Goro Gutu woreda and Goro Biyo kebele from Meta woreda were selected as the MUS facilities there satisfy all the criteria stated earlier.

A total number of households (HHs) from the two kebeles 1,575 i.e 918 HHs and 657 HHs in Ifa Dhaba and Goro Biyo kebeles respectively used as a sampling frame for the research. The 1,575 HHs incorporated three different groups of individuals. These include HHs accessing water for both domestic and productive activities, HHs accessing water for only domestic activities and those who are not accessing water from these MUS facilities (non beneficiaries of the MUS facilities). For the purpose of this research, the former two groups are considered as user groups and the latter as non user groups. It was planned to satisfy the multiple water needs of 45 and 48 HHs respectively in Ifa Dhaba and Goro Biyo kebeles with the MUS facilities existing there. However at the time of the research work, the number of user groups had increased. The number of beneficiary HHs who was accessing water for both domestic and productive activities from the MUS facilities was 82 and 84 in Ifa Dhaba and Goro Biyo kebeles respectively and the number of those who was accessing water for only domestic

activities was 150 and 125 respectively in Ifa Dhaba and Goro Biyo kebeles. These and other non beneficiaries of the MUS facilities (non user groups) constituted the 1,575 HHs.

The population being found in different location and their being two different kinds i.e user groups and non user groups of the existing MUS facilities in the selected kebeles increase heterogeneity of the population. So, in order to reduce this heterogeneity, the population was first stratified in to two groups i.e groups based on their place of residence, as groups in Ifa Dhaba and Goro Biyo kebeles. Then, four strata based on their being beneficiaries and non beneficiaries were formed i.e beneficiaries and non beneficiaries of MUS facilities in Ifa Dhaba kebele and similar kinds of groups in Goro Biyo kebele were formed. beneficiaries of the MUS facilities in the selected kebeles were further divided in to two groups of HHs, those who were accessing water for productive as well as domestic activities and those who were accessing water for only domestic activities. Finally a total of 6 strata (3 strata in each of the kebeles) were formed. Lists of user groups in both of the kebeles were available from the kebele Development Agents (DAs) and it was impossible to get lists of non user groups. But before pursuing the sample selection, the size of the samples was determined.

When we come to the sample size determination, among the different methods used to determine the sample size, the one developed by Carvalho in 1984, which is getting familiarity with different researchers, was applied to determine the sample size. The method is discussed as follows.

Table 1: Carvalho's method of sample size determination

Population size	Sample Size		
	Small	Medium	Large
51 - 90	5	13	20
91 - 150	8	20	32
151 - 280	13	32	50
281 - 500	20	50	80
501 - 1200	32	80	125
1201 – 3200	50	125	200
3201 - 10000	80	200	315
10001 - 35000	125	315	500
35001 - 150000	200	500	800

Source: Mahlet, 2008

Table 1, shows how Carvalho's method of sample size determination could be conducted. The method proposes selection of small, medium and large size samples from different ranges of population as seen on the table. Thus the size of the population of this research i.e 1,575 falls in the range between 1,201 and 3,200 which propose selection of 50, 125 and 200

of small medium and large sized samples. Medium sized sample of 125 was found convenient for the research as large sized samples require high cost and much time.

The determined sample size of 125 was made to incorporate large number of beneficiaries (user groups) as the study focused on assessing the challenges and opportunities of the MUS facilities in the target woredas. The number of user groups to be incorporated in the research was made to be equal to the number of beneficiaries which the MUS facilities in the two selected kebeles were intended to serve at the time of their establishment i.e 93HHs (45HHs from Ifa Dhaba and 48HHs from Goro Biyo kebele). The proportion of HHs from those who are accessing water for domestic and productive activities and from those who are accessing water for only domestic activities was determined based on their size. The remaining 32 HHs were selected from non beneficiaries (non user groups) in each kebele. Their proportion was made to be 12 and 20 from Ifa Dhaba and Goro Biyo kebeles respectively. These non beneficiaries were incorporated in the research in order to find out their attitude and aspirations towards the existing MUS facilities in the selected kebeles.

The determined sizes of samples were selected from the defined strata in each of the selected kebeles. The selection was conducted using simple random sampling technique specifically using a method called fish blow drawing in the case of user groups where as selection of samples from non user groups was made using quota sampling as it was impossible to apply similar techniques as in the case of user groups. The proportion of men and women was decided using their proportion in each stratum. This implies that multistage sampling was employed for the purpose of selecting samples for the research.

4.2. Date types, sources and method of acquisition

Qualitative and quantitative data were collected from primary and secondary sources. The main primary sources of the data include, sample households, key informants, focus groups and individuals met while conducting informal interviews where as the main secondary sources include published and unpublished documents, research reports and websites. The data was collected from primary and secondary sources by employing different tools of data collection. The following sub sections discuss details on how the data collection was made.

4.2.1. Primary data collection

The primary data collection was made for the research using tools like survey questionnaires, key informant interview, focus group discussion and other tools like observation and informal interviews with some individuals. These different types of tools were employed in order to collect specific types of data and to triangulate information by incorporating similar

questions during the design of the tools. Discussions on how the different tools were applied for the primary data collection are given as follows.

a. Survey questionnaires

This method was employed with the aim to assess and find out the basic demographic characteristics of the households, attitude of HHs towards the MUS, the bottlenecks solutions and opportunities of the MUS facilities existing in the target areas. Household survey was conducted using questionnaire administered to 125 sample households. The survey questionnaire was prepared in such a way that they can capture information relevant to the research area. Before going to the data collection, pretest of the developed questionnaire was made in order to check the feasibility of the questionnaire and then after some adjustment was made. Enumerators with educational background of grade 12 completions and diploma holding were selected to increase the trustworthiness of the data. These enumerators were given one day training and adequate elaborations on the objectives of the research, content of the questionnaire, composition of the samples and other aspects.

b. Key informant interview

Key informant interview was used with the hope to increase the quality and reliability of the data. Interviews with different stakeholders like farmers, development agents, officials of government and non governmental organizations at the woreda level were conducted. It helped to know their opinion and perception on different aspects of MUS facilities in the study area and to the MUS approach in general and the performance of the MUS facilities existing there. It was also employed to gather information on challenges and opportunities of the MUS facilities in the study area. Selection of key informants was made using purposive sampling.

c. Focus group discussion

Focus group discussion is another tool used for collection of primary data. A series of focus group discussions with water user committees, groups of beneficiaries and non beneficiaries of MUS facilities divided as women groups and men groups from the upstream and downstream users in both of the selected kebeles wer e condu cted with groups of each consisting eight to twelve individuals. Individuals assumed to provide relevant information were selected to participate in the focus group discussion using purposive sampling technique. The findings of the discussion were used to strengthen the information gathered using survey questionnaire from the sample households and key informant interview of the different stake holders. Different photos were taken while conducting discussions with different groups of individuals. They are found in figure 3 in the annex section.

d. Other tools

In addition to the above tools of primary data collection, tools like visits to the other MUS sites in the target woredas and informal interviews with different individuals like successful farmers and others were made. Visits of MUS facilities found in other kebeles helped to see the situation of the MUS facilities there and informal interviews with successful farmers were helpful to know their achievements in relation to the MUS facilities and to know their perception towards MUS.

4.2.2. Secondary data collection

Secondary data were collected from review of the available documents which are published and unpublished materials from concerned organizations like AAU (Addis Ababa University), CSA (Central Statistical Authority), MoWR (Ministry of Water Resources), RiPPLE (Research-inspired Policy and Practice Learning in Ethiopia and the Nile region), IWMI (International Water Management Institute), IRC (International Water and Sanitation Center), and others. Different websites from internet were also visited while searching for different literatures. These secondary information was used to back the primary data obtained using the different tools mentioned above.

4.3. Data analysis

After all the relevant data were collected, they were tabulated to make them suitable for the purpose of being encoded in the SPSS (statistical package for social scientists) software. Then Descriptive statistics, including tables of percentage distribution, frequency distribution and others were used for the analysis of the coded data. Figures (charts) were also used for more illustration. The findings were further elaborated in the form of descriptions and narrations. Finally interpretation of the data analysis was made in the form that was more suitable for decision making to present the results and discussion as well as the summary and conclusion parts of the research in a more reliable way.

CHAPTER FIVE: Results and discussion

This chapter presents the key findings of the study. The results of the findings have been organized under five sub-sections. The first and the second sub-sections provide information on Background of sample households and Water facilities existing in the selected kebeles respectively. The third and the fourth sub-sections address issues like multiple use water systems in the target woredas, Challenges to the existing MUS facilities and Solutions to the existing problems on MUS facilities and the future prospects of such facilities.

For the purpose of simplicity, in this research, those individuals who access water from the MUS facilities in both of the selected kebeles are referred to as user groups and those who do not access water from the MUS facilities are referred to as non user groups.

Tables of percentage and frequency distribution and charts are used for illustration of data analysis results. Thus values in brackets in each of the tables in each of the following sub sections represent percentage values.

5.1. Background of sample households

5.1.1. Demographic characteristics

As it is stated in the methodology part, the number of the respondents from the user groups in Ifa Dhaba kebele of Goro Gutu woreda and those of respondents in Goro Biyo kebele of Meta woreda were 45 and 48 respectively. Similarly, the number of respondents from non user groups in the respective kebeles was 12 and 20.

The discussion of the results starts with the explanation of the demographic characteristics specifically by showing the length of the residency of the respondents in the selected kebeles. The results of the data analysis showed that majority of the respondents from user and non user groups in both of the kebeles started to live in the specified kebeles starting from their childhood (86.7% of user groups in Ifa Dhaba kebele, 89.6% of user groups in Goro Biyo kebele, 91% of non user groups in Ifa Dhaba kebele and 65% of non user groups in Goro Biyo kebele). Among those user groups in Ifa Dhaba and Goro Biyo kebele, 13.3% and 10.4% of them respectively lived in the specified kebeles for about 20 years. From non user groups in Ifa Dhaba kebele, 8.3% of them had lived there for about 20 years where as 15%, 10% and another 10% of non user groups in Goro Biyo kebele had lived there for about five years, ten years and twenty years respectively.

Respondents who did not start to live in the kebeles since their childhood gave their reasons to come and reside there. 13.3% and 10.4% of user groups in Ifa Dhaba and Goro Biyo kebele respectively started to live there after they got married. Similarly among those non

user groups in Ifa Dhaba and Goro Biyo kebele, the respective 8.3% and 35% of the respondents came to live in the specified kebeles due to marriage. This implies that the main reason for majority of new inhabitants to come and reside in the specified kebeles is marriage and majority of them lived there for longer periods. Thus, it can be said that information gathered form such respondents would be very valuable as they could have good knowledge and experience of the area. Detailed background of the sample households in the study area is given as follows.

Table 2: Distribution of households by sex composition

Sex	User groups		Non user groups		Total
	Ifa Dhaba	Goro Biyo	Ifa Dhaba	Goro Biyo	
Male	25 (55.5)	27 (56.2)	9 (75.0)	12 (60.0)	**73 (58.4)**
Female	20 (44.5)	21 (43.8)	3 (25.0)	8 (40.0)	**52 (41.6)**
Total	**45 (100.0)**	**48 (100.0)**	**12 (100.0)**	**20 (100.0)**	**125 (100.0)**

Source: own survey, 2009

Note: figures in brackets represent percentage values.

As it can be seen on table 2 above, there were 55.5% male and 44.5% female respondents from user groups in Ifa Dhaba kebele, where as the male and female composition of respondents in Goro Biyo kebele were 56.2% and 43.8% respectively. In the case of non user groups in Ifa Dhaba kebele, the respective percentage of male and female respondent was 75% and 25% where as among those similar groups of respondents in Goro Biyo kebele, 60% were male and the remaining 40% were female. When we look at the overall sex composition of the respondents we can see that 58.4% of the respondents were male and the remaining 41.6% of the respondents were female. This implies that the respondents incorporated good proportion of males and females.

Table 3: Distribution of households by age composition

Age range	User groups		Non user groups		Total
	Ifa Dhaba	Goro Biyo	Ifa Dhaba	Goro Biyo	
19 – 25 years	6 (13.3)	6 (12.5)	1 (8.3)	3 (15.0)	**16 (12.8)**
26 – 40 years	28 (62.2)	31 (64.6)	7 (58.3)	13 (65.0)	**79 (63.2)**
> 40 years	11 (24.4)	11 (22.9)	4 (33.3)	4 (20.0)	**30 (24.0)**
Total	**45 (100.0)**	**48 (100.0)**	**12 (100.0)**	**20 (100.0)**	**125 (100.0)**

Source: own survey, 2009

Note: figures in brackets represent percentage values.

With regard to age, table 3 shows that majority of respondent user groups in Ifa Dhaba kebele, i.e 62.2% were in the age range between 26 and 40 while 24.4% of them were greater than 40 years and the remaining 13.3% were in the age range between 19 and 25. Among those similar groups in Goro Biyo kebele, majority of them (64.6%) were found in the age

range between 26 and 40, 22.9% of them were greater than 40 years and the remaining 12.5% were in the age range between 19 and 25. In the case of non user groups in Ifa Dhaba kebele, 58.3% of them were in the age range between 26 and 40, 33.3% of them were greater than 40 years, and the remaining 8.3% were in the age range between 19 and 25 years while among those non user groups in Goro Biyo kebele, 65% of them were between 26 and 40 years, 20% of them were greater than 40 years and the reaming 15% were in the age range between 19 and 25. The overall age composition of the respondents showed that 12.8% of them were in the age range between 19 and 25, 63.2% of them were in the age range between 26 and 40 and the remaining 24% of the respondents were greater than 40 years.

This implies that majority of the respondents in both of the kebeles, whether they are from user groups or non user groups, were greater than 26 years which makes it relevant to obtain information with regard to the main inquiry of the research.

Table 4: Distribution of households by educational background

Educational background	User groups		Non user groups		Total
	Ifa Dhaba	Goro Biyo	Ifa Dhaba	Goro Biyo	
Illiterate	29 (64.4)	30 (62.5)	9 (75.0)	17 (85.0)	**85 (68.0)**
Basic education	4 (8.9)	8 (16.7)	1 (8.3)	1 (5.5)	**14 (11.2)**
Primary school	11 (24.4)	10 (20.8)	2 (16.7)	2 (10.0)	**25 (20.0)**
Secondary school	1 (2.2)				**1 (0.8)**
Total	**45 (100.0)**	**48 (100.0)**	**12 (100.0)**	**20 (100.0)**	**125 (100.0)**

Source: own survey, 2009

Note: figures in brackets represent percentage values.

When we come to the educational background, table 4 revealed that majority of the respondents from user groups in Ifa Dhaba kebele (64.4%) were illiterate, 24.4% of them were primary school completes, 8.9% of them got basic education and the remaining 2.2% were secondary education completes. Among those user groups in Goro Biyo kebele, those who are illiterate constitute 62.5% of the respondents, those who completed primary school constitute 20.8% and those who got only basic education constitute 16.7%.

In the case of non user groups in Ifa Dhaba kebele, 75% of them were illiterate, 16.7% of them were primary education completes and the remaining 8.3% of them got basic education. Among non user groups in Goro Biyo kebele, 85% were illiterate, 10% were secondary education completes and the remaining 5% were primary school completes. The overall educational background of the respondents showed that 68% were illiterate, 11.2% of them got only basic education, 20% of them were primary school completes and the remaining 0.8% were secondary school completes.

When the educational background of the respondents was cross tabulated with age groups, majority of user groups as well as majority of non user groups were illiterate and were in the age range between 26 and 40 years and they constituted 37.6% and 51.7% respectively. This implies that there is prevalence of illiteracy with in the adults in the selected kebeles. This is the case similar to the situation in many rural areas in the country

Table 5: Distribution of households by marital status

Marital status	User groups		Non user groups		Total
	Ifa Dhaba	Goro Biyo	Ifa Dhaba	Goro Biyo	
Single	1 (2.2)	2 (4.2)			**3 (2.4)**
Married	28 (62.2)	38 (79.2)	9 (75.0)	19 (95.0)	**94 (75.2)**
Divorced	15 (33.3)	2 (4.2)	2 (16.7)	1 (5.0)	**20 (16.0)**
Widowed	1 (2.2)	6 (12.4)	1 (8.3)		**8 (6.4)**
Total	**45 (100.0)**	**48 (100.0)**	**12 (100.0)**	**20 (100.0)**	**125 (100.0)**

Source: own survey, 2009

Note: figures in brackets represent percentage values.

As it can be seen from table 5 above, 62.2% of the respondents from user groups in Ifa Dhaba kebele were married, 33.3% of them were divorced, 2.2% were single and another 2.2% of them were widowed where as 4.2%, 79.2%, 4.2% and 12.4% of the respondents from user groups is Goro Biyo kebele constituted single, married, divorced and widowed household heads.

From non user groups in Ifa Dhaba kebele, those who were married, divorced and widowed were 75%, 16.7% and 8.3% respectively and among those non user groups in Goro Biyo kebele married and divorced heads of households (HHs) constituted 95% and 5% respectively. When we see the overall marital status of the respondents, those who were single and married constituted 2.4% and 75.2% respectively and those who were divorced and widowed constituted 16% and 6.4% respectively.

It was also found from informal interview of individuals that it is those divorced or widowed women who stay un married for more years than men as they are the ones who would be responsible to take care of their children. This is also the case similar to many of the situation in majority of rural areas in the country.

Table 6: Distribution of households by family size

Size of a family	User groups		Non user groups		Total
	Ifa Dhaba	Goro Biyo	Ifa Dhaba	Goro Biyo	
1 – 4	9 (20.0)	13 (27.1)	4 (33.3)	5 (25.0)	**31 (24.8)**
5 – 7	26 (57.8)	25 (52.1)	5 (41.7)	9 (45.0)	**65 (52.0)**
8 – 10	8 (17.8)	8 (16.7)	1 (8.3)	6(30.0)	**23 (18.4)**
> 10	2 (4.4)	2 (4.2)	2 (16.7)		**6 (4.8)**
Total	**45 (100.0)**	**48 (100.0)**	**12 (100.0)**	**20 (100.0)**	**125 (100.0)**

Source: own survey, 2009

Note: figures in brackets represent percentage values.

The size of a family shown on table 6 above revealed that 57.8% and 20% of those user groups from Ifa Dhaba kebele constituted households having 5 to 7 and 1 to 4 members in the family. 17.8% and 4.4% of the respondent user groups from Ifa Dhaba kebele constituted households having 8 to 10 and more thane 10 members in their family respectively. Among those user groups in Goro Biyo kebele, 52.1% of them constituted 5 to 7 members, 27.1% constituted 1 to 4 members, 16.7% of the respondents constituted 8 to10 members and the remaining 4.2% of them constituted more than 10 members in their family.

From the non user groups in Ifa Dhaba kebele, 41.7%, 33.3%, 16.7% and 8.3% of the respondents have 5 to 7, 1 to 4, > 10 and 8 to 10 members in the family respectively and among those similar groups in Goro Biyo kebele, 45%, 30% and 25% of the respondents have 5 to 7, 8 to 10 and 1 to 4 members in their family respectively. When we see the analysis of the over all data, we can see that majority of the respondents (52%) constituted 5-7 members in their family. It was also tried to calculate the average family size in a family and it was found 6. The key informant interview with the two kebele DAs also revealed that the average size of a family in Ifa Dhaba kebele is 6 and that of Goro Biyo is 5

Table 7: Distribution of households by religious composition

Religion	User groups		Non user groups		Total
	Ifa Dhaba	Goro Biyo	Ifa Dhaba	Goro Biyo	
Christians	5 (11.1)	3 (6.3)	1 (8.3)	5 (25.0)	**14 (11.2)**
Muslim	40 (88.9)	45 (93.7)	11 (91.7)	15 (75.0)	**111 (88.8)**
Total	**45 (100.0)**	**48 (100.0)**	**12 (100.0)**	**20 (100.0)**	**125 (100.0)**

Source: own survey, 2009

Note: figures in brackets represent percentage values.

With regard to religion, Table 7 above shows that 11.1% and 88.9% of the respondent user groups in Ifa Dhaba kebele were Muslim and Christians respectively where as Muslims and Christians from user groups in Goro Biyo kebele constituted 93.8% and 6.2% of the respondents respectively. In the case of non user groups, Muslims in Ifa Dhaba kebele constituted 91.7% and Christians constituted 8.3% while Muslims in Goro Biyo kebele

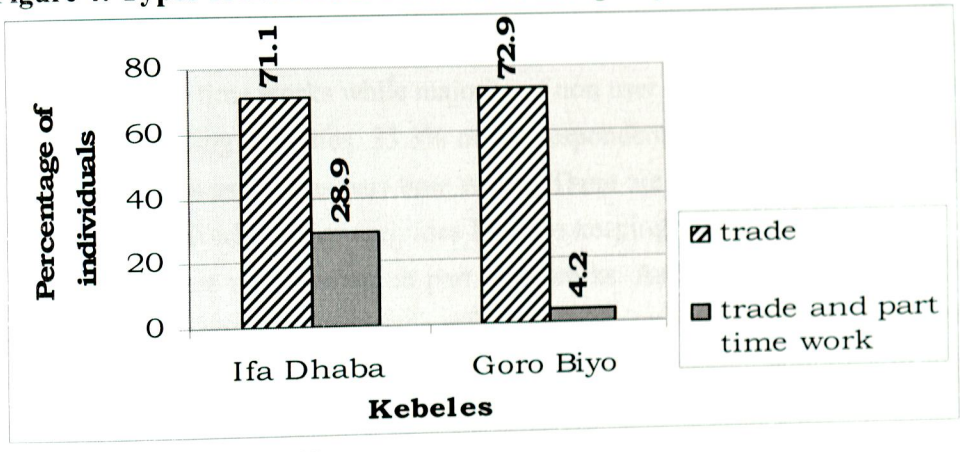
constituted 75% and Christians constituted 25%. This implies that majority of the respondents in the selected kebeles were Muslims. These facts go with the information obtained from the two kebele DAs using key informant interview. It also showed that the ethnic composition in the two kebeles as Muslims, Christians and Catholics.

5.1.2. Socio-economic characteristics of households

a. Economic activities

The results of the data analysis showed that 100% of user and non user groups of individuals in Ifa Dhaba and Goro Biyo kebeles are involved in agricultural activities. Agriculture is the main source of income for these individuals. In addition to this, it was also found that majority of the respondents from the two groups (user and non user groups) in the two kebeles are involved in other additional activities as shown on the graph below.

Figure 4: Types of additional activities of user groups

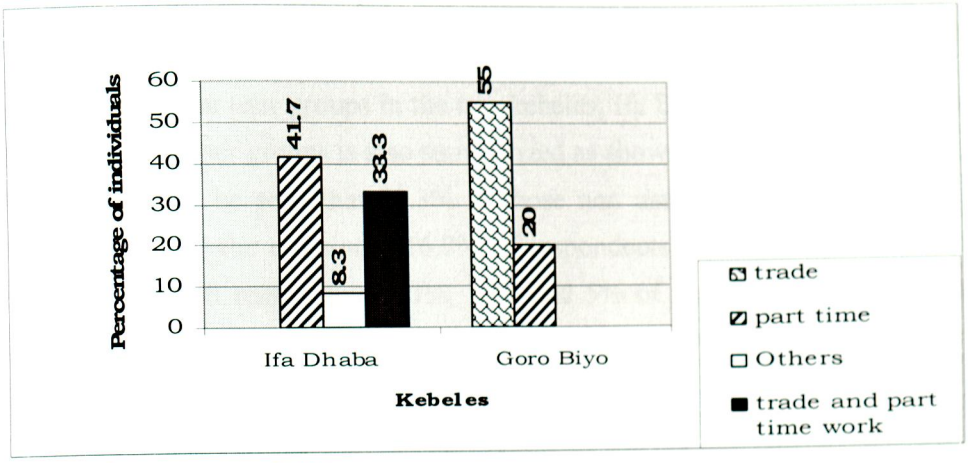


Source: Own survey, 2009

Note: figures on the charts represent percentage values.

Figure 4 shows that majority of the respondents i.e 71.1% of user groups in Ifa Dhaba kebele and 72.9% of user groups in Goro Biyo kebele are involved in trading activities and the remaining 28.9% and 4.2% of them in Ifa Dhaba and Goro Biyo kebele respectively were involved in trading activities with part time works. As the information obtained from Ifa Dhaba and Goro Biyo kebele Development agents (DAs) part time works in the case of those in Ifa Dhaba kebele, usually refer to activities in the safety net programs where there is farmers training center (FTC) and for those in Goro Biyo kebele are employment activities in different organizations.

Figure 5: Types of additional activities of non user groups



Source: Own survey, 2009

Note: figures on charts represent percentage values.

As shown on figure 5, large proportion of non user groups in Ifa Dhaba kebele (41.7%) are involved in part time works while majority of non user groups in Goro Biyo kebele (55%) are involved in trading activities. 33.3% of the respondents in Ifa Dhaba kebele are involved in trading activities as well as part time works. There are 8.3% of the respondents in Ifa Dhaba kebele are involved in other activities like bee keeping. There are 20% of the respondents in Goro Biyo kebele are involved in part time works. As mentioned above this part time work includes mainly participation in the safety net program in the case of Ifa Dhaba kebele where there is (FTC) farmers training center and other employment activities in the case of Goro Biyo kebele.

b. Land ownership and land use pattern

The result of the analysis of data collected from households using questionnaire also showed that 100% of the user and non user groups in both kebeles own agricultural land even though the type of possession(ownership) and size varies. This implies that households in both of the selected kebeles own land but with different types and sizes. Key informant interview with the selected farmers and development agents in the two kebeles revealed that size of land being small is a major challenge to the residents and almost all of the respondents were complaining on their land size being very small and not enough to perform their agricultural works.

From the user groups in Ifa Dhaba kebele 82.2% of them owned private land and 17.8% owned private land with rented land. From the same type of respondents in Goro Biyo kebele, it was found out that 70.8% of them owned private land, 4.2% of them owned private land with rented land, 8.3% owned inherited land, 6.3% of them owned family land, 4.2%

and another 6.3% of them owned private land with inherited land and private land with family land respectively. This can be clearly seen on table 2 in the annex section.

In the case of non user groups in the two kebeles; Ifa Dhaba and Goro Biyo, the type of land holding of non user groups is also summarized as shown in table 2 in the annex section. From the table, it can be seen that 83.3% of those non user groups in Ifa Dhaba kebele owned private land and the remaining 16.7% of respondents in the kebele owned private land in combination with rented land. 80%, 15% and 5% of respondents from non user groups in Goro Biyo kebele respectively own private land, (private land in combination with inherited land and inherited land.

The average size of land a family owned was computed from the results of the data analysis and it becomes 2.39 Timad (0.29 hectare) in the case of Ifa Dhaba kebele and 1.39 Timad (0.17 hectare) in the case of Goro Biyo kebeles. It is almost equal to the values of average land size of a family obtained based on information gathered from the two kebele development agents.

With regard to land use pattern of the user groups in Ifa Dhaba 46.7% of them use their land to produce cereals and chat, 20% of the respondents use their land to produce cereals and chat together with rearing animals, 13.3% of them use their land to produce cereals only, 6.7% of the respondents use their land to produce cereals and to rear animals, 4.4% of the respondents use their land to produce cereals, coffee, chat together with rearing animals and there are also few individuals who are using their land to produce fruits and vegetables together with other types of crops. In the case of user groups in Goro Biyo kebele, 27.1% of individuals use their land to produce cereals, fruits and vegetables and chat, 22.9% of them use their land to produce cereals, 14.6% to produce cereals and chat, 8.3% to produce cereals, fruits and vegetables and to rear animals, 6.3% to produce cereals and to rear animals, 6.3% to produce cereals, fruits and vegetables, coffee and chat, 4.2% to produce cereals and chat and to rear animals, 4.2% to produce cereals, fruits and vegetables, coffee and rear animals and very few individuals use their land to produce other combination of produces.

From non user groups in Ifa Dhaba and Goro Biyo kebele, those who are using their land to produce only cereals are 41.7% and none of the respondents respectively. Those who are using their land to produce cereals and chat constitute 33.3% and 15% in the two respective kebeles. Those who are using their land to produce cereals together with rearing animals are 0 and 20% respectively in Ifa Dhaba and Goro Biyo kebeles. There are 5% of respondents who are producing cereals together with fruits and vegetables in Goro Biyo kebele but none of the respondents in the Ifa Dhaba kebele produce fruits and vegetables. There are 25% of individuals who are producing cereals, coffee and chat in Ifa Dhaba kebele and none in Goro

Biyo kebele. Again on contrary to the practices of production in the Ifa Dhaba kebele, there are 5%, 10%, 35% and 10% of the respondents in Goro Biyo kebele who are producing a combination of the following respectively: (cereals, fruits and vegetables and rearing animals), (cereals, fruits and vegetables with chat), (cereals, chat with rearing of animals) and (cereals, fruits and vegetables, chat with rearing of animals).

c. Types of crops grown and animals raised

i. Cereals

When we come to the specific types of cereals produced by the different groups of users and non users of MUS in Ifa Dhaba and Goro Biyo kebele, we can find from the results of the data analysis that majority of user groups in the former kebele are producing maize and mashila (sorghum) while majority of the respondents in the latter kebele are producing wheat and maize, the next higher percentages of individuals in Ifa Dhaba and Goro Biyo are producing sorghum and maize respectively and there are few individuals who are producing other combinations of cereals. The summary is as given in table 3 in the annex section. As shown in this table, among user groups those who are producing maize and mashila (sorghum) in Ifa Dhaba kebele comprises 64.4% of the respondents, while those in Goro Biyo kebele comprises 2.1% of the total respondents. Those who are producing wheat and maize in Goro Biyo kebele comprise 54.2% of the respondents. In Goro Biyo kebele there are few individuals who are producing other combinations of cereals. However their percentage is very small, less than 5%.

In the case of non user groups, 75.0%, 16.7% and 8.3% of them in Ifa Dhaba kebele are producing (maize and mashila (sorghum)), (mashila (sorghum)) and none respectively while 50% and another 50% of those in the other kebele i.e Goro Biyo are produce maize and (wheat with maize) respectively.

ii. Fruits and vegetables

With regard to the fruits and vegetables production in the two kebeles, the findings showed the following. Production of it by user groups in Ifa Dhaba kebele is not known as majority of the respondents gave no response. However small proportion of them (4.4% and 2.2%) produce potato and tomato respectively. In the case of Goro Biyo kebele, majority of the respondents (52.1%) from user groups are producing potato and the remaining 47.9% give no response.

In the case of non user groups, there are no respondents in Ifa Dhaba kebele who are producing fruits and vegetables while there are 30% of the households in Goro Biyo kebele who are producing potato.

iii. Chat

Chat is one of the major cash crops grown in East Hararghe zone. The results of the data analysis also revealed that majority of the respondents, i.e 77.8% and 56.3% from user groups and 56.3% and 91.7% from non user groups in Ifa Dhaba and Goro Biyo respectively are producing chat.

This implies that the major crops grown in the selected two kebeles are maize, sorghum, wheat and chat.

iv. Animals

The result of the data analysis shows that the types of animals raised with majority of the respondents from user and non user groups is not known as (75.6% and 68.8%) from user groups and (100% and 40%) of respondents from non user groups in Ifa Dhaba and Goro Biyo kebele respectively did not mention the type of animals they raised. But 11.1% and 13.3% of those user groups in Ifa Dhaba kebele respectively raise cows with oxen and keep bees. The respective percentages of user groups in Goro Biyo kebele who keep cow with oxen, donkey and (cow, oxen together with goats and sheep) are 25%, 4.2% and 2.1% respectively. In the case of non user groups from the same kebele, 25% and 35% of the respondents respectively keep animals like cattle and donkey.

5.2. Water facilities

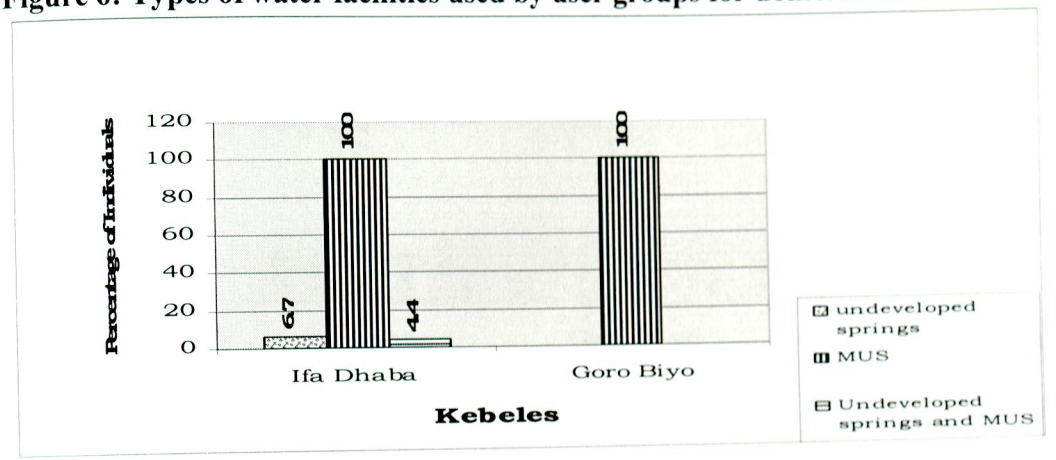
Focus group discussion with the committee members and the selected beneficiaries and also informal interviews conducted with officials in HCS, in both of the kebeles showed that there are different sources of water existing in the kebeles. These include; hand dug wells (ponds), roof water catchments, developed springs (MUS), another springs developed but a bit different from the mentioned MUS facilities with the absence of multiple s structures, and undeveloped springs. There is also practice of roof water catchments in both of the kebeles

5.2.1. Purpose of water facilities

To this aspect, regardless of the difference in types of the water sources 100% of user and 100% of non user groups in both of the kebeles said that they use water for the purpose of domestic consumption, cattle rearing and for irrigation. This finding could support idea of many of literatures dealing with the water use pattern that say 'water obtained from whatever source in the world is used for domestic as well as productive activities' and it is also observed in different parts of the world.

When we come to the question 'which source of water is used for domestic activities, rearing animals and for irrigation?' the data analysis results are summarized as in the following figures.

Figure 6: Types of water facilities used by user groups for domestic activities

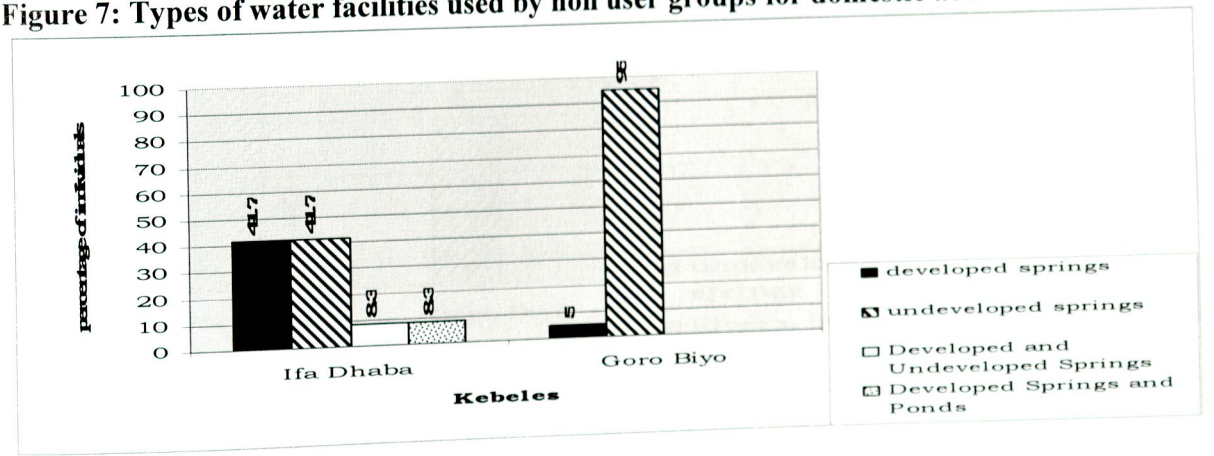


Source: Own survey, 2009

Note: figures on charts represent percentage values.

Figure 6 show that 100% of user groups in both of the kebeles use MUS facilities for their domestic consumption. There are also some percents of user groups in Ifa Dhaba kebele who are using other water sources in addition to the MUS facilities like developed springs (used by 6.7% of user groups) and undeveloped springs (used by 4.4% of user groups).

Figure 7: Types of water facilities used by non user groups for domestic activities



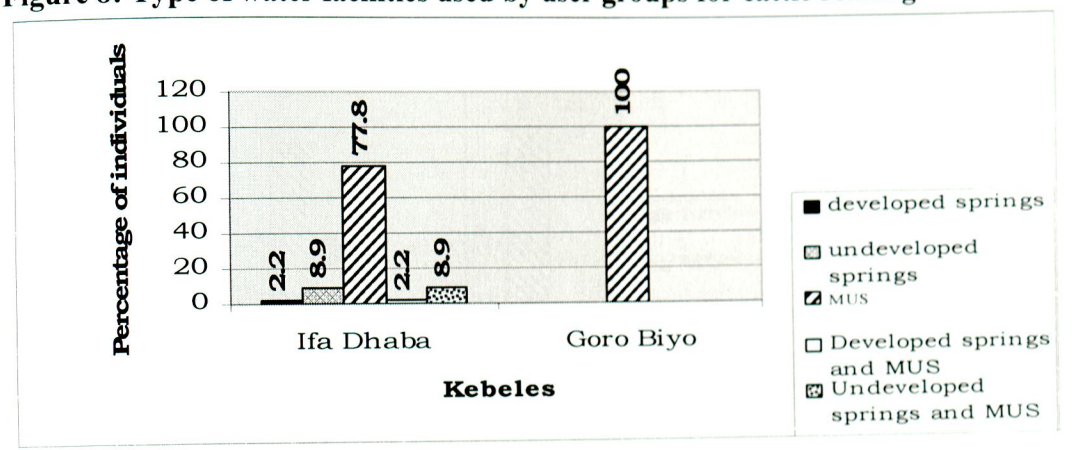
Source: own survey, 2009

Note: figures on charts represent percentage values.

Figures 7 shows that majority of the respondents in both of the kebeles (Ifa Dhaba and Goro Biyo), 41.7% and 95% respectively are using undeveloped springs for their domestic consumption where as 41.7% and 5% of the respondents in the respective kebeles use

developed springs a bit different from the MUS facilities. 8.3% and another 8.3% of non user groups in Ifa Dhaba kebeles are using (developed springs with undeveloped springs) and (developed springs with ponds) respectively.

Figure 8: Type of water facilities used by user groups for cattle rearing

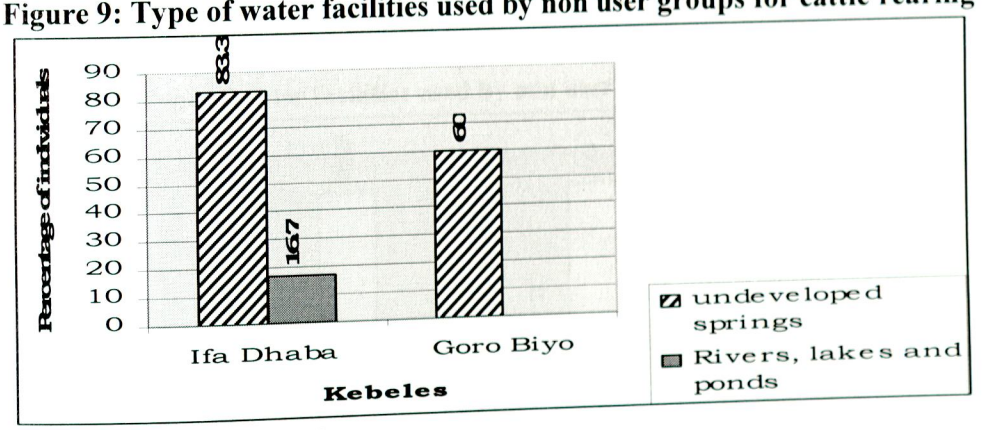


Source: own survey, 2009

Note: figures on charts represent percentage values.

Figure 8 show that majority of user groups in Ifa Dhaba and Goro Biyo kebele (77.8% and 100% respectively) used MUS facilities for cattle rearing. 2.2%, 8.9%, 2.2% and 8.9% of user groups in Ifa Dhaba kebele use developed springs, undeveloped springs, developed springs with MUS facilities and undeveloped springs with MUS facilities respectively.

Figure 9: Type of water facilities used by non user groups for cattle rearing



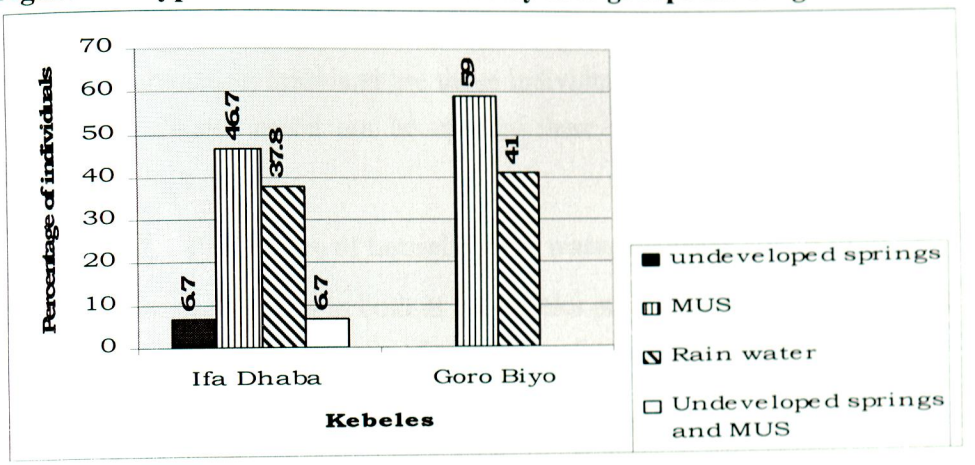
Source: own survey, 2009

Note: figures on charts represent percentage values.

Figure 9 shows that for the purpose of cattle rearing, majority of non user groups in both of the kebeles use undeveloped springs (83.3% of the respondents from Ifa Dhaba kebele and 60% of respondents in Goro Biyo kebele). Some 16.7% of individual non user groups from Ifa Dhaba kebele use rivers lakes and ponds to water animals. The remaining 40% of the

respondents from non user groups in Goro Biyo kebeles did not mention the type of water facilities they are using to water their animals.

Figure 10: Type of water facilities used by user groups for irrigation

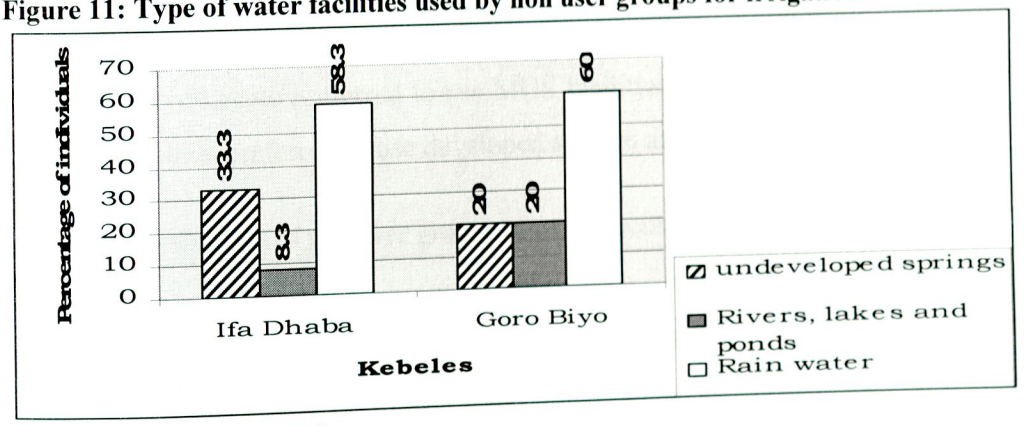


Source: own survey, 2009

Note: figures on charts represent percentage values.

As it can be seen from figure 10, there are large number of users groups who are using MUS for irrigation (46.7% in Ifa Dhaba kebele and 59% in Goro Biyo kebele. The next higher percentage of individuals from user groups in both of the kebeles (37.8% and 41% respectively) is using rain water to grow crops. There are also 6.7% and another 6.7% of individuals in Ifa Dhaba kebele who are using undeveloped springs and undeveloped springs with MUS facilities to irrigate their land.

Figure 11: Type of water facilities used by non user groups for irrigation



Source: own survey, 2009

Note: figures on charts represent percentage values.

As it is shown on figure 11, majority of non user groups i.e 58.3% from Ifa Dhaba kebele and 60% from Goro Biyo use rain water for irrigation. 33.3% of non user groups from Ifa Dhaba kebele and 20% of the same groups in Goro Biyo kebele use undeveloped springs. The

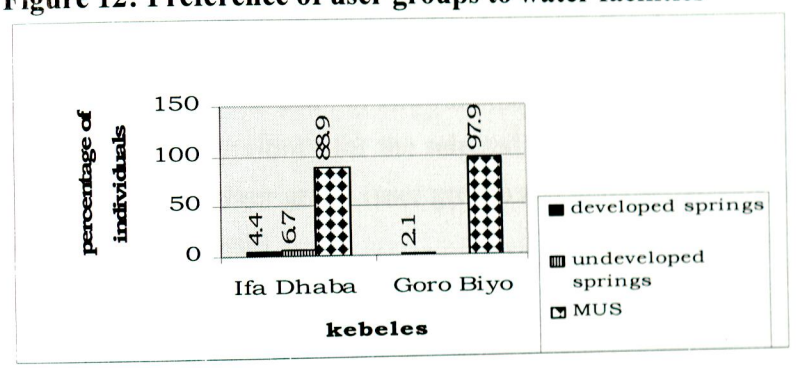
remaining percentages i.e 8.3% and 20% in Ifa Dhaba and Goro Biyo kebele respectively use rivers, lakes and ponds to water their animals.

This implies that there are user groups who are using other systems for domestic as well as productive activities. Those user groups who are using water from other sources for the purpose of irrigating their land are those individuals who are in villages at the upper side of the springs. Water could not be uplifted there as motors are not installed on the MUS facilities.

5.2.2. Preference of households to water facilities

User and non user groups in both of the kebeles prefer to use one water source over the other and they also gave their reasons of prioritizing the selected systems.

Figure 12: Preference of user groups to water facilities

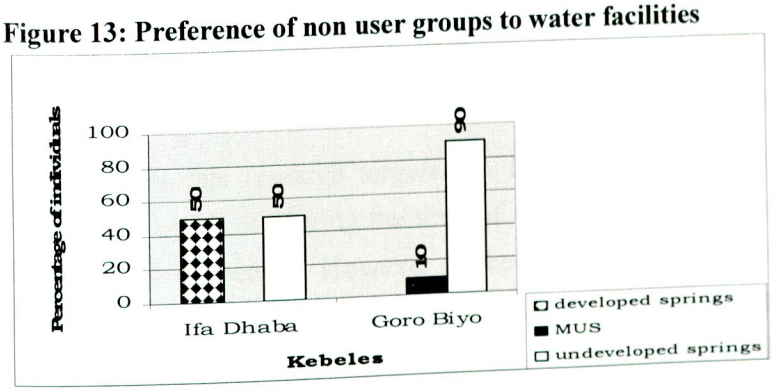


Source: own survey, 2009

Note: figures on charts represent percentage values.

Figure 12 showed that 88.9% and 97.9% of the respondents from user groups in Ifa Dhaba and Goro Biyo kebele preferred to use MUS facilities. 4.4% and 6.7% of the respondents in Ifa Dhaba kebele preferred to use developed springs and undeveloped springs.

Figure 13: Preference of non user groups to water facilities



Source: own survey, 2009

Note: figures on charts represent percentage values.

Figure 13 illustrated that majority of non user groups in both of the kebeles i.e 50% and 90% respectively in Ifa Dhaba and Goro Biyo kebele prefer to use undeveloped springs. However there is also relatively large number of individuals from non user groups in Ifa Dhaba Kebele (50%) who preferred to use developed springs which are different from the existing MUS facilities in their structures. The result of the data analysis also shows that there are 10% of individuals in Goro Biyo kebele who prefer to use MUS facilities even though they are not actually using the mentioned MUS systems. They are those groups of non users who are aware about the MUS facilities in their kebele.

The majority of individuals stated their reasons for preferring the stated water facilities in their areas. As it was found from the data analysis facilities being good for health, being the only available system in the area and others like the water facilities being found in nearby areas are the major reasons of majority of user groups in Ifa Dhaba and Goro Biyo kebele. On the other hand those non user groups from both of the kebeles also stated that the systems being good for health and not knowing the presence of other facilities in the area are the main reason for giving priority for the selected systems. This implies that aspects that are mostly looked at by whoever group (user groups and non user groups) is the systems being good for health (health aspect).

5.3. Multiple use water systems in the target woredas

5.3.1. Performance of the existing MUS facilities

This research was done on the assessment of the challenges and opportunities of multiple use water systems (MUS) in Goro Gutu and Meta woredas of East Hararghe zone. Thus the research focused on MUS facilities that gave service for more number of years and provide service for large number of beneficiaries to satisfy both of their domestic as well as productive needs.

The MUS facility the research targeted are found in Ifa Dhaba and Goro Biyo kebeles of the respective target woredas (Goro Gutu and Meta) specifically they are found in Kore and Gelan villages respectively.

The one that this research targeted in Ifa Dhaba kebeles is found in Kore village. It is constructed by HCS. During the time of its establishment, it was planned to provide service for about 45 household. However at the time of data collection, the number of household beneficiaries has grown to 82. These 82 households access water for both domestic as well as productive activities. As it was found from the key informants there are also 150 beneficiaries from villages at the upper side of the spring. These upstream users are those

who are accessing water for only domestic activities and not for productive activities as the water could not be uplifted due to absence of motors installed on the springs developed.

Similarly, As per Goro Biyo kebele Development Agents (DAs), the MUS facility that this research targeted, is found in Gelan village. It was constructed by HCS. During the time of their establishment, it was planned to serve 48 households but during the time of data collection, it was found that the number has increased to 84 households. These 84 households were accessing water for both domestic and productive activities. There are also around 125 households who are accessing water for domestic activities. Since these 125 households are found in villages at the upper side of the springs they could not access water for the purpose of irrigation like the 150 households in the case of Ifa Dhaba kebele.

5.3.2. Water use arrangements of the MUS facilities

With regard to access of water from the MUS, the result of the data analysis of the survey questionnaires indicated that majority of the respondents in the two kebeles (95.6% of the respondents in Ifa Dhaba kebele and 72.9% of the respondents in Goro Biyo kebele) said that there is no restriction with regard to the amount of water they are allowed to take from the MUS facilities for their domestic consumption. However most of the respondents in both kebeles are taking on average less than 3 Jerricans of water per day due to mainly difficulty of transporting on the rugged nature of the area and those who have donkeys usually take three or more number of Jerricans of water for their domestic consumption. The remaining 4.4% and 27.9% of the respondents in Ifa Dhaba and Goro Biyo kebeles respectively said that there are restrictions with regard to the amount of water to be taken from the MUS facilities.

When MUS users in both of the kebeles estimated the distance and hours they are traveling from the point of use i.e from their home to the point access (where these MUS facilities are found) the following was found. 68.8% of users from Ifa Dhaba kebele said that they travel a distance of around 1 to 3 Kms, 28.8% of the respondents said that they travel for less than one Kms and the remaining 2.2% said they travel 3-5 Kms to access water from the MUS facilities. Similarly majority of them in Goro Biyo kebele (70.8%) said that they traveled for less than 1 Km. 22.9 of the respondents said that they travel for around 1-3 Kms and the remaining 2.1% said they travel 3-5 Kms. 4.2% of the respondents in this kebele who gave no response.

With regard to the time they spent to travel the distance they mentioned above to access water from the point of use up to the point of access, 100% of the respondents from Ifa Dhaba kebele said that they travel for more than one hour to access water from the MUS facility. In the case of Goro Biyo, majority of the respondents (75%) said that they traveled

for more than 1 hour, 20.8% said they traveled for about 30 minutes and the remaining few individuals (4.2%) gave no response to this particular question.

User groups also discussed about the time they spend around the MUS facilities after they reach there, waiting for their turn. From the respondents in Ifa Dhaba kebele it was found that 93.3% of them are spending more than 5 minutes as they can not access water right away and 2.2% of them said they are spending about 30 minutes around the systems and the remaining 4.5% gave other reply. Among those respondents from Goro Biyo kebele 47.9% of them said that they are spending long hours around the schemes to access water, 25% said they spend about 30 minutes, 18.8% of the respondents said that they spend less than 5 minutes as they can access water right away and there are few individuals in this kebele who gave no response.

From the researchers observation it can be said that water for domestic activities can not be accessed right away from the MUS facilities in both of the selected kebeles. This is because in all the days of the researcher's visit of the selected kebeles for the survey and for the focus group discussions, it was observed that there is large number of individuals with their Jerrican waiting for their turn around the MUS facilities.

This implies that since there are some individuals who are traveling long distances for long hours to access water for domestic activities from the MUS facilities in the selected kebeles. On contrary to this, the time user groups spend after they reach the MUS facilities in both kebeles is longer. Majority of the respondents were also saying that they used to spend less than 30 minutes around the schemes in both kebeles in early days of establishment of the MUS facilities and it is increasing from time to time. This in implies that respondents are very much concerned with the time they spend around the MUS facilities after they reach there to access water for their domestic activities.

With regard to the number of days they are accessing water for their domestic consumption, the result of the data analysis shows that majority of user groups in both kebeles said that they access water for their domestic consumption on daily basis during the mornings. 97.8% of the respondent in the Ifa Dhaba kebele said that they can access water from the MUS facilities on daily basis for domestic consumption and 2.2% of them gave no response. In the case of Goro Biyo kebele 97.9% of the respondents said that they can access water from these MUS facilities every days during the mornings also for domestic consumption and the remaining 2.1% gave no response.

The above access situations are situations of access to water from the MUS facilities in both of the selected kebeles for the purpose of domestic consumption. For those who are using

water from the MUS facilities for the purpose of irrigation in both kebeles, the access situation is as it is stated in the following paragraphs.

Majority of the respondents in both of the selected kebeles said that there are some restrictions to use water for the purpose of irrigation in different aspects like time (as water is not accessed for irrigation purpose on daily basis rather on long intervals) and place (as it is only households living in the down side of the developed springs (MUS facilities) who could use water for irrigation in both of the kebeles). This implies that accessing water from the existing MUS facilities in both kebeles for irrigation is more problematic than accessing water for domestic purposes.

Canals are the means of transporting water from the reservoirs to the lands to be irrigated in both of the kebeles. As to the observation of the researcher, the canals in Ifa Dhaba kebele are not that much well constructed when compared to those in Goro Biyo which are well constructed. The feature of the canals in both of the kebeles is as it is seen in figure 6 in the annex section.

Those individuals who are using water for the purpose of irrigation in both of the kebeles said that the program for access was with in two, three and four days interval during the early days of establishment of the MUS facilities and it was changed to accessing water for irrigation with in 15 days and sometimes with in one month interval as the discharge of the spring is getting lower and lower from time to time. This was made to be applicable with the help of committee members as a resolution mechanism to the conflicts which used to occur between groups when the discharge of the springs got lesser and lesser. Majority of the respondents said that they are not happy with the program for irrigation as they said 'they access water after the plants they cropped started to die'. This is the view of respondents in both of the kebeles.

This implies that there is variation in situations of access to water for domestic and productive uses with in the user groups. There is also variation in terms of access to water for irrigation purposes with in the user groups basing their place of residence.

5.3.3. Management of MUS facilities

From the analysis of the survey questionnaire and data obtained from FGD of committee members, it was found that there is a committee and a controller, who is assigned from the committee members to coordinate the service provision of the MUS facilities in both kebeles. The results of the data analysis also revealed that elder and leaders of Idir and other associations living in that kebele are among those who are eligible to be members of committee.

Majority of the respondents (100% in Ifa Dhaba kebele and 91.7% in Goro Biyo kebele) said that there are fees users of MUS are requested to pay for accessing water from the MUS facilities. The mode and amount of payment is similar in both of the kebeles i.e one birr per month. Majority of the respondents in Ifa Dhaba kebele do not know why they are paying such amount of money as only 2.2% of them said that they are paying it for the membership and the remaining 97.8% gave no response where as those users of MUS in Goro Biyo know the reason of the payment. 50% of them said it is for maintenance and 35.4% of them said that it is membership fee. However as per the information gathered during the FGD held with committee members, it was found that members are made to pay one birr per month while accessing water for their domestic activities to use it for maintenance of the systems in times of failure.

The other thing found from the analysis of the survey data is that users, the controller and the committee are the three major actors in setting the amount of money users are paying to access water from the MUS facilities in both of the kebeles as those who said that the money that users are paying is set by the users themselves constitute 57.8% in Ifa Dhaba kebele and 75% in Goro Biyo kebele, those who said that it is set by the controller constitute 20% and 2% in Ifa Dhaba and Goro Biyo kebeles respectively and those who said that it is the committee constitute 22.2% of the respondents in Ifa Dhaba kebele and 14.6% in Goro Biyo kebele. However the information gathered during FGD held with the committee members also revealed that the money users are paying is set by the users themselves after a meeting is held with the committee members.

5.3.4. Programs of access to water from the MUS

Majority of the respondents (93.3% in Ifa Dhaba kebele and 83.3% in Goro Biyo kebele) said that there are changes in the set programs from season to season. There are small percentages of individuals who said no and who gave no response to this particular question. As it is also found from the data analysis of the survey questionnaire, among those respondents in Ifa Dhaba kebele, 48.9% of them said that the main reasons for change of programs of access of water from the MUS facilities is change in the amount of water of the spring in different seasons, 24.4% of them said that change of water of the spring, change of needs of water and change of work of user are the main reasons for the change of the programs, 13.3% said that it is the change of water of the spring and change of needs of water users is the main cause for the change of the programs and there are small percentages of individuals who said there are other reasons and who gave no reply at all for this question. Among the respondents of Goro Biyo kebele, 50.0% of the respondents said change in the amount of water of the spring in different seasons is the main reason for the change of the programs, 22.9% said change of

water of the spring, needs of water and work of user are the main reasons of change of the programs. 16.7% of the respondents gave no response. 4.2 of them said that change of water of the spring and water needs of users are the main reasons, 6.3% of the respondents said that it is the change of water of the spring, changes in the water needs of the users, change in the works of the users and other are the main causes of change of the programs. This implies that the main causes for the change of the programs in both kebeles are change in the amount of water of the spring in different seasons, change of water of the springs, change in water needs of communities and changes in the work of users.

5.3.5. Comparison of MUS with other water systems

As it is seen from the results of the data analysis, majority of the respondents from user groups in both of the kebeles were using undeveloped springs as their main source of water before the establishment of the existing MUS facilities while majority of non users were and still are using undeveloped springs.

Users of the MUS said that they have gained some advantaged due to the establishment of the existing MUS facilities. As mentioned by user groups in Ifa Dhaba kebele the advantages gained by users include being able to get clean and safe water and being able to save ones energy where as from those in Goro Biyo kebele being able to get clean and safe water, being able to get large amount of water and being able to save energy are some of the stated advantages.

There is small percentage of individuals who mentioned some other reasons with regard to the changes user groups gained in their life both in Ifa Dhaba and Goro Biyo kebele. These include being able to keep ones family and oneself healthy, being able to save energy, time and money and being user of irrigation.

In addition to this, majority of the respondents from user groups in both of the kebeles said that they have attained positive developments in their production and productivity as a result of the positive changes they gained due to the establishment of the MUS facilities. 75.6% and 50% of the respondents from Ifa Dhaba and Goro Biyo kebele respectively ascertained the presence of positive changes in their production and productivity by saying yes to the question 'whether there are growth in their production and productivity'.

In both of the kebeles there are some exemplary farmers who have changed their life by doing their farming in a very productive way after they have accessed water from the MUS facilities. They were using water for their domestic and productive activities. For example Ato Eliyas from Ifa Dhaba kebele and Ato Abdi Kasim from Goro Biyo are among the individuals who are admired by their achievements in their life after accessing water from the

existing MUS facilities, by the key informants and the respondents of the survey questions. It was found out that the mentioned individuals have shown monumental changes in their life (teaching their children in towns and fulfilling the basic needs of their family).

5.3.6. Attitude of households towards MUS

The result of the data analysis shows that the attitude of individuals towards MUS is positive. In the case of user groups, as they have seen the changes that could be brought by entertaining the MUS facilities, they develop positive attitude towards it and they are aspiring to become user of such facilities in an extensive manner. From those non user groups of individuals in both of the selected kebeles, majority of them do have some ideas with regard to the MUS facilities existing in their and nearby areas but they are not accessing water from such facilities due to some inconveniences like un availability of such systems in their place of residence and far distance of the existing systems and others. Majority of the respondents from non user groups in Ifa Dhaba and Goro Biyo kebele (83.3% and 90% of the respondents respectively) stated their aspiration to be able to access water from the MUS facilities.

5.4. Challenges to the existing MUS facilities

As it was seen in the analysis of the survey data majority of users of MUS in both kebeles said that they have been facing with some major problems after they have started to access water from the existing MUS facilities. The different problems raised include those mentioned in the following table.

Table 8: Challenges existing on MUS facilities in the target areas

Problems	User Groups	
	Ifa Dhaba	Goro Biyo
Frequent shortage of water	10 (22.22)	3(6.25)
Reduction of the amount of water	11(24.44)	22(45.83)
Frequent shortage of water and frequent damage of taps	12(26.66)	8(16.67)
Frequent change of programs and reduction of the amount of water	11(24.44)	2(4.17)
Reduction of the amount of water and others	1(2.22)	7(14.58)
Frequent shortage of water and reduction of the amount of water		6(12.50)
Total	45(100)	48(100)

Source: Own survey

Note: figures in brackets represent percentage values.

Different individuals raised different combinations of challenging situations to the MUS facilities existing in the area. Table 8 shows the raised problems by different percentages of user groups in Ifa Dhaba and Goro Biyo kebeles. These include frequent shortage of water of

the spring (stated by 22.22% and 6.25% of respondents in Ifa Dhaba and Goro Biyo kebele respectively), reduction of the amount of water of springs (stated by 24.44% and 45.83% of respondents in Ifa Dhaba and Goro Biyo kebele respectively), frequent shortage of water and frequent damage of parts (stated by 26.66% and 16.67% of respondents in Ifa Dhaba and Goro Biyo kebele respectively), frequent change of programs and reduction of the amount of water of springs(stated by 24.44% and 4.17% of respondents in Ifa Dhaba and Goro Biyo kebele respectively) and reduction of the amount of water and others (stated by 2.22% and 14.58% of respondents in Ifa Dhaba and Goro Biyo kebele respectively).

However the major ones are reduction of the amount of water of springs, frequent shortage of water and frequent damage of parts as they are mentioned by majority of respondents.

Majority of the respondents from Ifa Dhaba kebele (73.3%) said that they have been troubling with the mentioned problems for the last four years where as majority of respondents in Goro Biyo kebele (37.5) said that the mentioned problems have been obstacles for access of water from the existing MUS facilities for more than three years.

The results of the focus group discussion in both kebeles also acknowledged the above result and more additional problems were also identified. These include contaminated water going out of the taps of the MUS facilities and sometimes even some kinds of worms are found, waiting for long hours as there are usually long queues at the points of access of water and conflict among user groups.

The key informants' interview also resulted in the identification of some more problems to the existing MUS facilities. They include problems like simple damage of parts resulting from mismanagement, damages due to natural hazards such as flood, decrease of the discharge of the water source and selfishness behavior observed with in the communities.

With regard to the problems government is facing shortage of budget for water development office is the major challenge. The other thing is there is no budget allocated specific for the development of such MUS facilities.

5.5. Solutions and opportunities

5.5.1. Solutions to the problems existing on MUS facilities

Respondents in Ifa Dhaba and Goro Biyo kebele suggested different things that should be considered in addition to the efforts that have already been taken to solve the existing problems. These include search for alternative water sources, build up of the spring well, search for and develop other springs, increase the depth of springs and installation of motors.

The participants of the focus group discussion also pinpointed on some possible solutions as examination of springs to see why the discharge is reduced and to take some good measures search for and develop other prospective springs which could bring good opportunities for many people. They also proposed establishment of such MUS facilities in other villages as such interventions satisfy the needs domestic and productive sector. The researcher also proposes promotion of MUS in different parts of the kebeles, woredas, zones and in the country in general.

5.5.2. Prospects of the MUS facilities in the future

Majority of the respondents in both kebeles (93.3% in Ifa Dhaba kebele and 66.7% from Goro Biyo kebele) acknowledged that there are future prospects of the existing MUS facilities if the above corrective measures are made actual. They also said that the MUS facilities have positive prospects as they facilitate the agricultural activities of the rural households. When farmers access water from the MUS facilities, they would be able to produce more than they used to produce using rain water and when they produce more they would be able to sell more and gain additional income and farmers change their life in general. Respondents also stated their aspiration to access more number of MUS facilities by stating the following 'we want to access more number of MUS, we want to became user of irrigation, we want to keep their family and themselves healthy, we want to increase in the income we are gaining and we want to change our life in general by accessing more number of MUS facilities'.

Majority of the respondents in both kebeles emphasized on the actualization of the aspects like (To increase the depth of the springs, Build the spring well, To search for and develop other springs, To build MUS, Install Motors and others) for the betterment of the MUS facilities.

As it was found from the key informant interviews the MUS facilities was constructed with the aim of bringing monumental impacts in the poverty reduction and improvement of water access that the country is trying to achieve and the fact seen on the ground is good. Accordingly, the existing MUS facilities facilitate the betterment of health situation of the community – occurrence of diarrhea will decreases – resulting in a decrease in spending time and money on health care and an increase in time availability to spend on agricultural activities, improve time saving – time spending on fetching water has decreased and production in agriculture has increased. As a result, it was observed that production of the community increased and an increase in the income, which is leading to improved food security situation of the community. Taking this in to account, it would be good to promote MUS.

As the information obtained from the DAs of Ifa Dhaba and Goro Biyo there are some springs that have potential to develop for the construction of the MUS facilities. These include in the case Ifa Dhaba Ifa Dhaba there are about 9 springs identified in different villages (1 spring in Golu, Ramis, Mumed, 2 springs in Kuye, 4 springs in Kore). And in the case of Goro Biyo, 3 springs in Wotero, 2 springs in Ture, 2 springs in Gelan and 1 spring in Kute villages. Photo taken to one of the prospective spring in Goro Biyo kebele is shown in figure 5 of the annex section. These springs should be developed to attain the benefits of the existing MUS facilities at large scale in the kebele as well as in the woreda.

CHAPTER SIX: Conclusion and recommendation

6.1. Conclusion

The main objective of the study is to assess the challenges and opportunities of multiple use water systems (MUS) in Goro Gutu and Meta Woredas of East Hararghe Zone, Oromiya Regional State. Samples were selected from two kebeles of the target woredas. Both primary and secondary data were collected and analyzed. The findings were further elaborated in the form of descriptions and narrations. Finally, interpretation of the data analysis was made.

The results of the data analysis revealed that there are water facilities which are planned and constructed for multiple purposes in the different kebeles of Goro Gutu and Meta woredas. During the early ages of the MUS facilities, many individuals were found using and benefiting from the services of the systems. Households were able to diversify their livelihood and many of them were happy with the emergence of such MUS facilities in the two kebeles. They were able to easily access water for both domestic as well as productive activities. There was good initiation of households to do additional works. They were able to produce more and able to get additional income as a result they were able to send their children to school, and able to provide their children with basic needs. However, as time goes on, the amount of water of the developed springs got lesser and lesser while the number of beneficiaries and their demand increased. It has become inevitable to see conflicts between groups of individuals at water access points i.e, points where water is accessed. It has also become too difficult to access water for the purpose of irrigation with in short intervals. As a resolution mechanism water user committees set some more restrictions but many of the households were not happy with it.

The MUS facilities existing in the kebeles as well as those in the visited sites are troubled with some major challenges. These problem were identifies from the survey data, responses of key informants and focus group discussion, visits of other sites and informal interviews made with some individuals in the study sites. The problems include: reduction of the amount of water of springs, frequent damage of parts, contaminated water going out of the taps of the MUS facilities, waiting for long hours as there are usually many people at the points of access of water, conflict among users and shortage of budget

Even though the above mentioned problems are troubling user groups in both of the kebeles, the attitude of the respondents was positive towards MUS. The same is true with regard to the non users. Non users from the two kebeles and other visited sites have interest to entertain such facilities. Users themselves were emphasizing on the increase of interventions on MUS in the target areas as well as in the country in general. This is a view of different individuals contacted during the key informants interview and focus group discussion. The

researcher also suggested the promotion of such facilities as such facilities at the larger extent as they are contributing a lot in the water interventions and poverty reduction activities and in changing lives in the woreda. The following recommendations are also forwarded against the observed challenges to the MUS facilities.

6.2. Recommendations

The MUS approach and the MUS facilities implemented in the study area are found very important as they are contributing something of value towards interventions on the water sector, interventions of poverty reduction and intervention in bringing about significant changes in the lives of rural households and they have good prospects in the future. However such invaluable approaches and systems have been facing some challenges as mentioned in the previous sections of the thesis. Therefore, there is need for integrated action of societies with concerned governmental and non governmental organization against these challenges. Basing the facts seen in the previous sections of the thesis the following recommendations are proposed:

- There should be well done feasibility study before the planned MUS facilities are being implemented
- Increase the number of such facilities in order to reduce the conflicts that might occur in the future if the shortage of water of the springs continue like this
- Implementers should focus and work hard in order to satisfy needs of users by focusing on aspects that are most liked and considered, like the health aspect and others which are most liked by respondents in the case of Ifa Dhaba and Goro Biyo kebele
- Implementers of MUS should work hard to increase the capacity of societies on the proper and effective management of the facilities before their projects phased out
- Encouragement of different bodies involved development works to intervene on this prospective sector i.e MUS
- Increase the awareness of societies at large and other government and non governmental bodies that are supposed to be valuable for the process of extending MUS interventions all over the country
- Increase the capacity of societies who are users of such facilities at the end to take responsibilities.
- As mentioned in the review of literature part, there are enabling environments that enhance actualization of MUS on the ground in the country. Thus these enabling environments should be advocated and communicated to the societies and other concerned parties

REFERENCE

Alemayehu Mekonnen, (N.D.). *Multiple use of household level rural water supply for livelihood as a strategy for accelerated implementation of rural water supply universal access program in Ethiopia.* National rural WaSH consultant in the ministry of water resources.

Barbara Van Koppen, Patric Moriarty and Eline Boelee, 2006. *Multiple use water services to advance the millennium development goals. Research report 98*

Butterworth J.A.; Moriarty, P. B.; Venter Hildebrand, M.; Van Koppen, B.; Schreiner, B.; Versfeld, D. 2003. Proceeding of the International Symposium on Water, Poverty and Productive Uses of Water at the Household level. 21 - 23 January, 2003. Muldersdrift, South Africa. National Resource Institute, IRC International Water Affairs and Forestry, International Water Management Institute. Delft, Netherlands. International Water and Sanitation Center

Central Statistical Agency, 2008. 2007 population and housing census report.

Degefa Tolossa and Tesfaye Tafesse, 2008. *Linkages between water supply and sanitation and food security:* A case study in four villages of East Hararghe Zone, Oromiya region. College of Development Studies, Addis Ababa University

Desalegne Simachew,(N.D.). *Water, sanitation and hygiene: sustainable development and multisectoral approaches.* Feasibility assessment of Multiple use water services in Shebedino woreda of SNNPR for the 34th WEDC international conference held at Addis Ababa.

Efrem Bechere, 2006. *Agriculture and Rural Development in Ethiopia*, Paper for International Conference on a Development Strategy of Horn of Africa. 20 - 22, October 2006. University of Texas, Arlington

G. K. Adu-Wusu, L. Roberts and K. A. Debrah, 2008. *Experience on Multiple Use Dams in Sissala West District, Ghana.* Research Paper Presented for the International Symposium on Multiple-use Services. 4 - 6 November 2008. Addis Ababa, Ethiopia.

Haregewoin Cherinet and Emebet Mulugeta, 2002. *Country Gender Profile Ethiopia.* Swedish International Development Cooperation Agency

H. Furihata, 2008. *Multiple Functions of Water Management on Paddy Fields* Research Paper Presented For The International Symposium On Multiple – Use Services 4 – 6 November 2008 Addis Ababa, Ethiopia.

I. Dominguez, S. Corrale, I. Restrepo, and J. A. Butterworth, 2008. *Multiple Uses of Water: A View from Reality of Rural Communities and National Polities In Colombia.* Research

Paper Presented on the International Symposium on Multiple-use Service. 4 - 6 November, 2008. Addis Ababa, Ethiopia

IRC (International Water and Sanitation Center), 2009 website updated on January 2009

Jean-Marc Faures, Guido Santini and Audrey Nepveu de Villemarceau, 2008. *A livelihood approach to water interventions in rural areas and implications for MUS*. Background Paper for the International Symposium on Multiple-use Services. 4 – 6 November, 2008. Addis Ababa, Ethiopia.

L. Rashid-Sally., D Van Rooijen and Abraham E, 2008. *Analyzing productive use of domestic water and wastewater for urban livelihoods of the poor*: a study from Accra, Ghana. Background Paper for the International Symposium on Multiple-use Services. 4 – 6 November, 2008. Addis Ababa, Ethiopia.

M. Adank, B.Belete, M.Jeths, 2008. *Costs and Benefits of Multiple Use of Water*. A Case from Ethiopia. Research Presented for the International Symposium on Multiple-use Services. 4 - 6 November, 2008. Addis Ababa, Ethiopia

Ministry of Foreign Affairs, 2007. *The General Profile of Ethiopia*. Website Updated in 2007

Ministry Of Water Resources, 2007. Speech of the Minister Website Updated On September 2, 2007

Monique Mikhail and Robert Yoder, 2008. *Analysis of the MUS learning alliance process in Nepal*. Background Paper for the International Symposium on Multiple-use Services. 4 – 6 November, 2008. Addis Ababa, Ethiopia.

Moriarty, P.; Butterworth, J.; Van Koppen, B.; Soussan, J., 2004 *Multiple-use Water Services to Advance the Millennium Development Goals*

Munir A. Hanjra and Francis Gichuki, 2008. *Investments in agricultural water management for poverty reduction in Africa*: Case studies of Limpopo, Nile, and Volta river basins

Narayan Singh Khawas and Monique Mikhaile, 2008. *Impacts of Multiple-use Water Services in Teri Danda Community, Nepal*. Research Paper Presented for the International Symposium on Multiple-use Services 4 - 6 November, 2008 Addis Ababa, Ethiopia.

Oromia regional state Finance and Economic Development Bureau, 2008. Annual Report

Oromia regional state Finance and Economic Development Bureau, 2005. *Socio economic profile of Goro Gutu district over the years* (1998- 2003)

Oromia regional state Finance and Economic Development Bureau, 2005. *Socio economic profile of Meta district over the years* (1998- 2003)

RiPPLE Newsletter, Issue No. 3, January - April, 2008

RiPPLE Newsletter, Issue No. 4, May - August, 2008

Seleshi, B. Awlachew, Menker, M., Abesha, D., Atnafe, T., Wondimkun, Y. 2006. Proceedings of MoARO/MoWR/USAID/IWMI Symposium and Exhibition on Best Practices and

Technologies for Small Scale Agricultural Water Management. 7 - 9 March, 2006, Addis Ababa, Ethiopia

Seleshi, B. Awulachew, Michael Menkir, 2007. *Improving Agricultural Water Management and Irrigation Development in Ethiopia*. Agricultural Water Management Policy Brief. Issue No. 1.MoWR, MoARD, USAID, IWMI.

Stef Smits, Mary Renwick, Daniel Renault, John Butterworth and Barbara Van Kopper, 2008. *From Practice to Policy*. Background Paper for the International Symposium on Multiple-use Services. 4 – 6 November, 2008. Addis Ababa, Ethiopia.

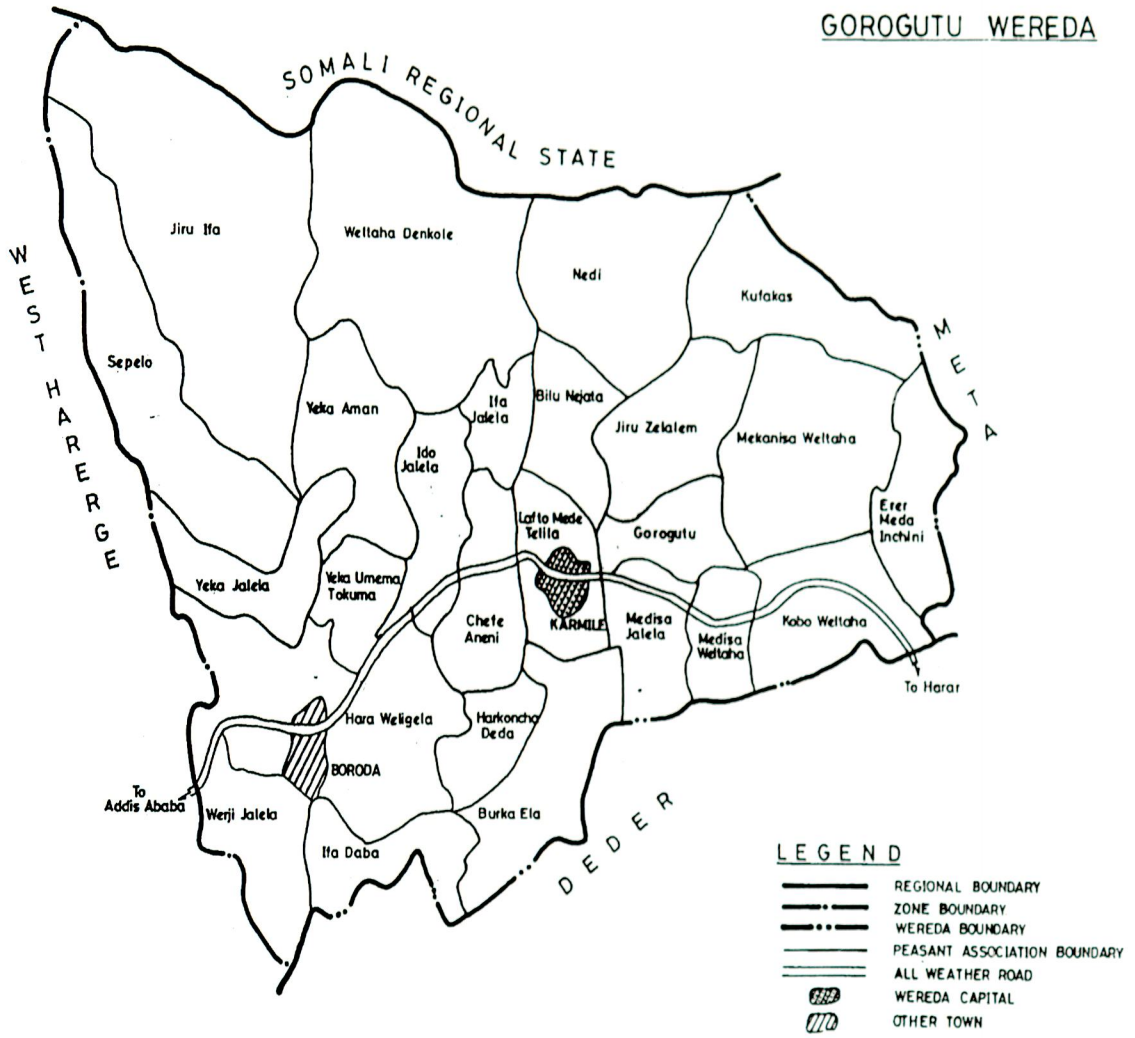
T. Slaymakes, Fiseha Hagos, J. Tucker, E. Ludi, E. Boelee and S. Awlachew, 2008. *Poverty Impacts of Improved Access to Water and Sanitation in Ethiopia*, Research Paper Presented for the International Symposium on Multiple-use Services 4 - 6 November, 2008 Addis Ababa, Ethiopia

Yalew Belete, 2006. *Current Experience on Existing Small Scale Irrigations*. Research Paper Presented For MoARD/MoWR/USAID/IWMI Symposium and Exhibition on Best Practices and Technologies for Small Scale Agricultural Water Management. 7 - 9 March, 2006, Addis Ababa Ethiopia.

Annexes

Annex A: Figures

Figure 1: Goro Gutu woreda and its kebeles



Source: Oromiya finance and economic development bureau

Figure 3: Photo taken while Focus Group Discussion (FGD) is conducted

FGD with committee members

Source: photo taken during the survey

FGD with women groups

Source: photo taken during the survey

Figure 4: Many people around the MUS facilities waiting for their turn

Source: photo taken during the survey

Figure 5: One of the prospective spring in Goro Biyo kebele

Source: photo taken during the survey

Figure 6: Water passage for domestic and productive uses from the springs

Water passage for domestic consumption

Source: photo taken during the survey

Water passage for productive activities

Source: photo taken during the survey

Annex B: List of Tables

Table 1: Per Capita stored water availability in selected countries

Countries	Reservoir storage per capita (M^3/Cap)
Australia	4717
Brazil	3386
China	2486
Thailand	1277
Mexico	1104
South Africa	687
Ethiopia	38
Kenya	4

Source: Seleshi, 2007

Table 2:- Types of ownership of land

Descriptions	User groups		Non user groups	
	Ifa Dhaba	Goro Biyo	Ifa Dhaba	Goro Biyo
Private land	37 (82.2)	34 (70.8)	10 (83.3)	16 (80)
Private and rented land	8 (17.8)	2 (4.2)	2 (16.7)	
Inherited land		4 (8.3)		1 (5)
Family land		3 (6.3)		
Private and inherited land		2 (4.2)		3 (15)
Private and family land		3 (6.3)		
Total	**45 (100.0)**	**48 (100.0)**	**12 (100.0)**	**20 (100.0)**

Source:- Own Survey, 2009

Table 3: Types of crops produced and animals raised

Table 3.a. Types of cereals produced

Cereals produced	User groups		Non user groups	
	Ifa Dhaba	Goro Biyo	Ifa Dhaba	Goro Biyo
Sorghum	10 (22.2)	1 (2.1)	2 (16.7)	
Maize and Sorghum	29 (64.4)	1 (2.1)		
Sorghum, maize and Adenguare	5 (11.1)	1 (2.1)		
Maize, Sorghum, Adenguare and Boloke	1 (2.2)			
Maize		17 (35.4)		10 (50)
Wheat				
Wheat and Maize		26 (54.2)		
Maize and Adenguare		1 (2.1)	9 (75)	
Wheat, maize and Adenguare		1 (2.1)		
Wheat and adenguare				10 (50)

Source:- Own Survey, 2009

Table 3.b. Types of fruits and vegetables produced

Cereals produced	User groups		Non user groups	
	Ifa Dhaba	Goro Biyo	Ifa Dhaba	Goro Biyo
Potato	2 (4.4)	25 (52.1)		6 (30)
Tomato	1(2.2)			

Source:- Own Survey, 2009

Table 3.c.Percentage of individuals producing chat

Description	User groups		Non user groups	
	Ifa Dhaba	Goro Biyo	Ifa Dhaba	Goro Biyo
Chat	35 (77.8)	27(56.3)	11(91.7)	15 (75.0)
Missing System	**10(22.2)**	**21(43.8)**	**1(8.3)**	**5(25.0)**
Total	**45(100.0)**	**48 (100.0)**	**12(100.0)**	**20(100.0)**

Source:- Own Survey, 2009

Table 3.d.Percentage of individuals rearing animals

	User groups		Non user groups	
	Ifa Dhaba	**Goro Biyo**	**Ifa Dhaba**	**Goro Biyo**
cow/oxen	5 (11.1)	12 (25.0)		5 (25.0)
donkey		2 (4.2)		7 (35.0)
Cow/oxen and goats/sheep		1 (2.1)		
other	6 (13.3)			
Total	**11 (24.4)**	15 (31.3)		**12 (60.0)**
Missing System	**34 (75.6)**	**33 (68.8)**	**12 (100.0)**	**8 (40.0)**
Total	**45 (100.0)**	**48 (100.0)**		**20 (100.0)**

Annex C: Questionnaire for non user groups

Addis Ababa University,
School of Graduate Studies,
College of Development Studies

The questionnaire is prepared to generate information for the study on the challenges and opportunities of multiple use water systems from two woredas in East Hararghe Zone of Oromiya regional state. Please fell free to give whatever information you think is important for the study. Your responses will be confidential. Your cooperation in giving genuine, relevant and in carefully filling the questionnaire would be greatly appreciated. Thank you in advance.

1. Sex of the respondent
   a. Male
   b. Female

2. Age of the respondent
   a. 1-18 years
   b. 19-25 years
   c. 26-40 years
   d. > 40 years

3. Educational background
   a. Illiterate
   b. Basic Education
   c. Elementary school complete
   d. Secondary school Comp.
   e. Higher Education comp.

4. Religion of the respondent
   a. Orthodox
   b. Muslim
   c. Protestant
   d. Catholic

5. Marital status
   a. Single
   b. Married
   c. Divorced
   d. Widowed

6. Specify the Address you are living in
   a. Kebele
   b. Woreda

7. When did you start to live in this woreda and kebele
   a. Starting my childhood (go to question No. 9)
   b. 5 years ago
   c. 10 years ago
   d. 20 years ago
   e. Others please specify

8. What was the main reason for you to come here?
   a. To live with a family or relative
   b. To search for jobs
   c. Due to marriage
   d. Due to resettlement
   e. Others please specify

9. Size of your family
   a. 1-4
   b. 5-7
   c. 8-10
   d. > 10

10. Do you have land?

a. Yes b. No

11. If your answer to question No. 10 is yes, what is the type of ownership and size of your land?

Type of ownership	Size of your land
a. Private property	
b. Rented land	
c. Inherited land	
d. Family land	
e. Others please specify	

12. For what purposes do you use your land? (More than one answer is possible)

Purposes	Amount of the produced materials	Use of the produced materials (for consumption or sale)
a. To produce cereals		
b. To produce fruits and vegetables		
c. To produce coffee		
d. To plan trees		
e. To produce chat		
f. To rear animals		

13. What is the occupation of the head of the household?

a. Farmer
b. Trade
c. Weaving
d. Wood work
e. Poetry
f. Metal work
g. Employed in GOs and NGOs
h. Pensioner
i. Others please specify

14. What is the additional works the head of the household is engaged in? (More than one answer is possible)

a. Farmer
b. Trade
c. Weaving
d. Wood work
e. Poetry
f. Metal work
g. Employed in GOs and NGOs
h. I am pensioner
i. Others please specify

15. What is the average size of your income per year? (More than one answer is possible)

Type of work	Average size of income per year
a. Selling cereals	
b. Selling fruits and vegetables	
c. Selling coffee	

d. Selling tree logs	
e. Selling fire wood	
f. Selling wood and poetry products	
g. Selling metal products	
h. Selling honey	
i. Selling live animal	
j. Employed in GOs and NGOs	
k. Others please specify	

16. What are the different basic facilities available in your area? (More than one answer is possible)

a. Schools
b. Health posts
c. Electric services
d. Telephone services
e. Postal services
f. Water facilities
g. Others, please specify

17. What are the different sources of water in your area? Rank them as per your preference. (More than one answer is possible)

Sources of water	Rank them as per your preference
a. Tap water	
b. Developed springs	
c. Undeveloped springs	
d. Rivers, lakes and ponds	
e. MUS	
f. Others please specify	

18. What is your main reason to give first priority for the selected types of water systems? (More than one answer is possible)

a. It is easy to use
b. It won't require much energy
c. It is the only available system in our area
d. There is no restriction to use
e. Requires no or less payment
f. I have no idea whether there are other water systems or not
g. It is good for health
h. My parents were using such system
i. Others please specify

19. Have you ever faced any problem of drying up of different water bodies in your area?

a. Yes
b. No

20. If your answer is yes to question No. 19, how many have dried up?

Sources of water	No of facilities dried up
a. Tap water	
b. Developed springs	
c. Undeveloped springs	

d. Rivers, lakes and ponds	
e. MUS	
f. Others please specify	

21. Who is responsible to access water from the members of the family?

a. I myself
b. Spouse
c. Male children
d. Female children
e. Employed individual
f. Others please specify

22. For what purposes do you use water obtained from such systems?

a. Domestic consumption
   i. For drinking
   ii. For cooking
   iii. For washing

b. Productive purposes
   i. For cattle
   ii. For irrigation

23. Are you accessing water from the same source for the purposes mentioned above? If your answer is No, please tell us how?

Purpose of water	Types of water facilities
Domestic consumption	
For drinking	
For cooking	
For washing	
Productive purposes	
For cattle	
For irrigation	

24. Have you ever faced problems related to the water systems you are using at the current time?

a. Yes b. No

25. What is the source of water you are using at the present time?

a. Tap water
b. Developed springs
c. Undeveloped springs
d. Rivers, lakes and ponds
e. MUS
f. Others please specify

26. If your answer is yes to question No. 25, what are the problems?

a. Frequent shortage of water
b. Frequent damage of system parts
c. Frequent change of programs
d. Frequent turn over of committee members
e. Reduction of the amount of water
f. Others please specify

27. For how long do these problems persist?

a. For one year b. For two years c. For three years
d. For more than three years

28. What were the efforts taken to solve these problems?

a. Change of schedules
b. Change of amount of water obtained from the systems
c. We were made to use other alternative sources of water
d. Reduction of fees to be paid
e. Frequent maintenance of taps

29. Do you think that these efforts are sufficient?

a. Yes b. No

30. If your answer is No to question No 29, what do you suggest?

31. Do you think that there are future prospects of these water systems?

a. Yes b. No

32. If your answer to question No. 31 is yes, please specify how?

33. What do you suggest for the betterment of these water sources to make them able to provide better services for the future and to make expansions in this kebele and through out the country in general?

34. Do you have any idea of Multiple Use water Systems (MUS)?

a. Yes b. No

35. If your answer is yes to question No. 32, when did you come to know about it?

a. This year
b. One year ago
c. Two years ago
d. Three years ago
e. Others

36. How did you hear about it?

a. From a friend
b. Through masmedia
c. During Idir meetings
d. From kebele officials
e. When I participated in the construction
f. From relatives
g. I have seen it
h. Others

37. Are there such MUS in your area?

a. Yes b. No

38. How many are they?

39. When are these MUS facilities constructed?

a. This year
b. One year ago
c. Two years ago
d. Three years ago
e. Four years ag
f. more than 4 yrs

40. Do you have any idea who has constructed them?

a. GOs
b. NGOs
c. The community
d. The rich man of the town
e. Others, please specify

41. Who are using water from these sources?

a. Those living in this kebele
b. Those living in this and the neighboring kebeles
c. Any one in need of water
d. Members of committee or any other association
e. Others, please specify

42. Why are you not using such MUS?

43. Do you have plan to use such MUS for the future?

a. Yes b. No

44. If your answer to question No. 41 is yes, please mention your main reasons to use such MUS?

45. Do you have any other things to say?

Annex D: Questionnaire for user groups

Addis Ababa University,
School of Graduate Studies,
College of Development Studies

The questionnaire is prepared to generate information for the study on the challenges and opportunities of multiple use water systems (MUS) from two woredas in East Hararghe Zone of Oromiya regional state. Please fell free to give whatever information you think is important for the study. Your responses will be confidential. Your cooperation in giving genuine, relevant and in carefully filling the questionnaire would be greatly appreciated. Thank you in advance.

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   a. Male
   b. Female

2. Age of the respondent
   a. 1-18 years
   b. 19-25 years
   c. 26-40 years
   d. > 40 years

3. Educational background
   a. Illiterate
   b. Basic Education
   c. Elementary school complete
   d. Secondary school Comp.
   e. Higher Education comp.

4. Religion of the respondent
   a. Orthodox
   b. Muslim
   c. Protestant
   d. Catholic

5. Marital status
   a. Single
   b. Married
   c. Divorced
   d. Widowed

6. Specify the Address you are living in
   a. Kebele
   b. Woreda

7. When did you start to live in this woreda and kebele
   a. Starting my childhood (go to question No. 9)
   b. 5 years ago
   c. 10 years ago
   d. 20 years ago
   e. Others please specify

8. What was the main reason for you to come here?
   a. To live with a family or relative
   b. To search for jobs
   c. Due to marriage
   d. Due to resettlement
   e. Others please specify

9. Size of your family
   a. 1-4 b. 5-7 c. 8-10 d. > 10

10. Do you have land?
   a. Yes
   b. No

11. If your answer to question No. 10 is yes, what is the type of ownership and size of your land?

Type of ownership	**Size of your land**
a. Private property	
b. Rented land	
c. Inherited land	
d. Family land	
e. Others please specify	

12. For what purposes do you use your land? (More than one answer is possible)

Purposes	**Amount of the produced materials**	**Use of the produced materials (for consumption or sale)**
a. To produce cereals		
b. To produce fruits and vegetables		
c. To produce coffee		
d. To plan trees		
e. To produce chat		
f. To rear animals		

13. What is the occupation of the head of the household?

a. Farmer
b. Trade
c. Weaving
d. Wood work
e. Poetry
f. Metal work
g. Employed in GOs and NGOs
h. Pensioner
i. Others please specify

14. What is the additional works the head of the household is engaged in? (More than one answer is possible)

a. Farmer
b. Trade
c. Weaving
d. Wood work
e. Poetry
f. Metal work
g. Employed in GOs and NGOs
h. I am pensioner
i. Others please specify

15. What is the average size of your income per year? (More than one answer is possible)

Type of work	Average size of income per year
a. Selling cereals	
b. Selling fruits and vegetables	
c. Selling coffee	
d. Selling tree logs	
e. Selling fire wood	
f. Selling wood and poetry products	
g. Selling metal products	
h. Selling honey	
i. Selling live animal	
j. Employed in GOs and NGOs	
k. Others please specify	

16. What are the different basic facilities available in your area? (More than one answer is possible)

a. Schools
b. Health posts
c. Electric services
d. Telephone services
e. Postal services
f. Water facilities
g. Others, please specify

17. What are the different sources of water in your area? Rank them as per your preference. (More than one answer is possible)

Sources of water	Rank them as per your preference
a. Tap water	
b. Developed springs	
c. Undeveloped springs	
d. Rivers, lakes and ponds	
e. MUS	
f. Others please specify	

18. What is your main reason to give first priority for the selected types of water systems? (More than one answer is possible)

a. It is easy to use
b. It won't require much energy
c. It is the only available system in our area
d. There is no restriction to use
e. Requires no or less payment
f. I have no idea whether there are other water systems or not
g. It is good for health
h. My parents were using such system
i. Others please specify

19. Have you ever faced any problem of drying up of different water bodies in your area?

a. Yes
b. No

20. If your answer is yes to question No. 19, how many have dried up?

Sources of water	**No of facilities dried up**
a. Tap water	
b. Developed springs	
c. Undeveloped springs	
d. Rivers, lakes and ponds	
e. MUS	
f. Others please specify	

21. Who is responsible to access water from the members of the family?

a. I myself
b. Spouse
c. Male children
d. Female children
e. Employed individual
f. Others please specify

22. For what purposes do you use water obtained from such systems?

a. Domestic consumption
   i. For drinking
   ii. For cooking
   iii. For washing

b. Productive purposes
   i. For cattle
   ii. For irrigation

23. Are you accessing water from the same source for the purposes mentioned above? If your answer is No, please tell us how?

Purpose of water	**Types of water facilities**
Domestic consumption	
For drinking	
For cooking	
For washing	
Productive purposes	
For cattle	
For irrigation	

24. How many MUS facilities are there in your area

25. Is the location of the MUS facilities convenient for every one?

a. Yes
b. No

26. When are these MUS facilities constructed?

a. This year
b. One year ago
c. Two years ago
d. Three years ago
e. Four years ag
f. more than 4 yrs

27. Do you have any idea who has constructed them?

a. GOs
b. NGOs
c. The community
d. The rich man of the town
e. Others, please specify

28. Who are using water from these sources?

a. Those living in this kebele
b. Those living in this and the neighboring kebeles
c. Any one in need of water
d. Members of committee or any other association
e. Others, please specify

29. For how long you have been using such MUS?

a. For less than one year
b. For one year
c. For two years
d. For more than three years

30. How long do you travel to access water from these MUS?

a. For less than 1 kms
b. For about 1 - 3kms
c. For about 3 - 5kms
d. For more than 5 kms

31. How long do you travel to access water from these MUS?

a. For less than 30 minutes
b. For about 30 minutes
c. For less than an hour
d. For about one hour
e. For more than one hour

32. For how long do you stay around the schemes to get water?

a. One can access water right away
b. We have to wait for more than 30 minutes
c. Since there will be a long queue, we usually spent long hours
d. Others please specify

33. For how many days per week you are allowed to access water from these MUS?

a. Once a week
b. Twice a week
c. Three times a week
d. More than three days a week
e. Every day
f. Others, please specify

34. How are these programs set?

a. The community after a meeting is held
b. The person assigned to control the daily use of water
c. The committee
d. The body who has constructed it
e. Others, please specify

35. Are there any changes to these set?

a. Yes
b. No

36. If your answer to question No. 35 is yes, what are the reasons for the change of the programs?

a. Seasonal change of amount of water
b. Seasonal change of the work of households
c. Suitability of the area in different seasons
d. Others please specify

37. Are you satisfied with the programs?

a. Yes
b.No

38. How many liters per household are allowed to take?

a. As per your wish (unlimited)
b. Less than 5 Jerricans of water
c. 5 – 10 Jerricans of water
d. More than 10 Jerricans of water
e. There is no ristriction
f. Others, please specify

39. Do you think it is enough for the one's daily use?

a. Yes
b. No

40. Are you expected to make some payment when you access water from the MUS?

a. Yes
b. No

41. If your answer to question No. 40 is Yes, how much money are you expected to pay?

a. Less than 50 cents per Jerrican of water
b. 50 cents per Jerricans of water
c. More than 50 cents per Jerricans of water
d. 1 birr per Jerricans of water
e. Others please specify

42. Are there any other fees you are expected to pay?

a. Yes
b. No

43. If your answer to question No. 42 is Yes, do you have any idea of why you are paying this money?

a. Membership fee
b. Monthly fee
c. For maintenance
d. Service charge
e. Others

44. Who is responsible to fix the fee to be paid?

a. The community after a meeting is held
b. The person assigned to control the daily use of water
c. The committee
d. The body who has constructed it
e. Others, please specify

45. Are there committees to coordinate the service of such MUS?

a. Yes
b. No

46. Who are eligible to be members of the committee?

a. Employees
b. Elders and other respected individuals

c. Heads of Idirs and other associations
d. Individuals from other kebeles
e. Youth
f. Others, please specify

47. How are these committees assigned?

a. After having meetings with the residents of the kebele
b. They are assigned by the organization constructing MUS
c. Others, please specify

48. What was the source of water you were using before the establishment of these MUS?

a. Tap water
b. Developed springs
c. Undeveloped springs
d. Rivers, lakes and ponds
e. MUS
f. Others please specify

49. What other difference have you seen on your life due to the establishment of such MUS?

a. We are able to access more clean water
b. We are able to access large amount of water
c. Distance and time spent is shortened
d. Others please specify

50. If you say that you have gained some benefits in your life due to the establishment of the MUS facilities, have you seen growth on your productivity and production? If yes, by what amount?

a. Yes
b. No

51. Have you ever faced problems related to the MUS facilities you are using?

a. Yes
b. No

52. If your answer is yes to question No. 51, what were the problems?

a. Frequent shortage of water
b. Frequent damage of system parts
c. Frequent change of programs
d. Frequent turn over of committee members
e. Reduction of the amount of water
f. Others please specify

53. For how long do these problems persist?

a. For one year
b. For two years
c. For three years
d. For more than three years

54. What were the efforts taken to solve these problems?

a. Change of schedules
b. Change of amount of water obtained from the systems
c. We were made to use other alternative sources of water
d. Reduction of fees to be paid
e. Frequent maintenance of taps
f. Others

55. Do you think that these efforts are sufficient?

a. Yes b. No

56. If your answer is No to question No 55, what do you suggest?

57. Do you think that there are future prospects of these MUS facilities?

a. Yes b. No

58. If your answer to question No. 57 is yes, please specify how?

59. What do you suggest for the betterment of these water sources to make them able to provide better services for the future and to make expansions in this kebele and through out the country in general?

60. Do you have any other things to say?

Annex E: Guides for FGD

Question for Focus Group Discussion

It is known that there are Multiple Use water Systems (MUS) developed by government and other non governmental organizations. You are selected for the focus group discussion with the hope that you are aware of such Multiple Use water Systems and Services (MUS). I am studying my MA at Addis Ababa University, College of Development Studies. The main aim of the discussion is to find out some information that could support the study which is made on the challenges and opportunities of multiple use water systems in two woredas of East Hararghe Zone, Goro Gutu and Meta woredas. Since your answers are kept confidential, fell free to give whatever information you think is important.

1. What was the source of water you were using before the establishment of these MUS?
   a. Were there tap water? How many were there?
   b. Were there developed wells/springs? How many were there?
   c. Were there undeveloped wells/springs? How many were there?
   d. Were there Rivers, lakes and ponds? How many were there?
   e. Were there any others systems in your area? How many were there?
2. Discuss the difference between the previous systems of water provision and the existing Multiple Use water Services (MUS)?
   a. Is there any difference with the length of distance and hours you have been traveling to access water?
   b. Is there any difference in terms of energy lost while using these two different types of systems?
   c. What about cost minimization?
   d. With regard to other aspects …
3. Discuss on the challenging problems you have been facing on the existing MUS?
   a. List down some of them
   b. Identify the most challenging problems

c. Identify the most redundantly occurring problems with their reasons

d. Discuss on the solutions that have been taken so far and suggest some other possible solutions to alleviate the existing problems for good?

4. What are the future positive prospects of such MUS?

a. Should it be continued

b. Are there necessity of any other changes

Annex F: Interview schedules

Questions for Key Informant Interview

1. What is the full name of your organization?
2. Year of establishment of your organization?
3. What are the different areas you are engaged in?
4. Specify the target areas with in the country?
5. When did you start to work in this woreda??
6. Is the idea of Multiple Use water Systems (MUS) implemented in your organizations?
7. What was the main reason you have decided to involve in such kinds of MUS?
8. Do you think they play some roles with regard to maximizing the access to safe and potable water as well as poverty alleviation?
9. When and where did you start establishing such MUS a?
10. What were your criteria to select these project sites for MUS?
11. How many such MUS have you constructed so far in the woreda in general and in the kebele in particular?
12. Are all these MUS you have developed fully functional?
13. If No, why?
14. How long did it take you to finish construction?
15. Did you consult the community about their preference with regard to various types of water systems?
16. When did you construct MUS in this woreda and the others?
17. What was you target?
    a. With regard to the target population
    b. With regard to the planned operation
18. Were you able to meet your target?
19. What is the actual No of beneficiaries of such MUS in this woreda in general and in this kebele in particular?

20. Were there any positive comments from the community about these MUS?

a. If Yes, pleases mention some of the positive comments

21. Are there any other negative comments given for you?

a. If Yes, please mention some of them

22. Do you have any monitoring mechanisms after the completion of the construction and while the MUS has started their operation?

23. Were there any problems you have been facing with the MUS since the start of your intervention?

24. If Yes, can you list down some of the problems?

25. Which were the most challenging ones?

26. What measures have been taken to solve the above mentioned problems?

27. Were these efforts successful in solving such problems totally?

28. Have you ever done an impact assessment to the service provision of the MUS? If yes, what are the findings of the assessment?

29. Do you have plan to expand such MUS in the existing operational woredas and other parts of the country?

30. What are the future prospects of such MUS?

Declaration

I, the undersigned, declare that the thesis is my original work, has not been presented for a degree in any other university and that all sources of material used for the thesis have been duly acknowledged.

Declared by:

Eyerusalem Fithawok

Candidate

Confirmed by:

Tesfaye Tafesse

Advisor