

Impact of technical and institutional issues on the sustainability of rural water supply: The case of Mandura Woreda, Benishangul Gumuz Region, Ethiopia

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Gmuz women's fetching water in Tunidadush kebele



Women and girls travelling home after collecting water from Abatachine River around Genet Mariam area

DECLARATION

I hereby declare that the Dissertation entitled: “Impact of technical and institutional issues on the sustainability of rural water supply: The case of Mandura Woreda, Benishangul Gumuz Region, Ethiopia” Submitted by me for the partial fulfillment of the M.A. in Rural Development to Indira Gandhi National Open University (IGNOU) New Delhi is my own original work and has not been submitted earlier either to IGNOU or to any other institution for the fulfillment of the requirement for any course of study. I also declare that no chapter of this manuscript in whole or part is lifted and incorporated in this report from any earlier work done by me or others.

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List of Abbreviations

BGRS	Benishangul Gumuz Regional State
BoFED	Bureau of Finance and Economic Development
BoWMERD	Bureau of Water, Mineral and Energy Resource Development
CSA	Central Statistical Authority
E.C	Ethiopian Calendar
ETB	Ethiopian Birr
FGD	Focus Group Discussion
HDW	Hand Dug Well
HH	House Hold
MoWR	Ministry of Water Resource
NGO	Non-Governmental Organization
O and M	Operation and Maintenance
PS	Protected Spring
RWS	Rural Water Supply
SPSS	Statistical Packages for Social Scientists
SW	Shallow Well
WaSHCO	Water, Sanitation and Hygiene Committee members
WHO	World Health Organization
WoFED	Woreda office of Finance and Economic Development
WSDP	Water Sector Development Program
WSP	Water Supply and Sanitation Program
WWMERDO	Woreda Water, Mines and Energy Resources Development Office
ZoWMERDO	Zonal office of Water, Mines, Energy and Resource Development Office

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Glossary of Some Terms

Bega: Dry season in Ethiopia

Got: Village in the study area

Kebele: Smallest local governments' administrative unit

Kiremt: Wet or rainy season in Ethiopia

Woreda: District level of administrative unit

Zone: Governments administrative structure next to region

Zuria: Surrounding, but in this study it means falling in to the same category based on some similar features (kebeles political relation with woreda administration).

Definition of Some Terms

Definitions of some words or phrases used in this thesis are described as follows:

Community Managed: implies the community takes full responsibility of the management of its water supply schemes (Davis et al., 1993).

Functional: refers to the proper physical state of water supply scheme in relation to their present working conditions at the time of the survey.

Jerican: Plastic container used to fetch water that can carry 20 liters of water.

Management: refers to the day to day operation of projects (Mengesha et al., 2003)

Managing community water properly: refers operating and maintaining a system on a day today basis so that it continues to work and supply water as planned (Davis et al., 1993).

Operation and Maintenance: refers to mechanisms put in place for efficient management and repairs of water supply facilities (Musonda, 2004).

Rehabilitation: refers to activities carried out to correct major defects in order to restore a water supply scheme to its intended operational status and capacity (Dereje, 2007).

Rural water supply schemes: refers water supply points installed in rural areas that include protected HDW, Ss, PSs and Deep well or boreholes.

Rural water supply: refers to provision of clean and safe water for rural communities through construction of protected HDW, SWs, PSs and deep or bore holes.

Sustainability: refers to water supply schemes being maintained in a condition that ensures a reliable and adequate potable water supply over a prolonged period of time (Davis and Brikke, 1995).

Water committee: a group of people (5-7) at community level who are responsible for overall management (both financial and technical aspects) of the developed water supply schemes in their village.

Water supply agencies: refers all institutions (government, NGOs, donors, private sectors and others) which are involved in the provision of water to the community through funding and implementation.

Water supply: implies the supply of clean water for human as well as livestock, industrial and municipal uses (MoWR, 1999).

Abstract

Access to safe and adequate water is vital for preservation of human health and socio-economic development. However, it is lacking in most of rural areas of Benishangul Gumuz Regional State in general and Mandura woreda in particular. In addition to limited provision of this basic service in the study area, significant numbers of water supply schemes that contribute for service coverage are also poorly managed, provide service with problems and others malfunctioning at any time. As a result, the number of people accessed to safe water has reduced. This study therefore, has attempted to assess the impact of technical and institutional issues on sustainability of rural water supply schemes in Madura woreda. In carrying out the study, the researcher selected 216 household beneficiaries by using systematic random sampling from eleven water supply scheme (4 functional and 7 non-functional). Data obtained from household survey were mainly analyzed quantitatively while information from focus group discussions, key informant interview and personal observations were analyzed qualitatively to supplement data from household survey.

As far as the findings, the survey result found that sustaining the proper functionality of the schemes has been one of the major problem and foreseeable bottlenecks in the study area. The study found that 57.1% of water supply schemes are malfunctioning during the time of the survey. In addition, most of the functional schemes are also found poorly managed and provide service with problems. The survey result revealed that schemes are managed by communities through water committees who are responsible for the overall management of the schemes. However, the study found that water committees were not capable of managing the schemes properly as they lack the skills and basic trainings on the financial, technical and overall management. The study also revealed that communities were not fully participated especially during planning phases. In all sites of the scheme, there are local technicians who are responsible for technical aspects of the scheme. However, the study found that they were inadequately trained, lacks technical skills to carry out operation and maintenance as well as ill-equipped. Absence of spare parts at all levels was also identified as one of the major problem to carry out repairs when needed. The study also found that none of the implementing agencies have ensured availability of spare parts for community as well as allocated budget for it. Communities were also unable to meet all costs of operation and maintenance due to weak fee collection mechanisms and its management as well as lack of spare parts.

The study also revealed that weak support systems to community in part of implementing agencies were one of the reasons for failures of keeping water supply scheme sustainable. In addition, weak coordination among stakeholders which is explained by absence of adequate monitoring, evaluation and supervisions during the construction of water supply schemes was identified as the reasons for poor construction quality. Limited institutional capacity of the woreda Water, Mines and Energy Resources Development Office was also found as the other major factor that limits sustainability of water supply schemes in the study area. Therefore, the finding call for the need to give due attention to sustaining the existing schemes through meeting the needs of water committees, enhancing community participation in water supply sector, capacitating the woreda Water Mines and Energy Resources Development Office with the necessary resources, ensuring availability of spare parts for communities as well as need a strong coordination among stakeholders to support the water sector.

Key words in the study are: sustainability of rural water supply, community management, appropriate technology, and institutional frame work and community participation.

CHAPTER ONE

1. Introduction

1.1 Background

Water is one of the basic necessities for human survival and socio-economic development. It is used for a number of purposes (i.e. for domestic, agricultural, industrial and other socio-economic activities). Access to safe water and adequate sanitation is a universal need and basic human right. Desalegn (1999) stated that access to adequate and clean water will greatly contribute to improved health and productivity. On the other hand, Kiongo (2005) stated an insufficient access to water is not only bad for health, but also contributes to a poor food security and a lagging social development. Women's and girls' bear heavy burdens in providing water for their families and conflict over water are increasing at local, regional and international levels. The poor are particularly vulnerable to water scarcity, pollution and flooding.

Safe drinking water and basic sanitation is of crucial importance to the preservation of human health, especially among children. Water related diseases are the most common cause of illness and death among the poor of developing countries. According to World Health Organization (WHO), 1.6 million deaths of children per year can be attributed to unsafe water, poor sanitation and lack of hygiene (World Water Council, 2005).

Despite benefits of access to safe water stated above, many countries in the world currently suffered from shortage of safe drinking water and the case is aggravated more in developing countries including Ethiopia.

There are about 1.1 billion people across the world that do not access to safe drinking water. Many of these people live in rural areas and are the poorest and most vulnerable. In Sub-Saharan Africa (SSA), 300 million people, approximately 80 % live in rural areas; have no access to safe water supplies (<http://www.idh.org/news/2006/IAH.rural.pdf>).

The Millennium Development Goal (MDG) for water and sanitation is to reduce by half, the proportion of people who do not have sustainable access to safe drinking water and sanitation by 2015. This means that coverage has to be increased dramatically. It is not only coverage that

needs to be increased but also sustainability of implemented water and sanitation services indefinitely (Plan Ethiopia, 2006).

In Ethiopia where the majority of the population (about 85%) live in rural areas, millions of people (about 39.529 million) are facing problems of obtaining adequate potable water supply in 2006 (MoWR,2006:33). Similarly, in Benishangul Gumuz Regional State (BGRS) thousands of people (more than 339,000) still suffered from access to safe water supply in the year 2007 (BoWMERD,2007:3). Regarding the problem, Desalegn (1999) stated that in addition to limited provision of water supply, there has been a strong urban bias in water supply programs and the rural areas have suffered more as a result.

By realizing the importance of supplying safe drinking water to the community, government at different level, non-governmental organizations (NGOs) and donors invest a lot of capital every year in developing countries including Ethiopia in general and in BGRS in particular to tackle the problem through construction of new water supply projects. However, water supply schemes alone would not contribute for communities in rural areas to reduced water access problems. The issue of functionality, utilization by intended beneficiaries and continuity of water supply schemes to serve for long period are very important issues to be considered.

1.2 Statement of the Problem

The provision of safe and adequate water is becoming a critical issue for rural dwellers without which life will be difficult, but it is often lacking in most of developing counties including Ethiopia in general and in BGRS in particular even if sufficient water resources are available.

In BGRS, about 53.01% of the total population (23.8% of the urban and 58.64% of the rural) population still suffered from access to safe water supply in the year 2007 (BoWMERD,2007:3). Similarly, data from Mandura Water, Mines and Energy Resources Development Office (MWMERDO) and Finn-WaSH BG Program (2007) showed that about 40% of the total population in the woreda (50% in town and 38% in rural) were having access to safe water supply in 2007. Hence, 60% of the total population (50% of the town and 62% of the rural) did not have access to safe water supplies. This shows that much is still remaining to attain the full coverage of this basic service for the people of BGRS in general and rural areas of Mandura

woreda in particular. The stated coverage in the study area was achieved due to heavily involvement of NGOs mainly Finn-WaSH BG Program in the water supply development in the woreda since 2009.

In addition to limited provision of new water supply schemes in each year in Mandura woreda, sustainability of installed water supply schemes have been found crucial in ensuring the supply and maintaining the service. Most of rural water supply schemes constructed in the woreda in general and in rural areas in particular that have contributed for service coverage are also poorly managed and significant number of water supply schemes are malfunctioning. As a result of these, the number of people having access to safe water has declined and those without access to safe water depend on surface water sources such as unprotected springs, rivers, streams, hand dug wells and others.

With regard to unsustainable water supply schemes and their impacts to achieve the goal of safe water supply for all on sustainable basis, Davis and Brikke (1995) referring to WHO estimated 30-60% of existing water supply schemes in developing countries are not operational.

Regarding the non-functionality of rural water supply (RWS) schemes in BGRS, data from MoWR (2006:30) showed that about 30% of the schemes were non-functional. Available data also revealed that out of 125 RWS schemes surveyed in the region, 67 % of schemes were not-functional (MoWR, 2003).

Even though data is lacking on current status of the existing water supply schemes in Mandura woreda due to absence of inventory works, data from Finn-WaSH BG Program (2004:39) indicates that about 44% of water supply schemes in Mandura woreda have been non-functional in the year 2003 and the second quarter of 2004. The baseline survey conducted by Efficient Desalegne, Berhane and Friends WaSH Consultancy Partners (2011) showed out of 39 water supply systems exist in the woreda 6 (15.4%) of them were non-functional, where as 29 (74.4%) of them require minor repair works during the survey time. The survey team also identified that most of the functioning schemes were poorly managed and exposed to surface contamination; water user committee exist for most of the schemes but they were no more effective to properly discharge their responsibility.

Studies conducted by individuals and organizations in the region in water sector mainly focused on urban water supply systems. The researches' conducted by Assefa (2006) focused on urban water supply systems the case of Assosa town and BIK (2003) focused on urban water supply tariff setting and institutional capacity building (WAE,2004).

Study on sustainability of RWS schemes in the region in general and in Mandura woreda in particular were not adequate. Many RWS schemes were failing and the schemes are not sustainable. Thus, the number of people having access to safe water has reduced. Therefore, this study intended to identify the causes for failing of Rural Water supply in Mandura woreda of BGRS.

1.3 Significance of the Study

The significance of the study is the research will contribute to the better understanding of problems and factors related to sustainable rural water supply. The study will also serve as reference for those working in the planning and design works of rural water supply and sanitation projects.

The lessons draw from such study may contribute to current efforts by governments and NGOs to find better policy options to address the problem of sustainability in rural water supply schemes that contribute for better service coverage. The study also may Initiate a more comprehensive investigation to a greater understanding of the issues related to sustainability in the rural water supply scene.

1.4. Hypothesis and Research questions

The hypothesis framed for this study is as follow: technical and institutional issues do have impact on the sustainability of rural Water supply.

The study has attempted to address the following research questions:

1. What is the impact of the technical issue on sustainability of rural water supply
2. What is the impact of the institutional issue on sustainability of rural water supply

1.5. Objective of the study

1.5.1. General objectives

The general objective of this research is to assess the impact of technical and institutional issues on sustainability of water supply systems in Mandura woreda.

1.5.2 Specific objectives

1. To assess the impact of technical issues on sustainability of rural water supply
2. To examine the impact of institutional issues on sustainability of rural water supply systems

1.6. Scope and Limitation of the study

The focus of this study is on rural water supply projects constructed in the rural part of Mandura woreda. It has a primary focus on community-managed projects, where water systems are once erected, owned and administered collectively.

The limitations of the study are the following:-

1. Absence of well documented and consistent data about water supply schemes status and related issues at woreda as well as at regional level.
2. Since the study area is located in the rural part of the woreda, transport difficulty was encountered as a limitation in undertaking the research as the researcher frequently go field in different sites.

1.7. Organization of the Study

This study contains five chapters. Following this chapter, the second chapter incorporates literature review part. Chapter three comprises methodology part that includes: background of the study area, sampling design, data sources and type, methods of data collection and data analysis. Chapter four deals results and discussion. Finally, in chapter five conclusion and recommendations were provided

CHAPTER-TWO

2. Literature Review

2.1 Theoretical Review

2.1.1 Concept and Definition of Sustainability in Rural Water Supply

Sustainability is a widely used term which has a variety of meanings depending on the context in which it is used. Different scholars define sustainability differently.

Abrams (1998) cited in Lockwood (2003:10) described sustainability as: “whether or not something continues to work overtime”. This definition is similar with the definition by Moseley (2003:20) who defined sustainability as the capacity for continuance in to the long term future. According to Holdren et al., (1995) cited in Musonda (2004:36), a sustainable process or condition is defined as “one that can be maintained independently without progressive diminution of valued qualities inside or outside the system in which the process operates or condition prevails”. It emphasizes on something that can be kept for long period of time without significant diminution.

According to IRC(2004) referring DWAF (1997,b), sustainability in RWS scheme is defined as: the benefits of water supply projects continuing indefinitely in a reliable manner at a level of genuinely acceptable to the community it serves and close to the design parameters, without an unacceptable level of external management, technical or financial support. It gives attention to proper functionality of the system in providing service for long period of time for intended beneficiaries with some form of supports to users. On the other hand, Bhandari et al., (2000:1) refer sustainability in RWS as the ability to maintain efforts and derived benefits both at community and agency level even after assistance (managerial, financial and technical) is withdrawn. It emphasizes on the need to keep up the benefits from the water supply for long period of time even without adequate support to community. Similar to this, Canon (1992:12) cited in Musonda (2004:36) defined sustainability in RWS as “a continuation of the benefits that result from the activity, with or without the program or organization that stimulated the benefits in the first place. The source of those benefits may change but the benefits are still available because the demand for it is strong.”

Wijk-Sijbesma (1989) also defined a sustainable system in RWS as the one which is based on affordable appropriate technology and continues to deliver a high level of water-related benefits after completion of the project. Similarly, Hodgkin (1994) cited in Lockwood (2003:10) defined sustainability as the capacity of RWS project to continue delivering a flow of benefits for a long period of time after project inputs ceased. It emphasizes on the continuation of water supply benefits like water delivery itself, health benefits as a result of the service, time saved, convenience and its contribution to the livelihoods of the community after implementation of water supply project.

Carter et al., (1999:10) indicated the test of sustainability as whether the water supply facilities are functioning and being utilized. According to Davis and Brikke (1995), sustainability in RWS refers to water supply facilities being maintained in a condition which ensures a reliable and adequate potable water supply and that the benefits are continued to be realized for prolonged period of time. The researcher has adapted this definition because it gives a better meaning of what is implied sustainability in this study. This definition has given a great emphasis on reliability, adequacy of water supply, and continued functionality of the water supply scheme in providing proper service for intended beneficiaries for long period of time. As it is indicated above, most of the definitions implicitly or explicitly are to mean continuity through time or describes series of benefits resulting from implementation of water supply project.

2.1.2 Approaches in Rural Water Supply

There are two approaches mainly used in provision of any social service to the community in general and water supply projects in particular. These are supply based and demand driven approaches.

I. Supply Driven

The traditional approach of service delivery is top down, supply driven. It is aiming to solve the sector problem by building more pipes and taps. The need and preference of the community on activities such as design, appraisal and construction are centrally decided by government officials who have little or no contact with the community while most project activities such as cost recovery, O and M responsibilities, control and asset ownership are poorly defined and

communicated with users. Thus, the potential benefits from the sector are far from reaching and water systems used inappropriately or remain unused at all and significant numbers of supplies were not maintained for long period of time (Muluken, 2005:43).

Many agencies in the past have adopted the position of being ‘providers’ of safe water. This has meant that, the majority of decisions concerning the improvement of a community water supply have been taken by ‘outsiders’. The consequence of this approach is that communities have become dependent on external support to keep improved water supplies working (Davis et al., 1993:33).

It was indicated that, the International Drinking Water Supply and Sanitation Decade (IDWSSD) which was set at the beginning of 1980 to provide water and sanitation to all in 1990, did not achieve its intended goals and the extended efforts during the decade further underlined the limitations of centralized management, as more and more systems fell in to disrepair and disuse. The day to day costs of running programs are already too much for most water agencies. Because it was largely supply driven and did not respond to demand (Evas and Appleton, 1993; De Reget, 2005).

Similarly, evidences shows that the existing system for delivering rural water service operated through UP JalNijan (UPJN) project in India was highly centralized, excessively-staffed public sector organization. UPJN`s top-down approach rarely takes consumer preferences in to account. There is no capital cost recovery, and O and M costs are rarely collected. Poor O and M is a major problem with about one-third of the schemes non-functional at any one time (De Regt, 2005:5). Evas and Appleton (1993:23) also identified the weakness of the supply driven approach as it is rigid scheduling of projects that inhabits community participation and impairs long term sustainability.

ii. Demand Responsive Approach (DRA)

It has recently realized that the need to aim at sustainable functioning and use of rural water supplies require a DRA with communities playing a crucial role in both planning and implementing rural water supplies. The approach represents a shift from the top-down; state centered where by government was setting the targets with little or no involvement of the

intended beneficiaries or communities. For a genuine DRA to RWS systems, first there has to be a demand, where demand is not strong a program might try to develop it (MoWR, 2003:148).

The DRA associates a number of issues. The provision of improved water supply to communities should not only be based on their need, but communities' should also take the initiative to improve their water services. A range of technical options and service levels should be offered to communities and their related cost implications made clear. Furthermore, the basic principle of cost-sharing need to be specified, and community responsibility for costs of both capital, and O and M made clear from the outset. The involvement of communities in all steps of the project cycle will help to create a sense of ownership. The DRA goes further by calling for the development of rules, regarding communities' ownership and cost recovery (MoWR, 2003). According to IRC (2004:27) referring to Deverill et al., (2000), DRAs are all about matching systems to people with the primary goal of achieving system sustainability.

The fundamental basis of DRA was that the sustainable water systems at a community level can only be achieved if people are provided with the level of the service they want and are able to pay for. In other words, sustainability requires understanding and being responsive to people's effective demand for water. It focuses attention on consumer demand, that is the quantity and quality that consumers want at a given price. It requires that managerial decisions of facilities, cost recovery, O and M should be responsive to local needs as defined by users (IRC, 2004:49).

The program design which is based on the DRA will permit the communities to make informed choices about the types and levels of services to be provided, taking in to consideration their affordability. Moreover, it gives the communities ownership and responsibility for operating and managing the selected options (ADF, 2005:15). The approach also aims to provide the mainly failures found in the water supplies that can be attributed to a poor fit between the supply system (hard and soft ware) and the community in which it is installed (IRC, 2004:27).

Despite the fact that the DRA is more time and money requiring, the advantages that it build capacity to community members, the easiness to reach more communities and the achievement of sustaining established facilities is more valuable(Muluken,2005:48). In support of this,

evidences showed that ongoing RWS and sanitation projects have been very successful in India especially where the community driven, DRA works (De Reget, 2005:5).

2.1.3 Factors Affecting Sustainability of Water Supply Schemes

The research literatures describe many interrelated factors contributing or undermining sustainability of RWS projects.

According to ODI (2004:7), performance on sustainability is often gauged by looking at a number and proportion of functioning and non-functioning facilities. Functionality is however one dimensions of sustainability. Keeping the water point operational for long period requires attention to arrange of managerial, social, financial, institutional and technical issues. For example, the preparedness of water committee in rural areas to contribute to the establishment, management and maintenance of water points are elements which are keys to sustainability.

The commonly observed fact is that many water and sanitation programs in developing countries have not continued to work overtime or they have not been sustainable (Carter et al., 1999:8). They identified some of the causes of break down or non-sustainability of RWS schemes. These include: communities or intended beneficiaries may never have been convinced of the desirability of new water source in the first place; the financial costs which communities are expected to raise as a contribution to capital or recurrent expenses may be unacceptable, unaffordable or impracticable; communities may never have felt ownership of the new infrastructure, and governments may have been over stretched and under resourced, so that repairs and maintenance have not been taken place; benefits promised at the outset of projects have failed to materialize; and even where full community participation or management has been planned from the start, community-level committee and care takers have lost interest. The finding addresses a wide range of factors hindering sustainability in water supply projects.

Carter and Rwanwanja (2006:23), on their side identified some of the factors necessary to achieve sustainability: ensuring that the community is fully involved in decision making; building on what people already now and do; selecting appropriate technology; good quality construction; reliable support from private sectors and others in terms of for example, spare parts, strong community organization strengthened by appropriate capacity building; ongoing

support by an agency external to the community. Similarly, Mengesha, et al., (2003) identified that lack of community participation, weak institutional support, weak technical and management capacity, insufficient and inadequate technology, insufficient water facilities, distance and time required to collect water and low awareness about their uses are some factors affecting the continued functioning and utilization of water supply systems.

Bhandari et al.,(2000) also indicated sustainability of water supply depends on various factors like continued delivery of services, regular maintenance of the physical structure through the participation of users, long term institutional capacity of user groups, inter-institutional support and technical soundness of the program. It emphasizes on the need of appropriate technology which is acceptable and manageable by the community, adequacy of water supply, existence of institutional capacity to carryout maintenance, the need of institutional support for intended beneficiaries and the full participation community starting from the planning phases of the water supply projects so as to make the service sustainable.

Sayi (2004:4) stated the mal-functioning of the schemes are mainly because of the full burden of system management is placed on the community including cost recovery for O and M. Sometimes, there may not full-participation of the community, inadequate institutional support, inadequacy of legal and institutional frameworks, lack of skills, tool kits and spare parts to community for carrying out O and M.

Lockwood (2003:5), indicated long term sustainability of water supply project may be undermined by a number of factors: the lack of support to the communities to manage the schemes, lack of affordable spare parts and technical skills to carry out preventive maintenance and absence of training courses. In other way, Musonda (2004) identified some of the factors that would promote sustainability of the water supply facilities in Zambia. These include: ability of community to raise user fees, communities' capacity to operate and maintain the scheme, demand for water, existence of effective community organization, backup at a district level and governments allocation of funding to RWS sector.

Carter et al.,(1999:6) referring to Abrams (1996) pointed out, "If water flows, all of the many elements which are required for sustainability must have been put in place. There must have been

money for recurring expense and occasional repairs, there must have been acceptance from the consumers of the service, the source supplying the service must have been adequate, the design must have been properly done and there must have been sound construction”. It emphasized on the necessities of adequate finance for at least cover costs of O and M, demand for water from users, adequacy of water source, appropriate technology and design to make the water supply scheme sustainable.

Komives et al.,(2006:13) stated performance of village water systems is affected by village level pre-construction and implementation factors (e.g., demand responsiveness, participation of communities in general and women in particular in the planning processes); post-construction factors (e.g., type and extent of post construction support); village level water system characteristics (e.g., technology type, age of schemes, financial management and cost-recovery practices); village level institutional characteristics (e.g., strength, transparency and membership of WatSan committee); village characteristics (e.g., measure of remoteness, alternative water supply sources etc).

Lockwood (2003:28-29) also identified group of factors affecting sustainability of the water supply schemes. These include: Access to or availability of spare parts, tools and equipment for the community to carry out repairs and skilled technicians to carry out complete repairs; availability of some form of external follow up support relating to training and support of community management structure; existence of supportive policy environment, legal frameworks understanding the legitimacy of water committee and clearly defined roles for O and M; continued involvement of community: women along with men in all aspects of the system and maintenances; existence of adequate capacity (technical, financial, administrative); tariff collection and cost recovery to cover routine O and M of the water facilities and a system source that contribute to produce water of sufficient quantity and quality to satisfy users.

As indicted above, most of the factors identified by scholars that either positively or negatively affect sustainability of water supply schemes shows that sustainability is a result of many inter related factors which are internal and external to community. It informs in one or another way, the necessary precaution to be made in water supply implementations if the implemented water

supply schemes are to be sustainable and provide appropriate services for targeted communities.

Sustainability factors stated above from reviewing existing literatures are also related to the one which states sustainability in water supply schemes mainly relies on interrelated factors of community/social, technical, financial, legal and institutional as well as environmental (ODI,2004;http://www.who.int/water_sanitation_health/hygiene/om/linking_capa1.pdf).

2.1.3.1 Technical Factors

Appropriate technology selection, construction quality of the schemes, technical skills needed to operate and maintain the system, availability and accessibility to spare parts are also important factors contributing or undermine sustainability of water supply schemes.

i. Technology Choice and Construction Quality

The premise for technology selection was that “the technology chosen should give the community the highest service level that it is willing to pay for, will benefit from and has institutional capacity to sustain”(Arlosoroff et al., 1987:29).

Careful engineering design and construction are more important in addition to selection of appropriate technology for poor people than for the more affluent. It may be disastrous for people when a facility breaks down and cannot be repaired because of a fault inherent in the design or construction. If the initial scheme was paid for from communities (users) resources, they will probably be unable to make the effort a second time; if an outside agency helped, the attitude is likely to be “you have had your share, no more now!”(Carter et al.,1999).

ii. Availability of Spare Parts and Toolkits

Appropriate tolls for carrying out repairs should be made available to achieve sustainability. There is also need to ensure that spare parts are affordable, because at the moment most communities cannot afford the cost of spare parts (Musonda, 2004:139).

To support sustainability of RWS schemes, spare parts and toolkits must be available (Carter et al., 1999:10). In support of this, Komives et al., (2006:7) stated without access to a reliable

supply of spare parts and some qualified person to make repairs, water supply schemes will not be sustainable. WAE (2004:4) also indicated lack of input suppliers for spare parts contributes to lower continuity of water projects. Studies by Brikke et al.,(1995:16) cited in Muscoda (2004) and Davis et al.(1993) also considered availability of affordable spare parts, capacity at community level to operate and maintain the water supply facilities and ability of communities to contribute user fees as being critical to sustainability of water supply schemes.

iii. Technical Skills Needed for Operation and Maintenance

The ability of the community to operate and maintain the water schemes is very important aspect of sustainability. However, most rural communities lack technical skills to carry out major repairs. Getachew (2002) cited in MoWR (2003:144) identified various reasons for schemes being out of operation. Poor maintenance is the most important contributor for schemes non functionality due to weak supportive systems, difficult access to spare parts, lack of sense of ownership among users and lack of trained people.

2.1.3.2 Legal and Institutional Issues

At a national level, there must be clear policies and strategies that support sustainability of water supply schemes after implementation of the schemes. However, this might not practical at grass root levels. Bhandari et al., (2000) stated in the rural areas, the lack in the part of the government to setup an enabling environment for the development of a system and management of drinking water supply services through effective community participation is seen as the reasons for the failure as far as sustainability of the system is concerned.

Community management of RWS is by no means free from problem and despite strong investment in capacity building in many projects, a significant number of systems still run in to problems (Lockwood, 2003:23). For RWS, the basic concept is that schemes are user-community based and that because full self reliance cannot be achieved in the rural context, support structure is required to assist the community in planning, implementing and operating or managing its scheme (MoWR, 2003:144). Many improved water supplies require technical back up from an external body even if the regular O and M can be managed by communities themselves (Davis et al., 1993).

Recently there is an increasing recognition that the majority of communities will be unable to manage their own water supply systems without some form of external assistance and that the community management model has definite limitations. In order to guarantee the sustainability of RWS projects and associated benefits, it is necessary to provide support guidance which addresses arrangement of issues (Schouten and Moritarty, 2003). Lockwood (2003) also argued that it is unrealistic to expect that government can leave rural communities to their own devices after a water project is completed, and that for RWS systems to be successful, communities need some post-construction technical assistance.

The UN call for the Decade of eighties as an IDWSS has given ample of impetus to the sectoral development in Nepal increasing the coverage from 12% in 1980 to 37% in 1990. The estimated coverage was aimed at 72% by the end of eight five year plan (1992-1997), but remained at nearly 64%. Though there has been some achievements in terms of coverage, majority of the services provided to dispersed and remote community in the rural areas of Nepal were unreliable or even non-existent as neither the community nor the government alone could afford to maintain by itself (Bhandari et al., 2000).

2.1.3.3 Community Factors

Some of the community factors in relation to sustainability of water supply schemes include: the demand or perceived need for an improved service; the feeling of ownership, community participation in all project phases including planning, designing, constructing and managing the service, capacity and willingness of the intended beneficiaries to pay; management through a locally organized and recognized group; financial and administrative capacity of management (http://www.who.int/water_sanitation_health/hygiene/om/linking_capa1.pdf).

i. Demand for a Service

Experiences has shown that when development interventions align to the priorities of community, the sense of ownership increases, as does the likelihood that a community will work to maintain the results, thereby increasing the chance of sustainability (MoWR, 2003). It was also indicated that water supply services which are more demand responsive are more likely to be sustainable at the community level than services which are less demand responsive (Sara and

Katz, 1997 cited in Lockwood, 2003). In all cases, it emphasizes the need of community members demand for improved service prior to its implementation if the scheme has to be sustainable.

ii. Community Involvement

The traditional thinking of community as a passive beneficiary to which a new system or infrastructure have been built up it was then up to the community to use, operate and maintain it as a best as they could has resulted in many abounded or poorly managed or operated systems. The lack of sustainability has thus awakened the sector on the appropriate approach of development (Bhandari et al., 2000:2). In the rural areas, the lack in the part of the government to setup an enabling environment for the development of a system and management of drinking water supply services through effective community participation is seen as the reasons for the failure as far as sustainability of the system is concerned.

It is fundamental to any successful water supply scheme that the people concerned be involved in as many stages as possible in the entire process. If due consideration is not paid to social aspects when planning, the risk is high that the water supply system will either not be used or it will be misused. It is essential therefore that a high degree of community participation in rural water work is applied. In principle communities should participate in the planning, construction, O and M, and evaluation phases of RWS projects if a water supply scheme has to be sustainable (IDRC, 1981:90).

The highest potential for sustainability is achieved when the community is involved in all phases of the project starting from planning stage. If the scheme is to operate satisfactory, people have to recognize the need for the improved service, be able to and willing to pay for the maintenance cost/and eventually the construction cost, and be willing to manage its maintenance (Arlosoroff et al, 1987:3). Similarly it was indicated that, the success of RWS programs depends on the extent to which society is considered during the planning stages. Genuine and unflinching involvement of the intended beneficiaries' right from the initial stages ensures the success of village water supply systems. Enthusiastically community participation can play significant role in developing and increasing community awareness and pride of ownership toward the village

water supply system, resulting in success and a high level of performance of the system (IDRC, 1981:92).

Regarding the need of community to participate in pre-implementation phases of the project, White (1986) cited in Lockwood (2003) stated that the users can participate in the planning phases activity such as communities can be requested to make decisions on geographical scope of the project, integration among projects, siting of facilities, type and design of equipment, selection of water source, additional facilities (for watering cattle etc.), financing water charges and timing of fetching for water.

The Midre Genet water supply scheme in Southern Nations and Nationalities People Regional States of Ethiopia has given service for more than 17 years without interruption. The main reasons for sustainability of the scheme is identified as the strength of WatSan committee and external institutional support for service improvement, major repair works the establishment of appropriate and acceptable financing system. In addition to these, the overall clear and favorable policy environment, community management of water and sanitation services at both federal and regional levels and opportunities related to the location of the Midre Genet (its accessibility and location close to the woreda and regional capital to buy spare parts and get other services) have contributed to the success of the service (Plan Ethiopia, 2006:12). The main factors that have contributed to sustainability of Midre Genet water supply service are generally highlighted as follows: appropriateness of technology; having strong community management; financial feasibility; getting adequate institutional support; WatSan committee being a legal entity; meeting the capacity building need; women involvement in decision making and better documentation.

The findings above are related to De Reget (2005) referring a recent review of World Bank water supply projects by OED that stated the local community involvement in decision making about services in implementing and managing those services is linked to greater beneficiary satisfaction with services, and thus greater willingness to pay. Significant involvement by local stakeholders correlates with better replicable and sustainability in outcomes and impacts. A lesser degree of participation e.g., only providing materials and labor is associated with a lower likelihood of sustainability.

A. Women Involvement

In an endeavor to improve the whole community, the role of women has become more prominent. As a principal user of rural water supplies, women are encouraged to participate in the decision making and take active roles in management and maintenance activities. Development programmes which do not involve women fail to realize their full potential (IDRC, 1981). With regard to the need to involve women, Bhandari et al., (2000) indicated one of the prime reasons of failures of keeping schemes sustainable is poor involvement of women's from the beginning stage of the project. Similarly, Evas and Appleton (1993:24) indicated women participation is essential if systems are to be effectively used and claimed the need of special effort to integrate women fully in to the planning, implementation and management process in both professional and community settings.

Evidences also shows the role of women's in sustaining the functionality of water supply schemes. According to data from Plan Ethiopia (2006), projects in which water committee that have more women than men show greater efficiency and sustainability than those with more men than women. This has been a good indicator of success and demonstrates that women take the main responsibility for household water. One community-managed project (Dolocha) in the southern region of Ethiopia has only women as members of the water board and committees and women's as water sellers at water points. This project has shown striking success with good coverage and better sustainability.

2.1.3.4 Financial Factors

Factors such as capacity and willingness to pay as well as cost sharing and community financial management are likely to influence the financial sustainability of the system. Finance becomes more and more relevant, especially in a context where communities are being empowered with anew financial responsibilities (Davis and Brikke, 1995). In support of this idea, Musonda (2004:139) indicated ability of communities to raise user fees is crucial to sustainability of water supply facilities because they are used to purchase spare parts and paying technicians for carrying out repairs. On the other hand, Bhandari et al.,(2000:4) stated even when the community is willing to pay for and manage the upkeep of its water supply system, the scheme

may founder unless a suitable mechanism is found for collecting money, arranging repairs and paying caretakers or mechanics. With regard to this, Evas and Appleton (1993) stated an insufficient and inefficient use of funds for O and M restricts the reliability of spare parts, tools and recruitment and training of component staff. A lack of accountability in many maintenance departments leads to inefficient use of maintenance funds.

Full cost recovery is not a prerequisite for effective community management, but some contribution from users is needed to establish commitment. As a minimum as much of the recurrent costs as possible should be borne by the community or sustainability cannot be guaranteed (Evas and Appleton, 1993). Failure to adequately cover the costs of improved water supply services in developing countries has been identified as a major constraint to achieving the goal of safe water and adequate sanitation for all on sustainable basis. In recent years increased community financing through user payment has been promoted as a solution (Evas, 1992).

Generally, to achieve sustainability in water supply projects, covering costs of O and M is highly recommended by scholars. Boydel (1999) cited in IRC(2004:52) referring to evidence from the UNDP-World Bank funded schemes also indicated that for schemes to be sustainable, communities should pay for O and M and should make a “substantial” contribution to capital costs (this contribution will vary from project to project, but should be substantial enough to generate a feeling of ownership).

2.1.3.5 Environmental Factors

The continued functionality of water supply also depends on a reliable source and a reliable system of obtaining water from the source. The reliability of the source is often determined by seasonal changes. Some springs and wells may fail towards the end of the dry season owing to a drop in the water table. This is the time when water is needed most but when supplies are least reliable (Davis et al, 1993:26). In support of this, Lockwood (2003:22) indicated one of the external factors for post-project sustainability is rather obvious, but one that nonetheless tends to get overlooked is the sustainability of the water source itself. Obviously, deterioration of source water quantity will be major concern in areas of low rainfall or poor ground recharge where there is greater sensitivity to over-extraction. But even in relatively water abundant regions of the

world, the source can fail to satisfy demand either due to population expansion or abuse of the supply for non-domestic purposes.

Reason for choosing this area for investigation: - rural water supply facilities were not sustainable in Metekele Zone and failing at high rate after huge resources investment. This has created a continuous water shortage and access to safe water has reduced significantly in the area. In other terminology the study is selected purposively.

3.2 Research Design and sampling method

3.2.1 Research Design

Nest design was used to study the sustainability of water sources in the rural setting of Mandura woreda

3.2.2 Sampling method

3.2.2.1 Selection of Sample Kebeles

In Mandura Woreda, there are about 21 kebeles. Out of the total 21 rural kebeles, in 20 kebeles Finn-WaSH BG Program has significantly involved in provision of water supply and sanitation from the time of 2009/10-2001/12. I have selected purposively 8 kebeles based on accessibility, time and cost factors.

3.2.2.2 Selection of Sample Water Supply Schemes

As per data obtained from Mandura WMERDO Head, the total number of protected water supply schemes in the woreda at the end of 2003 E.C were 147 (111 Hand Dug Well (HDW), 26 Shallow Well (SW), 1 Deep Well (DW) and 9 Protected Spring (PS). List of the 21 water supply schemes found in the eight selected kebeles were obtained from WWMERDO staff. Of the total water supply schemes exist in the selected sample kebeles, 11 (4 functional and 7 non-functional) schemes were purposively selected.

The reason for selection of non-functional schemes was that I wanted to know major problem for scheme failure, measures taken by communities and implementing agencies to sustain the service.

3.2.2.3 Selection of Sample Households and Determination of Sample Size

According to Regional Water, Mines and Energy Resources Development Bureau as well as Mandura Woreda Water, Mines and Energy Resources Development Office the average number of people or HH beneficiaries expected to be served by protected HDW are 50 HHs (250 people), SW and PS 70 HHs (350 People) each and Deep Well (3000-4000 people). However, as lists of HH beneficiaries obtained from the respective water committees of the selected sample schemes which also served as a sampling frame reveals more than average or standards set by the local governments. From a total of HH beneficiaries of each sample scheme, 30% of them (216 HH beneficiaries) were selected using systematic random sampling. The systematic random sampling was found as an appropriate to select sample respondents from each scheme because of their relatively large number and as it saves time in carrying out selection.

For FGD purposively 3 water, sanitation and hygiene committees (1 from functional and 2 from non functional scheme, and the third from water, sanitation and hygiene committee's members which were serving for both functional and non functional schemes) whose members comprising 5-7 were contacted for discussion. This was done with the intention that water, sanitation and hygiene committee members have better information on sustaining the functionality of the schemes and related issues.

Similarly, two women groups were also be purposively selected for discussions as women's are the principal users of water and associated with water problems. In addition, 8 key informant interviewees were purposively selected from water implementing agencies at different level (3 from regional water bureau, 2 from zonal water staff, 2 from Mandura WWD and 1 from NGO (i.e. Finn-WaSH BG). This is to get pertinent information related to institutional issues. (Annex 7, lists of persons interviewed).

3.3 Data collection tools and procedures

Techniques used to collect primary data's that would meet the research objectives were HH survey, FGD, Key informant interview, field visit/observation and secondary data.

Household Survey: Closed and open ended structured questionnaires were prepared to generate the required information from the sample HHs. the structured questionnaires prepared in English

were translated into Amharic. Prior to the actual data collection through structured interviews, the developed structured questionnaires were pre-tested to ensure the validity and clarity of the questionnaires.

To carry out structured interview, 5 enumerators were recruited and trained for two days. The main criteria's used to select enumerators include: knowing the local language Gumuzega and Amharic fluently and ability to translate the languages, familiarity with the culture of the community and being ethnically belongs to the respondents; knowing the kebeles; educational back ground (greater than grade 10) and also based on their previous experience in data collection. Accordingly, 2 teachers and 3 college students were recruited and trained by the researcher to familiarize them with the structured questionnaires and the precautions to be made during their field stay. After all, the final structured interview employed to collect data from the sample HHs with close supervision of the researcher.

FGD: The primary data collected from the sample HHs were enriched by additional information gathered through FGD. Accordingly, with the help of checklists/unstructured questionnaires, discussions were held with water, sanitation and hygiene committees and selected women's. Discussions were mainly made on different issues that are related to water supply management and related problems undermining sustainability of their schemes and/or reasons for failure of their schemes to provide service as well as associated problems women's are facing. (Refer annex 9 subsections II and III about points of discussions).

Key Informant Interviews: A key informant interview was particularly important in getting information pertinent to the institutional aspects of water supply sector. Hence, views of water supply agencies (heads and experts) are very important as they have a better knowledge and experience on problems and prospects of RWS issues. To obtain the views of key informant interviewees, checklists were prepared and information was collected through unstructured interview. (Refer annex 9 subsections of I and IV about points of interview with key informants).

Filed visit and observations/visit: -. To understand the realities of the water supply system field visits were conducted.

Secondary data: Secondary data was also being collected to complement the primary data. The major sources of secondary data sources were from Government and NGOs publications, non-published documents, annual reports, archives, books, Websites, project documents such as proposals, WaSH baseline survey, Plans, monitoring and evaluation reports, rural water statistics abstracts, kebele level data, minutes and related sources were employed as a secondary sources.

The collected data involves both the qualitative and quantitative data. The quantitative data mainly employed data obtained from HH survey while qualitative data employed FGD, key informant interviews and personal observation. .

3.4 Data analysis method

Both quantitative and qualitative methods of data analysis were used. The primarily data collected from HH survey were organized, categorized based on the nature of data and coded. The survey data were analyzed using statistical packages for social scientists (SPSS) software version 13.0. Descriptive statistics such as percentage, ratio, frequency and cross tabulations were used to quantitatively analyze the data. On the other hand, qualitative data obtained from key informant interviews, FGD and personal observations were analyzed qualitatively to strengthen data obtained from HH survey.

CHAPTER-FOUR

4. Results and Discussions

4. Background Information of the Respondents

Understanding the socio-economic and demographic background information of the sample population is very important to know their characteristics. As stated earlier, the size of sample HH for this study is 216 which were selected from beneficiaries of 11 developed water supply schemes in 8 kebeles of the study woreda.

4.1. Sex and Age Composition of the Respondents

The following table (4.1) shows respondents' sex and age profile. With regard to the sex of the respondents, out of the total 216 sample households, 116 (53.7 %) are males while the remaining 100 (46.3%) are found to be females. Concerning the age composition of the respondents, about 46 (21.3%) lie in the age group of less than 30. The majority 68 (146.6. %) fall between the age of 31-40 while 62 (133.9 %) lie between the age group of 41-50 and 24 (51.8. %) of respondents are found above 50 years old. As it can be seen from the table, about 176 (81.5%) of the respondents are found between age group of 20-50 which are mainly considered as economically active population.

Table.4.1 Respondents by Sex and Age

Sex of the Respondent				Age Group					
Category	Male	Female	Total	< 20	20-30	31-40	41-50	>50	Total
Frequency	116	100	216	16	46	68	62	24	216
Percent	53.7	46.3	100.0	7.4	21.3	146.6	133.9	51.8	100.0

Source: Household Survey, 2012

4.2. Marital Status and Family Size of the Respondents

As can be seen from the table below (4.2), majority 195 (90.3%) of the respondents are found to be married, 9 (4.5%) widowed, 7(3.2%) divorced and 5 (2.3%) single. With regard to family size, those household sample respondents having family size from 1-3 comprise about 37 (17.1%), from 4-6 represent 59 (27.3%), 7-9 comprise 71 (32.8%) and those having greater than 9 family size represent 49 (22.7%). From the table, majority 120 (55.5 %) of the respondents have greater than six family members.

Table.4.2. Respondents Marital Status and Family Size

Marital Status						Family Size				
Category	Single	Married	Divorced	Widowed	Total	≤3	4-6	7-9	≥9	Total
Frequency	5	195	7	9	216	37	59	71	49	216
Percent	2.3	90.3	3.2	4.5	100.0	17.1	27.3	32.8	22.7	100.0

Source: Household Survey, 2012

4.3. Religion and Ethnicity

The following table (4.3) shows respondents' religion and ethnicity. According to the survey result, majority 165 (76.4 %) of the respondents are found to be Gumuz people who are speakers of Gumuz language and the majority 121 (56%) of the respondents are followers of orthodox religion.

Table.4.3. Respondents Religion and Ethnicity

Religion							Ethnicity				
Category	Orthodox Christian	Protestant	Catholic	Muslim	Others, Specify	Total	Gumuz	Agewu	Amhara	Others, Specify	Total
Frequency	121	64	25	-	6	216	165	41	8	2	216
Percent	56	29.6	11.6	-	2.7	100.0	76.4	18.9	3.7	0.9	100.0

Source: Household Survey, 2012

4.4. Respondents Educational Level

With regard to educational level of the respondents, the study found that greater proportion about 137 (63.4%) are illiterate, followed by able to read and write 49 (22.6%), 20 (9.2%) grade 1-6, 6 (2.7%) grade 7-8, and only 4 (1.8%) are found to be grade 9-12. No respondents were found who joined college and above. From this, it can be concluded that literary rate is very low.

Table.4.4 Respondents by Educational Level

Educational Status	Frequency	Percent
Illiterate	137	63.4
Able to read and write	49	22.6
1-6	20	9.2
7-8	6	2.7
9-12	4	1.8
Joined college and above	-	-
Total	216	100

Source: Household Survey, 2012

4.5. Sources of Family Income

Respondents were asked about their main sources of family income based on their importance. The household survey result shows that majority 196 (90.7%) and 9 (4.1%) of respondents reacted farming and business/petty trade as their main sources of income respectively. Others 4 (1.8%) and 5 (2.3 %) indicated government employee and daily laborer respectively.. The survey result also shows that 2 (0.9%) of respondents have no secondary source of income.

Table.4.5 Respondents by Source of Income

Sources of income	Main source of family Income	
	Frequency	Percent
Farming	196	90.7
Business/petty trade	9	4.1
Government employee	4	1.8
Daily laborer	5	2.3
No source of income	2	0.9
Others	-	-
Total	216	100.0

Source: Household Survey, 2012

4.6. Social Services Needed by Respondents

The respondents were also asked to indicate their needs of social services to be provided primarily. According to the survey result shown in the table 4.6 below, 71(32.8 %) and 93(43.1%) of respondents have replied a need for health and water supply respectively to be provided first. The remaining 21(9.7 %) have preference for education, 12(5.5%) for sanitation, 6 (2.7%) electricity, 8 (3.7) for road and 5 (2.3%) for telephone as their primary need.

Table.4.6 Respondents' Need of Social Services

Social Services	Needed to be provided primarily	
	Frequency	Percent
Health	71	32.8
Water supply	93	43.1
Education	21	9.7
Toilet/Sanitation	12	5.5
Electricity	6	2.7
Road	8	3.7
Telephone	5	2.3
Total	216	100.0

Source: Household Survey, 2012

The table demonstrates that majority of the population has great demands mainly for water supply followed by health services relatively to other social services.

4.7. Existing Water Supply Situation

4.7.1 Water Supply Sources

The results presented here (in table 4.7) are based on the main source of drinking water supply for the respondents during the time of survey. The survey result shows that 59 (27.3%) of the total respondents use river, 27(12.5 %) traditional HDW, 48(22.2%) protected HDW fitted with hand pumps, 20 (9.2%) SW fitted with hand pumps, 55 (25.5%) unprotected spring and 7(3.2%) from river sand dug wells. As can be seen from the table below, the principal sources of water supply in the study area is traditional sources where about 148 (68.5%) of the sample respondents are mainly getting drinking water from traditional sources, while only 32(31.5%) obtained on protected sources during the time of survey.

Table 4.7 Main Source of Drinking Water

Type of water source	Respondents	
	Frequency	Percent
River	59	27.3
Traditional HDW	27	12.5
Protected HDW	48	22.2
Shallow Well(SW)	20	9.2
Unprotected Spring	55	25.5
Protected Spring(PS)	-	-
Sand Dug Well	7	3.2
Total	216	100

Source: Household Survey, 2012

The majority of respondents reported that traditional water sources as their main source of drinking water were due to inadequacy of water supply from their schemes.

The figures below show different traditional sources of drinking water for majority of the respondents.





Fig 2. People fetching drinking water from traditional sources (river).

4.7.2. Status of Water Supply Schemes

As per data obtained from Mandura WMERDO Head, the total number of protected water supply schemes in the woreda at the end of 2003 E.C were 147 (111 Hand Dug Well (HDW), 26 Shallow Well (SW), 1 Deep Well (DW) and 9 Protected Spring (PS).

The total number of developed water supply schemes in the studied sample kebeles were reported to 21 (16 HDWs, 4 SWs, and 1 PS) for the same period. Even though complete data were lacking on status of the water supply schemes that exist in the woreda as whole, out of the total water supply schemes exist in the sample kebeles, 7 Schemes or 57.1% the schemes were not functioning during the time of survey. Majority of functional schemes were even providing service with problems (i.e. low yielded and frequent interruptions). As a result of failure in schemes, many of the rural communities were not served. This finding confirms with Davis and Brikke (1995), referring WHO that estimated 30-60% of existing water supply schemes in developing countries are not operational at any time.



Fig 3. Water supply scheme in Tuni Dadush Kebele.

4.7.3 Status of Water Supply Schemes since construction

In this subsection, status of developed water supply schemes is described in table 5.2 below based on views of respondents. In response to the question, “Have you ever faced the non-functional problem to your water supply scheme since the time of construction? The survey result shows 95(83.3%) of the total replied they have faced the non-functionality problem to their schemes while 19(16.7%) are not faced the non-functionality problem since the time of construction.

As shown in the table 4.8 below, respondents were also asked whether or not their water supply scheme has experienced the non-functionality or failed to provide service since the last one year. The household survey result indicates that 91(79.8%) of the total respondents have faced the non-functional problem with their scheme while the remaining 23(20.2%) have reported that their water supply scheme continuously provide service without failure.

Out of the total (91) respondents who have faced the non-functionality problem since the last one year, 22(24.2%) of them have reported their water supply scheme failed to provide service/mal-function once, 25(27.5%) reported twice, 26(28.6%) three times and 18(19.8%) four times. This implies that majority of the community did not get proper service from developed schemes because of its frequent problem (e.g. about 75.8% have faced with the problem from 2-4 times).

Respondents that have ever faced the non-functional problem were asked about the average time of schemes in state of disrepair once the schemes failed to provide service. The survey result shows that 35(36.8%) of the respondents reported 1-2 months, 28(29.5%) 3-6 months, 22(23.1%) 7-9 months, 9(7.9%) 10 months to one year and only 1(0.9%) replied more than a year. The majority (63.2%) of the respondents reported their scheme is in state of disrepair for long period of time (more than 2 months). From this it can be concluded that adequate attention was not given to maintenance and repair of water supply schemes by concerned bodies once the schemes are non-functional. The finding is far from the cases of Volta and Brong Ahafo villages of Ghana which has a well established system of district level support teams providing oversight and backup to the village water committees, takes on average 18 days for the schemes in state of disrepair (Komives et al., 2006).

Table 4.8 Nature of Water Supply Schemes Problems

Issues	Respondents
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Have you ever faced the non-functional problem since construction?	Response	Frequency	Percentage
Have you ever faced the non-functional problem since construction?	Yes	176	81.5
	No	40	18.5
	Total	216	100.0
Have you ever faced the non-functional problem since the last one year?	Yes	168	77.7
	No	48	22.2
	Total	216	100.0
Frequency of schemes non- functionality or fails to provide service since the last one year?	once	54	25
	twice	65	30
	three times	52	24
	4 times	34	15.7
	> 4 times	-	-
	Total	205	100.0
Average time spent of schemes in state of disrepair once non-functional?	1-2 month	64	29.6
	3-6 month	48	22.2
	7-9 month	29	13.4
	10-12 month	13	6.0
	> 1 year	2	0.9
	Total	156	100.0

Source: Household Survey, 2012

4. 8 Existing Problems to Sustainability of RWS Schemes

4.8.1. Community Related Problems

4.8.1.1. Demand of the Community for the Water Supply Service

As indicated in the literature part, development projects which are based on demand of the end users tend to be more sustainable than those projects with less or absence of demands. In relation to this, respondents were asked whether or not they had demand for developed water source prior to its implementation. As shown in table 4.9 below, majority 199 (92.1%) of the sample respondents reported as they had demand for the service. The remaining 17 (7.8%) were found that they did not have demand. from this, it can be concluded that majority of communities were aware of the benefits of water supply probably because of lack of adequate water sources near their villages and water related problems they face from their secondary sources prior to implementation of the scheme which in turn contribute for communities to take care of their schemes.

In assessing who initiated to provide their existing water supply schemes, 127(58.7%) of the respondents reported community, 52(24%) government, 20 (9.2%) NGOs, 12(5.5%) both community and government, while 5 (2.3%) replied all in collaboration. Still in all cases, communities were the main actors in initiating their water supply schemes to be developed. This can help communities to have positive attitude for the developed scheme.

Table 4.9. Communities Demand for the Water Supply Service and Initiator to be Provide

Issues	Respondents
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Did you have demand for protected water supply source prior to its construction?	Response	Frequency	Percentage
	Yes	199	92.1
	No	17	7.8
	Total	216	100.0
Who initiated to provide your protected water supply source?	Community	127	58.7
	Government	52	24.0
	NGOs	20	9.2
	Community and government	12	5.5
	All in collaboration	5	2.3
	Total	216	100.0

Source: Household Survey, 2012

4.8.1.2. Level of Community Participation

Local communities develop positive attitudes towards any development project when they develop a sense of belongingness. In turn, sense of belongingness develops in an individual or a community when they participate fully in the activity starting from the beginning knows the aim and become beneficiary from the project. With regard to this, Arlosoroff et al., (1987:3) strongly argued that the highest potential for sustainability is achieved when the community is involved in all phases of the project starting from planning stage.

The nature of community participation and type of contributions made by sample household respondents are shown in table 4.10. Regarding participation of community at any one phases of their water supply project, the survey result revealed majority 198 (91.6%) of sample respondents have made participation while the remaining 18 (8.3 %) did not participate in the water supply project. The main issue to be considered is the phases at which the community has made participation or involved. With regarding this, (IDRC, 1981:90) highly recommends the need of involving the community adequately in the planning, construction, O and M and evaluation phases of RWS projects if a water supply scheme has to be sustainable.

In assessing phases at which the community has made participation, the survey result shows that out of the total (206) who have made participation, 20(9.7%) of the respondents were participated during planning, 56 (28.1%) during construction (implementation), 22(10.6%) in post construction, 93 (45.1%) both during and post-construction while only 15 (7.2%) in all phases. This implies that majority of the users did not participate adequately especially during planning phases, which is the most important phase that gives an opportunity for communities to make informed decision about the water supply (e.g. in site and technology or scheme type selection etc). In other words, local communities' knowledge through experience is not considered in the planning phases which can impact on sustainability as they were not fully participated and undermine sense of ownership to the scheme.

Moreover, almost all FGD discussants and majority of key informants from government officials also confirmed the finding where the communities are ignored during planning and their participation is limited to provision of road and clearing the site of the proposed new scheme prior to the actual implementation. This is identified as failure of the implementing agencies to consult the local community during the design. This finding also confirms with the recommendations by (IDRC, 1981:90) which stated if due consideration is not paid to social aspects when planning, the risk is high that the water supply system will either not be used or it will be misused.

The survey result indicated in the table 4.10 further shows that among respondents who have made participation, 170 (78.7%) of the respondents reported their contribution by free labor and provision of local construction materials (sand, wood, stone) during and post-construction phases while only 25 (5.5%) contributed by free labor. The post construction participation of the community is mainly limited to fencing the water supply schemes.

Generally, the communities made significant contributions through provision of free labor and local construction materials during and post-construction phases. Communities were absent in planning phase. In support of this, De Reget (2005) referring A recent Review of World Bank

Water Supply Projects by OED stated significant involvement by local stakeholders correlates with better replicable and sustainability in the outcomes and impacts. A lesser degree of participation, e.g. only providing materials and labor is associated with lower likelihood of sustainability.

Table 4.10 Nature of Users' Participation and type of Contributions made in the Water Supply Project

Issues	Respondents		
	Response	Frequency	percent
Have you participated in provision of water supply?	Yes	198	91.6
	No	18	8.3
	Total	216	100.0
If 'Yes' at which phase the participation was made?	During Planning	20	9.7
	During construction	56	28.1
	Post-construction	22	10.6
	During and post- construction.	93	45.1
	In all phases	15	7.2
	Total	206	100.0
Type of contribution made?	Labor only	25	11.5
	Finance only	9	4.1
	Local construction material only	12	5.5
	Labor and local construction material	170	78.7
	In all	-	-
	Total	216	100.0

Source: Household Survey, 2012

Participants of FGD held with water committees mentioned that communities have high demand for water supply service. As a result they significantly participate through provision of local construction materials and free labor during provision of water supply. Users' participation in pre-implementation phase was only limited to provision of road and clearing the site of the

proposed water supply scheme. They blamed the implementing agencies for not involving or consulting the intended beneficiaries in site and scheme type selections. Despite absence of communities in planning phases, most of the discussants indicated it was not a critical problem for sustainability of their schemes. However, some of them indicated its impact on sustainability of their schemes. During field visit of this study, the researcher was also able to observe active participation of communities especially women's in provision of roads and cleaning the site of the proposed water supply scheme as shown in the figure below. This has an important effect in creating sense of ownership to communities to properly use the scheme.



Fig 4. Communities in Dikul kebele participating in site clearing and road provision.

Regarding the need of communities to participate in site selection of the schemes, Devis et al., (1993) stated if improved water supplies are conventionally positioned with the participation of the intended users, it will be more used by communities and will have a better sustainability than water supplies that are not conventionally positioned with participation of communities. In relation to this, respondents were asked about who made decisions in site selections of the developed water supply schemes. The survey result shows that 165 (76.3%) of the respondents replied government as decision maker, 26 (12.0%) NGO, 15 (6.9%) both by government and

community while the remaining 10 (4.6%) did not certainly know the decision maker. Based on the findings of scholars stated above, absence of communities in site selection would have a negative impact on sustainability of the water supply scheme as decisions were mainly made by implementing agencies.

4.8.1.3 Communities' Sense of Ownership to Water Supply Scheme

It is obviously true that if the communities/end users do not feel sense of ownership, the developed water supply scheme will most probably managed poorly, misused and the benefits will not be sustainable. However, degree of sense of ownership to certain developed infrastructural service depends on the degree to which the local communities are involved in the whole process, level of satisfaction with the service and others. Bahabdari et al., (2000) stated most of drinking water supply schemes dysfunction due to lack of ownership on the scheme. Ownership of schemes draws users' sentiment towards the surveillance of the scheme as a personal property. Users' satisfaction in yields, its location, quality, and regularity are taken as major indicators to measure the level of ownership.

By understanding the importance of communities' ownership, development projects started to follow demand responsive approaches where the communities will have their own contribution to create sense of ownership. In an attempt to create sense of ownership in RWS projects, the government of Ethiopia has developed the water supply policy which strongly recommends the need of community participation through provision of free labor, cash and local material during provision of water supply projects.

In assessing users' ownership feeling to the schemes, the survey result shows that 65(30 %) of the respondents reported as they feel sense of ownership while majority 151 (69.9 %) of them were not. The result of key informant interview held with government officials and NGO also show weak or absence of communities' ownership to the schemes in most cases due to low or lack of awareness. Some of the reasons for low sense of ownership identified by majority of FGD participants were failure of the schemes to provide adequate and continuous service that satisfy demand of beneficiaries, inconveniency of the scheme site, and existence of alternative

traditional sources for some communities and partly due to lack of communities' full participation in their water supply project.

During the time of the survey, the researcher also identified some indications of weak or absence of communities' sense of ownership to the schemes as most of the schemes are poorly managed, where the schemes have weak or no fences, guard, no appropriate drainage systems, schemes are pumped the whole day by users and children; and also not protected from domestic animals. Out of all visited functional schemes, only SW in Dafiye kebele has locks and appropriate timing of fetching water (opened twice per day) and providing appropriate service for users. This shows that weak or absence of communities' sense of ownership to the schemes is one of the reasons for poor management that in turn hinders sustainability of the schemes.

4.8.1.4 Managerial Problems

Water supply schemes will be more sustainable if they are managed by the communities themselves than external bodies (government or NGOs) because communities are closer to the scheme than external agencies. This is true when the communities are capable of managing the schemes by taking adequate trainings on technical, financial and overall management of the systems as well as accessed to external supports and the like.

At community level in all the sample sites, the water supply systems are managed by communities through water, sanitation and hygiene committee whose members are mainly 5-7 out of which 2-3 of them are females. Members of the water, sanitation and hygiene committee include one chair person, one secretary, one cashier, two local technicians and two as members. During the time of field visit, the researcher observed cases where one water, sanitation and hygiene committee also serves or manages two water supply schemes.

The water, sanitation and hygiene committees are responsible for mobilizing community for cash and labor contributions, over all financial and technical management of the scheme including carrying out O and M, protecting the scheme from children and domestic animals

through fencing the schemes, fixing time of fetching, keeping its sanitation, sustain the benefits of the water supply scheme after project completion and report to the Woreda Water, Mines and Energy Resources Development office if there is any problem beyond their capacities.

In the study area, the establishments of water, sanitation and hygiene committees are not legally registered by the regional government in general and by regional water bureau including Woreda Water, Mines and Energy Resources Development Office in particular. Key informant interviewees from Woreda and Zonal water office also confirmed absence of legally supported Water, Sanitation and hygiene committees where accountability and transparency were absent in financial management as some of the Water Sanitation and Hygiene committees especially the chair persons have used the money (fees collected from users) for their own and other purposes. The implication here is that absence of transparency and accountability in financial aspects could result in communities mistrust on Water, Sanitation and Hygiene committees and discourage the communities to contribute water fees properly that in turn limits adequacy of fees for O and M.

I. Problems Related to Water, Sanitation and Hygiene Committees

If RWS schemes are to be functional for long period of time and the benefits from the scheme to continue, those communities who manage the scheme have to have a financial and managerial capacities. In assessing the capability of Water Sanitation and Hygiene committees in managing the water supply schemes, respondents were asked how they evaluate the Water, Sanitation and Hygiene committees' capacity (see table 5.5 below). The household survey result indicate that 118 (54.6%) of the respondents have indicated Water, Sanitation and Hygiene committees were not capable of managing the schemes while the remaining 98 (45.3%) agree on their capability. As illustrated in the table below, respondents were also asked whether or not the Water Sanitation and Hygiene committees properly discharge their responsibilities. Majority 128 (59.2%) of respondents reacted the water, sanitation and hygiene committees did not discharge their responsibility adequately while 88 (40.2%) of them indicated water committees properly

discharge their responsibilities. In both cases, majority of the respondents were not satisfied with activities of Water, Sanitation and Hygiene committees.

Table 4.11 Respondents view on capability of WaSHCO

Issues	Respondents		
	Response	Frequency	Percentage
Do you think water committees are capable of managing water supply scheme properly?	Yes	98	45.3
	No	118	54.6
	Total	216	100.0
	Did WaSHCO adequately discharge their responsibilities?	Yes	88
	No	128	59.2
	Total	216	100.0

Source: Household Survey, 2012

Majority of focus group discussants from Water, Sanitation and Hygiene committees also believed that they were unable to run their roles properly due to their limited / lack of capacity and the cause can be traced back to inadequate and even absence of practical trainings and supports given to them from government side and absence of working manuals. They indicated as they were assigned to manage their water supply schemes properly without meeting their needs required for proper managing of the schemes. On the other hand, they reported that work load they have as most of the communities in the study area engage in farming activities; they have no adequate time to look after the water points. In addition, absence of some incentives for WaSHCO committees was identified as one of the reasons for not discharging their responsibilities properly. All of the discussants in the various form commented the merit of providing adequate and practical trainings and supports in addressing problems of sustainability in their water supply schemes.

Similarly, I was able to observe lack of regular meeting programs from part of WaSHCO and low educational level for majority of WaSHCO members/at least 4 out of 7 were illiterate in all visited sites of the sample schemes. The implication here is that communities are not capable to manage their schemes properly because they lack the skills and basic trainings on financial,

technical and overall management of their water supply schemes as well as absence of incentives and workloads they have. Accordingly, such limited capacity of WaSHCO has been identified as one of the major factor hindering schemes to provide proper service to the communities.

In line with the findings above, study by Bhandari et al., (2000) indicated inefficient and less capable institution like Water, Sanitation and Hygiene users committee is a prime reason why drinking water supply schemes are not sustainable. Similarly, finding by Komives et al., (2006:15) also shows 80% of problems in communities were an administrative or financial nature and identified the most problems as follows: lack of appropriate tariff collection, utilization of WaSHCO money for unrelated purposes, inappropriate and inefficient financial recording and lack of transparency and trust of the community.

4.8.2 Technical Related Problems

Carrying out an effective O and M of water supply systems is one of the important contributors of sustainability in RWS schemes because non-functionality or failure to provide service is features of any developed water supply scheme. However, carrying out effective O and M of water supply schemes require availability of local technicians that have technical skills to carry out O and M including major repairs, communities' access to adequate spare parts and toolkits.

4.8.2.1 Availability of Local Technicians and their Technical Skills

In community managed water supply schemes, availability of local technicians that can carry out O and M when needed is very important as rural communities are located in dispersed as well as difficulty for local governments to carry out such repairs as they are over loaded, understaffed and under resourced nature.

In all sites of the scheme, it is encouraging to note that each scheme or each Water, Sanitation and Hygiene committees have two local technicians (one male and the other female). However, it is true from the theory as well as in practice that unless availability of local technician is complemented by adequate technical skills to carry out repairs including major break downs, availability of spare parts and equipping them with the necessary toolkits, sustaining the services is greatly affected as it leads to poor O and M of the schemes.

With regard to technical skills of local technicians to carry out all types of repairs including major break downs, results of household survey indicated in table 5.6 reveals majority

189(87.5%) of the total respondents reported that local technicians did not have adequate technical skills to carry out repairs especially major repairs. The remaining 27 (12.5%) of the total have indicated ability of local technicians to carry out all types of repairs.

The finding above is also supplemented by FGD held with Water, Sanitation and Hygiene committees. As Water, Sanitation and Hygiene committees include local technicians in its member reported that the training given to WaSHCO in general and local mechanics in particular by implementing agencies on technical issues were not adequate. Almost all of the discussants stated that since the time of their water supply schemes construction and establishment of WaSHCO members, they have taken training only once that lasted from 2-3days before one year of the study time; and since then no refreshment training was given to them. As a result, they reported their inability to carry out repairs mainly major repairs. This has been partly evidenced as all sample non-functional water supply schemes are in state of disrepair for long period of time (3-6months until the time of the survey).

The study further inquired whether the local technicians were equipped with the necessary toolkits to carry out repairs or not (see table 4.11). Majority 181 (83.7%) of the total respondents reacted that local technicians were ill-equipped. Only 29(13.4%) of them reported that local technicians were well equipped with the necessary toolkits and 6 (2.7%) of the respondents did not know about adequacy of toolkits. This shows existences of local technicians in each water supply scheme were not accompanied by availability of the necessary toolkits to carry out O and M in the study area. Even though some FGD participants from Water, Sanitation and Hygiene committees indicated the ability of local technicians to carry out minor repair works rarely, this is impacted by absence of the necessary toolkits. Similarly, key informant interview made with government water sector officials reveals that majority of local technicians can carry out minor repairs but not equipped with adequate tools. From the discussions above, one can draw a conclusion that absence of adequate toolkits to the local technicians was one of the contributors for poor O and M of the schemes which in turn lead to non functionality of the schemes. This finding is related with the suggestion of Musonda (2004:139) who stated that appropriate tools for carrying out repairs should be made available to achieve sustainability.

Table 4.11 Respondents View on Ability of Local Technicians to carry out all types of Operation and Maintenance and Availability of adequate Toolkits

Issues	Respondents		
	Response	Frequency	Percentage
Do you think local technicians have adequate technical skills to carry out all types of repairs / maintenance?	Yes	189	87.5
	No	27	12.5
	Total	216	100.0
Are local technicians well equipped with the necessary toolkits to carry out repairs when needed?	Yes	29	13.4
	No	181	83.7
	I don't know	6	2.7
	Total	216	100.0

Source: Household Survey, 2012

4.8.2.2 Availability of Spare Parts

Availability of spare parts for community is one of the important factor that contribute to sustainability of RWS schemes because whenever the schemes encounter malfunctioning, communities will get easily with in short period of time. The implication here is that scarcities of spare parts to communities have a negative impact on sustainability of community water supply schemes. With regard to this, Komives et al., (2006) stated that without access to a reliable supply of spare parts and some qualified person to make repairs, water supply schemes will not be sustainable.

In assessing availability of spare parts at community level when ever needed by communities, 188 (86.5%) of the respondents have reported that the spare parts are not readily and easily available while only 28 (12.9%) have indicated availability of spare parts. The finding shows that communities in the study area are not accessed for spare parts. Participants of FGD from Water, Sanitation and Hygiene Committees mainly from non functional schemes identified lack of spare parts as a major problem to repair their schemes when ever their scheme encountered break downs. They further stated that even when they want to buy the inexpensive spare parts such as valves, rubbers, U-seals, these were not easily available and even rarely available from private sector or business man; it costs more than ten times the normal cost. As a result of these, some of participants have indicated their water supply schemes are in state of disrepair for long period of time and others as their water supply scheme is providing service with problems.

The finding above is also supplemented by key informant interview made with Regional Water, Mines and Energy Bureau Head, *Zonal* water sector experts as well as Mandura Woreda Water, Mines and Energy Resources Development Office staff members. They all indicated spare parts are not available at Woreda and even regional level. The result of interview also shows that neither of the Regional Water, Mines and Energy Bureau or Mandura Woreda Water, Mines and Energy Resources Development Office has allocated budget for spare parts and ensured availability of spare parts to communities. In addition to these, no formal private spare part providers exist in the region. From this, it can be concluded that government or implementing agencies have not given due attention to sustaining the schemes once installed and handed over to the users. From the above discussions, absences of spare parts to the communities have been the main reason for schemes not to be repaired once the schemes experienced break downs or non functional.



Fig 5. Spare parts requirement of different schemes.

4.8.2.3 Construction Quality of Developed Water Supply Scheme

As indicated in the literature part, it may be disastrous for people when a facility breaks down and cannot be repaired because of a fault inherent in the design or construction. The study

assessed the quality of constructed water supply schemes by taking the responses of sample households. The evaluation criteria introduced for them were poor (not good), good (satisfactory) and very good. Based on these criteria those households who replied not good, good and very good account for 125 (57.8%), 76 (35.1%), 15(7%) respectively. Generally, the implication here is that poor construction quality is one of the reasons for schemes non functionality.

Table 4.13. Respondents’ Opinion on Quality of Schemes.

Respondents Opinion about quality of Schemes	Overall Respondents	
	Frequency	percent
Not Good (poor)	125	57.8
Good (satisfactory)	76	35.1
Very Good	15	7
Total	216	100.0

Source: Household Survey, 2012.

During the time of survey, I observed that some of the water supply schemes especially non-functional schemes are cracked and the covers were not well fitted and exposed the water for pollution as shown in figure below.



Fig 6. HDW in Edida 01got'of Edida kebele

4.8.3 Financial Problems

4.8.3.1 Nature of Community's Contributions to Cost Recovery

If improved water supply schemes are to be managed properly and make the benefits sustainable, beneficiaries are expected to cover at least costs of O and M. With regard to this, the Water Resource Management Policy of Ethiopia (1999) clearly indicated that provision of drinking water supplies in urban areas are based on the principle of total cost recovery programs while rural water supplies are based on the principles of covering costs of O and M and these principles need urban tariff settings to be based on the basis of full-cost recovery and rural tariff settings to be based on the objectives of recovering O and M costs which are considered as mandatory.

The amount of money needed to meet costs of O and M depends on whether the beneficiaries pay or not and their ability to pay regularly. Unless costs of O and M are covered by beneficiaries, the probability of water supply schemes to be sustainable is very low as failure of water supply scheme /break down at any time is one of its features. In relation to this, ODI (2004) identified cash flows as a major problem in many rural areas especially if the water point breaks at wrong time.

In assessing whether the communities pay fees for the water service they use or not, the survey result indicated in the table 4.14 shows that 188 (87%) of the total respondents reported they pay. Only 28 (12.9%) of the respondents were found as beneficiaries but do not pay for the service. Those respondents who did not pay are those who are locally recognized as elders and unable to pay for the service. From this, it can be concluded that communities are aware of why they pay water fees that can in turn positively affect sustainability of the schemes as the fees may use for purchase of spare parts when needed.

In the study area, about 160 (74.0 %) of the research respondents reported that the water fees were set by WaSHCO while 23(10.6%) by WWMERDO, 11(9.6%) both by WMERDO and WaSHCO and only 22(10.1%) did not know who set the price of their water fees. However, interview made with Mandura WMERDO head reveals that fees were set by WaSHCO in collaboration with the Mandua WMERDO.

Regarding the amount of money payment made, the most common type of payment is one Ethiopian Birr (ETB)/month/household in all visited schemes except for SW in Eddida 01 ‘got’ where the beneficiaries are paying 20 cents or 0.2 ETB per Jerican or container they used to fetch water. The survey result indicated in the table 4.14 also shows, of the total respondents who have made payments, 165 (76.3%) of the respondents were paying 1 ETB/month/household while 38 (20.3%) of the respondents all from one scheme pay 0.20 ETB per Jerican. The payment is different from others because of low yields of water supply from the SW (7-15 Jerican per day) during the time of survey but the intended beneficiaries are about 120 HHs. Therefore the intension of such tariff settings was to generate better fees that can contribute for cost recovery than payments in other areas.

With regard to fairness of payments made by users/month or per container used to fetch water, out of the total (203) who made payments, 153 (70.8%) indicated its fairness mainly from those who were paying 1 ETB/month/household, while the remaining 50 (23.1%) reported its unfairness.

Out of 165 respondents who made payment of 1 ETB/month/household, 139 (84.2%) of the respondents were willing to pay 1 ETB, 13(7.8%) less than 1 ETB, 11(6.6%) from 1.10-2.00 ETB, and only 2(1.2%) agreed to pay from 2.10-3.00 ETB.

From the finding above, it can be concluded that the majority of beneficiaries were not able or willing to pay more than what they were paying due to either lack of financial capacity or dissatisfaction with their water supply. However, majority of FGD participants mainly from water committees indicated that most of communities are able and willing to pay more for improved service provided that appropriate service/or service that satisfy the needs of communities.

Table 4.14 Respondents' reaction on Financial Issues

Issues and Response	Respondents	
	Frequency	Percent
Who set the price of water fees?		
WaSHCO	160	74.0
Government/Woreda WMERDO	23	10.6
NGOs	-	-
WaSHCO With Woreda WMERDO	11	9.6
All in collaboration	-	-
I don't know	22	10.1
Total	216	100.0
Type of payment you made?		
1 ETB/month/ household	165	76.3
0.20 ETB per Jerican or container	38	20.3
Total	203	100.0
Do you think 1 ETB payment you made is fair?		
Yes	153	70.8
No	50	23.1
Total	203	100.0
Amount you are willing to pay/month?		
<1 ETB	13	7.8
1 ETB	139	84.2
1.10-2.00ETB	11	6.6
2.10-3.00ETB	2	1.2
>3.00ETB	-	-
Total	165	100.0

Source: Household Survey, 2012

4.8.3.2 Adequacy of Water Fees to Cover Costs

As indicated in the literature part covering costs o and m by beneficiaries is highly recommended if water supply schemes have to be sustainable. Evas and Appleton (1999) indicated that as a minimum, as much of the recurrent costs as possible should be borne by the community unless sustainability cannot be guaranteed.

In an attempt to know the views of the community concerning the adequacy of water fees collected from users to cover all costs of O and M, the results of the survey indicated in the table below shows that majority 195 (90.2%) of the total subjects replied for inadequacy of fees to cover all costs related to the scheme while only 9 (4.1%) of the household respondents all from functional schemes have agreed with its adequacy and no one has the same saying from non-functional scheme sites. The remaining 12(5.5%) did not know whether it is adequate or not.

Table 4.15 Respondents View on Adequacy of Water fees to Cover Costs

Issues and Response	Household Respondents	
	Frequency	Percent
Do you think fees collected are Adequate to cover all costs of O and M?		
Yes	9	4.1
No	195	90.2
I don't Know	12	5.5
Total	216	100.0

Source: Household Survey, 2012

Majority of the FGD participants from WaSHCO also asserted the inadequacy of water fees collected from users to cover all costs of O and M. They indicated existence of poor O and M system once the scheme has encountered non-functional or other problem due to lack of spare parts whenever need and even if it was rarely available from private sectors, the spare parts are very expensive and unaffordable. In addition, some of the beneficiaries did not pay regularly or at all for the service especially during the wet seasons as they are accessible to alternative sources as well as during the dry season especially months between March-May when the water discharge of their scheme significantly decline and even dries up in some cases.

The results of key informant interview held with Woreda Water, Mines and Energy Resources Development Office staffs revealed that even though there is an encouraging trend where the users are paying for the service, fees collected from users in general is not adequate to cover full costs of O and M including for major repairs. This is because spare parts are not easily available. Besides, weak or poor fee collection systems and its management by most of water, sanitation and hygiene committees where some of WaSHCOs have misused the water fees collected from beneficiaries. However, they strongly believed that fees generated from most of the schemes can cover costs of minor repairs. During interview, it was also indicated that some of the remotest kebeles (e.g. Dikul, and Jigda Sillassie) in the woreda did not yet pay for the water service they use but request the WWMERDO for repairs when the schemes encounter non functional. The implication here is that, inadequacy of fees collected from users to cover full costs of O and M are explained by absence of spare parts, poor or weak fee collection and poor management system, existence of alternative sources during wet seasons and inadequacy of the supply have discouraged the communities to pay regularly for the service.

From the findings above, it can be concluded that fees collected from users are not adequate to meet the full costs of O and M, which in turn negatively affect sustainability of water supply schemes in the study area. In line with this finding, study by Devis et al., (1993) clearly stated failure to adequately cover the costs of improved water supply services in developing countries has been identified as the major constraint to achieve the goal of safe water and sanitation for all on sustainable basis. To indicate the lion share of covering costs of O and M to achieve sustainability, they further stated that sustainability of water supply schemes can only be successful if community members are able to meet the costs of O and M. However, ODI (2004) indicated existence of dilemma over ensuring availability of adequate community funds to cover water point maintenance cost, as people are often reluctant to contribute towards the maintenance of a water point when the it is working ('why do you need maintenance money, it is working alright?') but are equally reluctant to contribute towards the maintenance of the water point when it break down ('why should I pay, it is not working and I am not getting any water?').

With regard to the fees collected from users being misused by some members of WaSHCOs which in turn limited availability of fees to chemically treat their water supply which was non

functional due poor water quality(bad smells); a woman one of the members of Water, Sanitation and Hygiene committee and local technician from Kuttir -2 kebele stated:

The fees contributed by users for operation and maintenance have been used by the former chair person of the Water, sanitation and hygiene committee (i.e.450 ETB) as well as acting as kebele administrator now. We have saved 368 ETB in woreda micro finance institution. As it can be seen, our water supply scheme has been non-functional since the last 6 months because of poor water quality (i.e. bad smells). Despite all the efforts I made to make the scheme functional by reporting to the woreda water, Mines and Energy Resources Development Office the procedure requires passing through the chair person of the kebele and he preferred to keep silent. The government/Woreda Water, Mines and Energy Resources Development Office knows the existence of the problem, but never had visited our scheme and made an effort to take the necessary measures. Now I and my villagers are forced to get water from traditional sources that affect our health because we have no any options.

4.8.4 Environmental Related Problems

4.8.4.1 Adequacy of Water Supply

Increasing the quantity of water that is available and bringing the water closer to the point of use can help productive activities.

The respondents were asked about adequacy of their water supply for users. The survey result revealed that majority 195 (90.3%) of the respondents replied inadequacy of water supply while the remaining 21 (9.7%) indicated its adequacy. Majority of participants in FGD held with WaSHCO and women's also indicated inadequacy of their water supply and even dries up during the dry season due to shallow depths of their schemes which is mainly constructed during the wet season ('kiremt'). The depth of visited HDWs ranges from 8-15 meters while SWs are reported to have depths of 42-45 meters. Interviewees from Woreda Water , Mines and Energy Resources Development Office also indicated low yielding of the supply and even dry ups of the developed schemes are increasing from time to time in the woreda. The implication here is that the supply is

not adequate due to low ground water resource potential probably as the woreda is located in the low land.

In addition to the above environmental related problem, data obtained from respective WaSHCO and Woreda Water, Mines and Energy Resources Development Office shows all sample selected schemes were serving more HHs than what was recommended by RWMERDB and WWMERDO which limited the adequacy of the supply for users. Similarly, it has been observed that most of functioning schemes are pumped the whole day by users and children, which without any doubt damages the physical state and even significantly reduce the yield of the well as it has no time for recharge as well as wastage of water during fetching where all affect sustainability as it affects the yield.

Regarding the problem of water supply inadequacy and the bulk of burden imposed on women's, one of the participants of FGD held with women's in Dikul kebele, who is beneficiaries of shallow well stated:

When the scheme was installed in 2002 E.C, we have been told that the shallow well's water supply is adequate and reliable, so that we (women's) will never suffer more again as previous. If there is adequate and reliable water supply from our developed scheme, why should we suffer to travel such long distances to sand dug wells from river. Now the supply of our shallow well is not more than 7-15 Jericans per day and those who came first mainly communities closer to the scheme would get it. Because of this reason, we are facing many problems like heavy burden we have to carry and face related problems mainly headaches, pains and exhaustions due to distances. So can we say that there is adequate and reliable water?

During the field visit, I was able to observe beneficiaries of water from developed source (i.e. HDW in Eddida 'got') are getting water for domestic purpose by traveling long distances and carrying heavy loads from sand dug wells of Abatachine river as the supply from their developed sources was inadequate as shown in the figures below.



Fig.7. A woman in Genete Mariame ‘got’ carrying drinking water from river sand dug well



Fig 8. Low yielding Shallow Well in Edida got.

4.8.4.2 Water Quality Problem

One of the important aims of providing water supply programs is to improve the health of the communities by providing clean water that can in turn contribute productivity of communities as compared to traditional water sources. Therefore, if implemented water supply scheme is expected to be used by intended beneficiaries, the quality of water has to be acceptable by users and/or better than their traditional water sources. If the water supply scheme is not used and the benefits from that scheme do not last, the water supply scheme can be said non-functional or not sustainable.

Regarding the non functionality of their water supply schemes due to poor water quality and related problems women's are facing, 38 years old woman, one of the former beneficiaries of HDW in Edida no1 'got' of Eddida kebele has stated:

When the system was installed, women's were very happy because of our access to clean water as well as its closeness to our home as compared to our traditional sources. I would never expect our water supply scheme face a problem or non functionality. After serving for about one and half years, it is now malfunctioning since the last eight months and even other developed water supply schemes near our village are also not functional. The problem of our scheme is that the water smells badly because some dead bodies have gone in to the water of the scheme through the crack and we have seen hairs in the water. Since then, we turned back to our former sources where we get drinking water in a small hand dug wells from river. I usually go to that source on average 3 to 4 times per a day for domestic purpose. I know that our traditional sources have also quality problem but we don't have any options. As a result of this, children are suffering from water born diseases like diarrhea and others. In addition, there is no grain mail in our kebele so we forced to travel long distances more than 10 kms to Genete Mariametown. Moreover, we are responsible for all domestic works, take care of children and also participate in productive sectors (like farming). As a result of all these workloads, I have no any time to take rest and the only time of my rest is during my short sleeping night that ranges from 5-7 hours.

The implications of the above discussions show women's are the most vulnerable to problems related to water supply when their water supply schemes face non functional or the supply is inadequate. A woman's saying is related to the finding of Davis et al., (1993:22). They stated in SSA the collection and carrying of water and fuel wood over considerable distance can result in women's having only a few hours' sleep a night in the dry season.

4.8.5 Nature of Institutional Supports given to Community and Coordination among Stakeholders

4.8.5 .1 Nature of Institutional Supports given to Communities in Managing Water Supply Schemes

If communities are expected to manage their water supply schemes successfully, support from external body especially from government part (i.e. Regional Water, Mines and Energy Resources Development Bureau, Zonal WMERD office, Woreda Water, Mines and Energy Resources Development Office and Kebele level water experts) should be given to communities. Support from NGOs is also critical in sustaining the functionality of rural water supplies. Such supports may include providing adequate training on financial management, O and M procedures, carrying out O and M activities which are beyond the financial and technical capacities of the community, providing spare parts to communities and/or ensuring its availability, follow-up of the activities carried out by WaSHCOs and equipping technicians with the necessary toolkits are the most important issues that should be given due emphasis by government and NGOs, because properly supported communities will have both the ability and willingness to manage their own water supply schemes.

In assessing the nature of institutional supports (both from government and NGOs) given to communities in managing their water supply systems properly, out of the total sample respondents 181 (83.7%) of them have indicated inadequacy of supports from both governmental and NGOs and only 35 (16.2%) of the sample respondents all from functional schemes reacted existence of adequate supports mainly from Woreda Water, Mines and Energy Resources Development Office and NGOs (i.e. Finn-WaSH BG).

Almost all FGD discussants expressed their grievance with regard to the issue of supports given to them on part of implementing agencies after once the schemes were handover to the communities. They were complaining the implementing agencies for their in adequacy of supports to communities and place all the burdens on the shoulder of WaSHCOs to manage and maintain their water supply systems sustainable without giving adequate and practical trainings on financial and technical aspects, ensuring availability and affordability of spare parts and/ or absence of spare part storage at all level, absence of working manual, follow-up of activities done by WaSHCOs etc. Majority of the discussants mentioned the above factors as the major inhabiting factors in sustaining the benefits from their developed water supply schemes. Almost all participants of FGD from non functional sites identified such factors as a major reasons that lead their scheme to non functionality as well as failure to maintain the schemes once non functional. However, some of the participants in FGD also indicated as the Woreda Water, Mines and Energy Resources Development Office provides spare parts when ever available and carry out repairs freely.

Key informant interviewees from government officials also believed about the inadequate supports they provide to rural communities because of the resource limitations they have. However, they indicated that they provide supports like: provision of spare parts when ever available, carry out major repairs when it was beyond the technical capacities of the local technicians, and provide trainings and supports to the committees whenever resources are available.

The weak or inadequate supports from implementing agencies to communities was evidenced by the researcher during the time of survey where all sample non-functional water supply schemes were in state of disrepair for long period (more than 6 months each until the time of survey) once the scheme has experienced heavy break downs. In addition, one HDW in Edida kebele which was not functional due to poor water quality is not also chemically treated. As a result, significant numbers of people are forced to use water for domestic purpose from traditional sources. The communities were unable to maintain the systems as the problems were beyond their technical and financial capacity.

A conclusion one can draw from the above discussions is that, inadequate supports to rural communities has been one of the major threats in sustaining the proper functionality of the developed water supply schemes as all burdens are imposed on communities to manage their water supply systems properly including carrying out O and M, while it was evident that most of the rural communities lack skills and basic trainings that required to manage their schemes.

Generally, the study found that the institutional supports in RWS are not adequate in Mandura Woreda. The finding above is in line with the recommendation given by Carter and Rwanwanja (2006). They stated ongoing support is crucial, noting lasts without follow-up support “keeping the fire burning”. Similarly, Musonda (2004:129) referring studies by Brikke et al., (1995) stated sustainability of water supply facilities can only be achieved if there is partnership between communities and water supply agencies as communities will always need external support due to their limited technical and financial capacity.

1. Problems Faced by Mandura Woreda Water, Mines and Energy Resources Development Office in Supporting Sustainability of RWS Schemes

In BGRS, decentralization in the water sector has been started in 1996 E.C (2004). Prior to decentralization and establishment of Zonal WMERD office and WWMERDO, development and management of RWS systems has been done by Regional Water, Mines and Energy Resources Development Bureau. As a result of decentralization in the water sector, duties and responsibilities to develop and manage RWS schemes have been given to the Woreda Water, Mines and Energy Resources Development Office. The roles of Regional Water, Mines and Energy Resources Development Bureau and Zonal offices are expected to provide supports to the Woreda Water, Mines and Energy Resources Development Office in terms of finance and technical including provision and ensuring availability of spare parts, carry out activities which are beyond the technical and financial capacities of the WWMERDO, providing them trainings to enhance their capacity to implement and properly support management of installed water supply schemes at woreda level.

In the present decentralization of the water sector, the WWMERDO is the closest level to provide support service to rural communities in managing their water supply systems. Because it is responsible for development of RWS schemes mainly HDWs and spring development, carry out maintenance works which are beyond the technical and financial capacities of the community, ensuring availability of spare parts at woreda level, follow-up activities of WaSHCO including providing them adequate and practical training on financial and technical management of water supply schemes. It is generally true that the institutional and administrative capacity of local governments in this case WWMERDO can influence success in water supply sectors either positively or negatively. To provide such supports or properly discharge its roles and responsibilities, the WWMERDO has to have qualified personnel, accessed to reasonable resources (finance and others). However, during the time of the survey, Mandura WWMERDO was found institutionally limited capacity. It is manifested in terms of the number of personnel and their qualification, financial and material availability and transport system available for the Office.

Despite limited institutional capacity of the WWMERDO, the office has made efforts in provision of spare parts when ever available, carry out major repairs when it was beyond the technical capacities of the local technicians, provide training for WaSHCOs and promoted community participations during water supply provisions .

Based on the above findings, limited institutional capacity of the Office is identified as one of the major problem to support water supply schemes sustainability in Mandura woreda. This finding confirms with conclusion made by Musonda (2004) referring studies conducted by Brikke et al (1995). They stated that although local governments are recommended to be suitable to handle RWS sector due to their proximity to rural communities, local governments are unable to successfully do so because they are overburdened, underfunded and have inadequate capacities. With regard to the limits of transportation on sustainability, Carter et al., (1999:10) recommended that to support sustainability of RWS schemes; appropriate forms of transport must be available.

4.8.5 .2 Nature of Coordination among Stakeholders Involved in Water Sector

There are different stakeholders dealing with the water sector in the region in general and in Mandura woreda in particular. These include RWMERDB, Zonal WMWRD office, WWMERDO and NGOs mainly Finn-WaSH BG Programe in Mandura woreda. The existing trend in implementation of RWS in the woreda is that, once the water supply scheme is developed by implementing agencies, it has been handed over to the users/communities and communities are the sole responsible body to manage their water supply schemes. However, literatures indicate the need of coordinated effort that should be made to achieve sustainability in water supply schemes because of the complexity and problems associated in managing water supply by the community alone or implementing agency.

The results of interviews held with stakeholders head in assessing the nature of coordination made among stakeholders to support the water sector in the study area is summarized as follows:

The RWMERDB did not adequately discharge its responsibilities in supporting the lower governments in terms of finance and the required technical support. Regarding its coordination with others, results of interview with the lower governments as well as NGOs indicate its inadequacy or week coordination. The result of interviews further revealed existence of relatively better coordination between WWMERDO and NGO. In general all interviewees indicated weak coordination of their staffs with zonal office.

Zonal WMERD office is a supportive staff whose mandates are mainly to provide technical supports to the WWMERDO, like carry out inventory works, water quality analysis and carrying out O and M which are beyond the capacity of WWMERDO. The office is not responsible to implement new water supply projects as they are mainly limited to the Regional Water, Mines and Energy Resources Development Bureau (for SWs) and WWDMERDO for implementing HDWs and springs. Interviewees from the Zonal office reported that no one of the stakeholders invite them in implementing water supply schemes and related activities like carrying out supervision, monitoring and evaluation of the projects. They stated, their office carries out

inventory works, water quality analysis and provide technical support based on the requests from RWMERDB and WWDs.

Interviewees from WWMERDO also complained for the inadequate supports both financial and technical given by the regional bureau and *zonal* office.

Majority of interviewed governmental officials and experts as well as NGOs reported existence of coordination problem amongst different actors at all level of the government offices to make water supply schemes sustainable. It was at all level reported, lack of continues monitoring, evaluation and supervision systems in the region due to weak coordination among stakeholders.

Generally, from the discussions above one can understand existence of weak coordination among stakeholders mainly from the government organizations; and NGOs have relatively better coordination with government bodies. The existence of week or inadequate coordination has a significant impact in hindering sustainability of water supply schemes as most of the schemes monitoring and supervisions during construction of schemes are weak that might lead to poor design of the system.

CHAPTER-FIVE

5. Conclusion and Recommendations

5.1 Conclusion

The survey made to assess factors undermining sustainability of rural water supply schemes in the study area identified a wide range of factors. In this sub section the major findings of the study are concluded in line with the basic questions of the study.

The findings of the study generally found that sustaining the proper functionality of water supply schemes in the study area is a major problem due to factors stated below:

The study found that communities have made significant contributions through provision of free labor and local construction materials during and post construction phases. However, their participation in implementation of water supply schemes is not fully addressed from the beginning where the intended beneficiaries were absent during planning including site and scheme type selections which might resulted in low sense of ownership.

In the study area it was encouraging to note that in all sites water supply schemes are managed by community through WaSHCOs who are responsible for overall management of the schemes. However, the study found that WaSHCOs were not capable of managing water supply schemes properly as they lack the skills and basic trainings on financial, technical and overall management of their schemes. In addition absence of working manuals, lack of backup support , lack of incentives as well as workloads of WaSHCOs are the major problems that limited WaSHCOs to properly manage their schemes.

The survey result revealed that most of water supply schemes are poorly managed by communities. The reasons are identified as low sense of ownership to the schemes by communities due to dissatisfaction with the water supply as most of the time the supply from their scheme was inadequate, failure of schemes to provide appropriate service and inadequate participation of communities as well as low awareness. In addition, inadequate trainings and supports from implementing agencies for communities have also contributed for poor managements of the schemes.

The study also indicated that communities have shown a good motivation in paying user fees. However, poor or weak fee collection and its management are one of the problems that limited adequacy of water fees to cover costs of O and M. The other reason for communities' inability to raise adequate user fees to purchase spare parts was because spare parts are expensive and even not available. The communities are mainly able to meet the costs of less expensive spare parts.

With regard to technical issues, one of the prospects for sustainability of water supply schemes in the study area was existence of local technicians in all sites who are responsible for technical management of the schemes. However, the study found that they were inadequately trained, lack technical skills to carry out all types of O and M as well as ill-equipped with the necessary tools.

The other major technical issue hindering sustainability of water supply scheme in the study area was difficulties of access to spare parts at all community, woreda and regional level. The study further found that none of the implementing agencies have ensured availability of spare parts to communities. In addition, there was no spare part stocking at all levels. The Regional Water, Mines and Energy Resources Development Bureau and WWMERDO failed to allocate budget for spare parts and no formal private spare part providers exist in the study area as well as at regional level.

The study found that once the schemes experienced heavy break down or any other non-functionality problems, the measures taken to repair and maintain the service was almost absent as most of the problems are beyond the financial and technical capacities of communities. The study proved that communities whose schemes are non functional failed to maintain their scheme.

The survey result has examined various reasons for schemes being out of operation. Poor O and M is the most important contributor and the cause can be traced back to number issues such as; a lack of sense of ownership among the users, a weak supportive system, difficult access to spare parts, a lack of trained people and toolkits as well as inability of communities to meet costs of O and M.

One of the prime reasons for failures of keeping water supply schemes sustainable was due to lack or weak support systems to the community in the part of implementing agencies after schemes are installed and handover to communities. Similarly weak coordination among stakeholders and absence of adequate monitoring, supervision and evaluations during construction of the schemes was found as reasons for poor construction quality and fault installations which affected sustainability water supply schemes and/or poor performance in the water sector.

The study also found that weak institutional capacity of the local government (WWMERDO) was one of a major challenge in supporting sustainability of water supply schemes in the study area. At woreda level, inadequate allocation of funds especially recurrent budget to the water sector, lack of full staffing in terms of human power as well as lack of transportation services are identified as the major factors restricted supports given to the community to maintain the proper functionality of the schemes as well as to repair the non-functional schemes.

Generally, the approaches in water supply in the study area focused on provision of new water supply schemes or running for coverage without giving due considerations for sustaining the installed water supply schemes. This was evidenced by none of the implementing agencies had made spare parts available for communities, allocated budget mainly recurrent budget as well as adequately prepared the community to manage their schemes. However, Finn-WaSH BG has recently started to adequately prepare the communities for overall management of the schemes with provision of trainings and closer follows-ups and supports in their intervention sites.

5.2 Recommendations

Unless the necessary measures have taken, the results of the household survey and field observations in to some of the developed water supply schemes indicates that sustaining existing water supply schemes in the study in the future would be one of the foreseeable bottlenecks. Therefore in light of major findings, the following recommendations are suggested.

1. Rehabilitation and maintenance of non-functional schemes; replacement of schemes that are beyond their design period and are not currently providing a service; construction of new schemes in areas where there is high demand for improved water and increasing the number of water points in schemes where there is high water demand but limited numbers of water points; and construction of water points at a reasonable distance to serve the majority of the users.
2. Improving community participations in the planning, site and scheme type selections is needed to enhance ownership of the communities to schemes.
3. If water supply schemes are to be managed properly by communities through WaSHCOs, providing adequate and practical trainings on financial and overall management of the schemes is crucial. In addition, legalizing the WaSHCOs, clearly defining their roles and responsibilities, developing working manuals, providing some incentives in the form of per diem during trainings will help in enhancing their ongoing capacity, motivation and commitment.
4. Regular follow-up and supervision of the WaSHCOs and schemes to prevent mismanagement and to check on scheme status.
5. To reduce communities' dependence on outside help for maintenance tasks, providing adequate and practical trainings on technical issues for local technicians is very important. In addition, equipping them with the necessary toolkits will significantly contribute in reducing poor maintenance systems in the study area.
6. Boosting communities' awareness on water supply schemes management through formal and informal education will help communities to take care of their schemes.
7. Developing a transparent and trusted system for collection and management of user contributions is particularly important in alleviating the mismanagement of finance that

also impacted on adequacy of user fees to cover costs of O and M and de-motivated users to pay fees regularly.

8. Minimizing the problem associated with unavailability of spare parts is very important. One way of alleviating the problem is through assessing mechanisms to find revolving funds for spare parts at least at regional level. If such funds are made available to purchase spare parts for communities; communities use water fees collected to purchase spare parts to make their water supply functional whenever breakage of the schemes that can in turn help to generate adequate fees to purchase spare parts. The other way of alleviating the problem is by promoting private sectors and/ or creating some form of cooperative either at woreda or regional level that can provide spare parts to the community at reasonable price with some incentives from part of government (example tax free).
9. Select appropriate technologies: Technologies must be chosen with due consideration for the management system that will oversee the operation, maintenance, repair, and financing of a facility. This point should be obvious but is too often overlooked.
10. Emphasize training to strengthen institutions at all levels; the training of key staff at all levels is essential because management skills are often in short supply. Training should employ adult education techniques, and the material should be presented in logical progression, rather than in single episodes, to facilitate retention. An in-house training capability within pertinent institutions should be considered as a project objective. Capacitating of the WaSHCOs through the provision of trainings and maintenance kits
11. If sustainability of water supply schemes has to be achieved, there is a need to have strong backup support at a district (woreda) level to support communities to manage their water supply schemes properly. Therefore, capacitating the WWMERDO with the necessary professionals, providing adequate trainings, allocating reasonable budget especially recurrent budget and arranging some form of transportation at least motor cycles has to be given due attention by concerned body.
12. With regard to weak coordination among stakeholders especially in the part of government, it is useful to review their roles and responsibilities with regard to water

supply schemes development and the necessary measures to be taken to sustain constructed water supply schemes.

13. Publicize project accomplishments to build support: Sustainability requires the continued support of all stakeholders. Briefing them periodically and showcasing project successes at opportune times is an important strategy. Identifying which stakeholders are critical for support after the project is completed and donor inputs are withdrawn is a necessary step.
14. Moreover, further research is needed to assess the detail impacts of community, financial, technical, legal and institutional as well as environmental factors affecting sustainability of water supply schemes in the study area.

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Annexes

Annex 1: Percentage of sanitation coverage in Ethiopia by region in 2004

No	Region	Rural	Urban	Total
1	Amhara	5.52	66.76	12.40
2	Oromya	16.94	81.84	24.93
3	Southern Nations and Nationalities People(SNNP)	54.59	85.23	57.27
4	Tigray	6.15	67.55	18.95
5	Afar	3.95	44.60	21.16
6	Somali	1.94	78.16	26.04
7	Benishangul Gumuz	26.35	82.72	33.91
8	Harare	6.34	88.61	55.98
9	Gambella	21.35	76.63	28.33
10	Dire Dawa	7.17	93.22	68.11
11	Addis Ababa	17.79	92.09	91.25
	National	21.34	77.68	30.63

Source: MoWR, 2009

Annex 2. List of kebeles in Mandura woreda

No	Name of <i>kebeles</i>				
1	Gumade	9	Babissa	17	Gilgel Beles 01
2	Wudit	10	Duhanzibaguna	18	Gilgel Beles 02
3	Datch Lumbiya	11	Ajenta	19	Gilgel Beles 02 Zuria
4	Dabuh Georgise	12	Tuni Dadush	20	Gidim Dafil
5	Duha Gubash	13	Foto manjare	21	Sah Dah
6	Duha Maksegnite	14	Jigda sillassie		
7	Dikul	15	Kuttir -2		
8	Bahus	16	Genete Mariyam		

Source: Mandura Woreda Woreda Water, Mines and Energy Resources Development Office 2012

Annex 3. List of water supply schemes in the sample kebeles by type, status and year of construction

S.N O	Name of the Kebele	Site Name	Types of schemes	Year of Construction in E.C	Constructed by	Distance from the center in KM	No of beneficiary	Functionality		GPS reading		Elevation	Remark
								Functional	Non functional	X	Y		
1.	Kuttir -2	Merkato Sefer	HDW	1998	CVM	10.5	-		✓	0215756	1230333	1251	
	"	Gambuh	HDW/Indian markll/	1998	CISP	10.4	-		✓	0215886	1230162	1262	
	"	Kazima	HDW	1998	CISP	13	-		✓	0217601	1229961	1327	
	"	Abadebasu sefer No.1	HDW	1990	CISP	12	-		✓	0217464	1229214	1331	
	"	No.2	HDW	1992	Catholic	11.5	-		✓	0217561	1229315	1341	
2.	Jigda Sillassie	Tarekegn sefer	HDW	1998	CISP	17	-		✓	0220962	1225047	1467	
3.	Genete Mariyam	Maksima sefer	HDW	1987	Gov.t	13	-		✓	0218679	1227694	1407	
		Around school	HDW	1987	Gov.t	13	-		✓	0218595	1227793	1405	
	>>	Ayikuhita	DW with motorized Dis.n	-		15	-		✓				
4.	Gilgel Beles 01	Meskel Adebabay	HDW	1994	Gov.t	1	-		✓	0209884	1235019	1021	
5.	Gilgel Beles 02	Around wereda office	HDW	1996	Gov.t	1.1	-	-	✓	0209607	1234050	1032	
	>>	Around Dibate road	HDW	1999	Gov.t	0.7	-	-	✓	0209274	1234181	1019	
6.	Dafili	Abbasubalew sefer	HDW	2001	Finn-wash	15	140	✓		0219745	1228778	1364	
	>>	Kumba No.1	HDW	2003	Finn-wash	15.8	155	✓		0219959	1229196	1379	
	>>	Kumba No.2	HDW	2003	Finn-wash	16	150	✓		0220139	1229053	1306	
7.	Tuni Dadush	Tuni No.1	HDW		Catholic	34	-		✓	0200531	1209124	1150	
	>>	School	Rian roof catchment	2002	Finn-wash	34	student	-	✓				
8.	Dikul	Gitsa	HDW	2002	Finn-wash	18	-	✓		0209854	1225720	1155	
	>>	Desanba School	HDW	2002	Finn-wash	18	-	✓		0209816	1225885	1066	
	>>	school	HDW	2003	Finn-wash	20	Students	✓					
	>>	Bizrakane	HDW	2003	Finn-wash	31	178	✓		0211637	1212993	1218	

Source: Madura Water, Mines and Energy Resources Development Office (2012).

Annex 4. Annex 4. List of selected kebeles and some information about studied sample schemes

S.N O	Name of the Kebele	Site Name	Types of schemes	Year of Construction in E.C	Constructed by	Distance from the center in KM	No of beneficiary	Functionality		GPS reading		Elevation	Remark
								Functional	Non functional	X	Y		
1.	Kuttir -2	Merkato Sefer	HDW	1998	CVM	10.5	-		✓	0215756	1230333	1251	
	"	Gambuh	HDW/Indian markll/	1998	CISP	10.4	-		✓	0215886	1230162	1262	
2.	Jigda Sillassie	Tarekegn sefer	HDW	1998	CISP	17	-		✓	0220962	1225047	1467	
3.	Genete Mariyam	Maksima sefer	HDW	1987	Gov.t	13	-		✓	0218679	1227694	1407	
4.	Gilgel Beles 01	Meskel Adebabaye	HDW	1994	Gov.t	1	-		✓	0209884	1235019	1021	
5.	Gilgel Beles 02	Around wereda office	HDW	1996	Gov.t	1.1	-	-	✓	0209607	1234050	1032	
6.	Dafili	Abbasubalew sefer	HDW	2001	Finn-wash	15	140	✓		0219745	1228778	1364	
7.	Tuni Dadush	Tuni No.1	HDW		Catholic	34	-		✓	0200531	1209124	1150	
8.	Dikul	Gitsa	HDW	2002	Finn-wash	18	-	✓		0209854	1225720	1155	
	>>	Desanba School	HDW	2002	Finn-wash	18	-	✓		0209816	1225885	1066	
	>>	school	HDW	2003	Finn-wash	20	Students	✓					

Source: Madura Water, Mines and Energy Resources Development Office (2012)

Note: F means functional during the time of survey and NF to mean non functional

Annex 5. Pictures of focus group discussions held with WaSHCOs (Water, Sanitation and Hygiene Committees)



Annex 6. Proposal submitted to Indira Gandhi National Open University (IGNOU) Department of Rural Development In Partial Fulfillment for the Degree of Master of Arts (MA Degree in Rural Development)

Indira Gandhi National Open University (IGNOU) Graduate Program

Impact of technical and institutional issues on the sustainability of rural water supply: The case of Mandura Woreda, Benishangul Gumuz Region, Ethiopia

By
Berhane kidane weldeyouhannes

Proposal submitted to Indira Gandhi National Open University (IGNOU)
Department of Rural Development In Partial Fulfillment for the Degree of Master
of Arts (MA Degree in Rural Development)

April 11, 2012

Addis Ababa

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Name of Study Centre: Addis Ababa

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Title of the Project:

Impact of technical and institutional issues on the sustainability of rural water supply: The case of Mandura Woreda, Benishangul Gumuz Region, Ethiopia

Signature of the Student: _____

Approved/Not Approved

Date: April 11, 2012

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List of Acronyms

BGRS	Benishangul Gumuz Regional State
BoFED	Bureau of Finance and Economic Development
BoWMERD	Bureau of Water, Mineral and Energy Resource Development
CSA	Central Statistical Authority
E.C	Ethiopian Calendar
ETB	Ethiopian Birr
FGD	Focus Group Discussion
HDW	Hand Dug Well
HH	House Hold
MoWR	Ministry of Water Resource
NGO	Non-Governmental Organization
O and M	Operation and Maintenance
PS	Protected Spring
RWS	Rural Water Supply
SPSS	Statistical Packages for Social Scientists
SW	Shallow Well
WaSHCO	Water, Sanitation and Hygiene Committee members
WHO	World Health Organization
WoFED	Woreda office of Finance and Economic Development
WSDP	Water Sector Development Program
WSP	Water Supply and Sanitation Program
WWMERDO	Woreda Water, Mines and Energy Resources Development Office
ZoWMERDO	Zonal office of Water, Mines, Energy and Resource Development Office

1. Introduction

1.1 Background

Water is one of the basic necessities for human survival and socio-economic development. It is used for a number of purposes (i.e. for domestic, agricultural, industrial and other socio-economic activities). Access to safe water and adequate sanitation is a universal need and basic human right. Desalegn (1999) stated that access to adequate and clean water will greatly contribute to improved health and productivity. On the other hand, Kiongo (2005) stated an insufficient access to water is not only bad for health, but also contributes to a poor food security and a lagging social development. Women's and girls' bear heavy burdens in providing water for their families and conflict over water are increasing at local, regional and international levels. The poor are particularly vulnerable to water scarcity, pollution and flooding.

Safe drinking water and basic sanitation is of crucial importance to the preservation of human health, especially among children. Water related diseases are the most common cause of illness and death among the poor of developing countries. According to World Health Organization (WHO), 1.6 million deaths of children per year can be attributed to unsafe water, poor sanitation and lack of hygiene (World Water Council, 2005).

Despite benefits of access to safe water stated above, many countries in the world currently suffered from shortage of safe drinking water and the case is aggravated more in developing countries including Ethiopia.

There are about 1.1 billion people across the world that do not access to safe drinking water. Many of these people live in rural areas and are the poorest and most vulnerable. In Sub-Saharan Africa (SSA), 300 million people, approximately 80 % live in rural areas; have no access to safe water supplies (<http://www.idh.org/news/2006/IAH.rural.pdf>).

The Millennium Development Goal (MDG) for water and sanitation is to reduce by half, the proportion of people who do not have sustainable access to safe drinking water and sanitation by 2015. This means that coverage has to be increased dramatically. It is not only coverage that needs to be increased but also sustainability of implemented water and sanitation services indefinitely (Plan Ethiopia, 2006).

In Ethiopia where the majority of the population (about 85%) live in rural areas, millions of people (about 39.529 million) are facing problems of obtaining adequate potable water supply in 2006 (MoWR,2006:33). Similarly, in Benishangul Gumuz Regional State (BGRS) thousands of people (more than 339,000) still suffered from access to safe water supply in the year 2007

(BoWMERD,2007:3). Regarding the problem, Desalegn (1999) stated that in addition to limited provision of water supply, there has been a strong urban bias in water supply programs and the rural areas have suffered more as a result.

By realizing the importance of supplying safe drinking water to the community, government at different level, non-governmental organizations (NGOs) and donors invest a lot of capital every year in developing countries including Ethiopia in general and in BGRS in particular to tackle the problem through construction of new water supply projects. However, water supply schemes alone would not contribute for communities in rural areas to reduced water access problems. The issue of functionality, utilization by intended beneficiaries and continuity of water supply schemes to serve for long period are very important issues to be considered.

1.2 Statement of the Problem

The provision of safe and adequate water is becoming a critical issue for rural dwellers without which life will be difficult, but it is often lacking in most of developing counties including Ethiopia in general and in BGRS in particular even if sufficient water resources are available.

In BGRS, about 53.01% of the total population (23.8% of the urban and 58.64% of the rural) population still suffered from access to safe water supply in the year 2007 (BoWMERD,2007:3). Similarly, data from Mandura Water, Mines and Energy Resources Development Office (MWMERDO) and Finn-WaSH BG Program (2007) showed that about 40% of the total population in the woreda (50% in town and 38% in rural) were having access to safe water supply in 2007. Hence, 60% of the total population (50% of the town and 62% of the rural) did not have access to safe water supplies. This shows that much is still remaining to attain the full coverage of this basic service for the people of BGRS in general and rural areas of Mandura woreda in particular. The stated coverage in the study area was achieved due to heavily involvement of NGOs mainly Finn-WaSH BG Program in the water supply development in the woreda since 2009.

In addition to limited provision of new water supply schemes in each year in Mandura woreda, sustainability of installed water supply schemes have been found crucial in ensuring the supply and maintaining the service. Most of rural water supply schemes constructed in the woreda in general and in rural areas in particular that have contributed for service coverage are also poorly managed and significant number of water supply schemes are malfunctioning. As a result of these, the number of people having access to safe water has declined and those without access to safe water depend on surface water sources such as unprotected springs, rivers, streams, hand dug wells and others.

With regard to unsustainable water supply schemes and their impacts to achieve the goal of safe water supply for all on sustainable basis, Davis and Brikke (1995) referring to WHO estimated 30-60% of existing water supply schemes in developing countries are not operational.

Regarding the non-functionality of rural water supply (RWS) schemes in BGRS, data from MoWR (2006:30) showed that about 30% of the schemes were non-functional. Available data also revealed that out of 125 RWS schemes surveyed in the region, 67 % of schemes were not-functional (MoWR, 2003).

Even though data is lacking on current status of the existing water supply schemes in Mandura woreda due to absence of inventory works, data from Finn-WaSH BG Program (2004:39) indicates that about 44% of water supply schemes in Mandura woreda have been non-functional in the year 2003 and the second quarter of 2004. The baseline survey conducted by Efficient Desalegne, Berhane and Friends WaSH Consultancy Partners (2011) showed out of 39 water supply systems exist in the woreda 6 (15.4%) of them were non-functional, where as 29 (74.4%) of them require minor repair works during the survey time. The survey team also identified that most of the functioning schemes were poorly managed and exposed to surface contamination; water user committee exist for most of the schemes but they were no more effective to properly discharge their responsibility.

Studies conducted by individuals and organizations in the region in water sector mainly focused on urban water supply systems. The researches' conducted by Assefa (2006) focused on urban water supply systems the case of Assosa town and BIK (2003) focused on urban water supply tariff setting and institutional capacity building (WAE,2004).

Study on sustainability of RWS schemes in the region in general and in Mandura woreda in particular were not adequate. Many RWS schemes were failing and the schemes are not sustainable. Thus, the number of people having access to safe water has reduced. Therefore, this study intended to identify the causes for failing of Rural Water supply in Mandura woreda of BGRS.

1.3 Significance of the Study

- The research will contribute to the better understanding of problems and factors related to sustainable rural water supply.
- The study will serve as reference for those working in the planning and design works of rural water supply and sanitation projects.
- The lessons draw from such study may contribute to current efforts by governments and NGOs to find better policy options to address the problem of sustainability in rural water supply schemes that contribute for better service coverage.

- It may initiate a more comprehensive investigation to a greater understanding of the issues related to sustainability in the rural water supply scene.

1.4 Hypothesis and Research question

The hypothesis framed for this study is as follow: technical and institutional issues do have impact on the sustainability of rural Water supply.

The study has attempted to address the following research questions:

- What is the impact of the technical issue on sustainability of rural water supply
- What is the impact of the institutional issue on sustainability of rural water supply

1.5 Objective of the study

1.5.1 General objectives

The general objective of this research is to assess the impact of technical and institutional issues on sustainability of Water supply systems in Mandura woreda.

1.5.2 Specific objectives

- To assess the impact of technical issues on sustainability of rural water supply
- To examine the impact of institutional issues on sustainability of rural water supply systems

1.6 Scope and Limitation of the study

The focus of this study is on rural water supply projects constructed in the rural part of Mandura woreda. It has a primary focus on community-managed projects, where water systems are once erected, owned and administered collectively.

The limitations of the study are the following:-

- Absence of well documented and consistent data about water supply schemes status and related issues at woreda as well as at regional level.

- Since the study area is located in the rural part of the woreda, transport difficulty will be encountered as a limitation in undertaking the research as the researcher frequently go field in different sites.

2. Literature review

Research has shown that rural water supplies in sub-Saharan Africa, particularly those relying on hand pumps; often demonstrate low levels of sustainability. The key causes for this include inappropriate policy or legislation; insufficient institutional support; unsustainable financing mechanisms; ineffective management systems; and lack of technical backstopping. The problem will only be solved by adopting a holistic approach to planning and implementation rather than focusing on one issue (Niyi et.al, 2007).

The determinant factors for the sustainability of rural water supply systems are categorized in to two main categories. These are pre implementation factors and post implementation factors. Community participation, technology selection, site selection, demand responsiveness, construction quality, population and training are some of the pre-implementation factors. And post-implementation factors are technical support, community satisfaction, institutional and financial management, training and willingness to sustain the water project (Gebrehiwot, 2006).

One of the pre implementation factors for rural water supply systems is demand responsive approach. In this context ‘demand’ is defined as the quantity and quality of water, where community members will choose to consume at a given price (Gizachew, 2005). In a demand responsive approach, beneficiaries should feel the need for safe drinking water supply, in order to identify safe drinking water supply projects. Water projects are more or less demand responsive to the degree that beneficiaries make choices and carry out resources in support of their choices (Gebrehiwot, 2006). If there is willingness in the community to provide valued resources in the exchange for 8 services then these community members valued the service. As a result demand for supply of water will facilitate the management of the water supply system and it enhances the rate of sustainability of the water supply system (Gizachew, 2005).

In the last three decades, literature in the water supply sector has shown that sustainability of rural water supply structures has become positively associated with small-scale initiatives, which maintain public participation (Davis and Liyer, 2002). Involving the users in the planning, implementation, operation, protection and maintenance of water supply systems meaningfully is the key to sustainability. Community members’ contributions might take the form of money, labor, material, equipment, or participation in project-related decision-making and meetings (Davis and Liyer, 2002).

Over the past three decades, experience has shown that water and sanitation activities are most effective and sustainable when they adopt a participatory approach that acts in response to genuine demand, builds capacity for operation and maintenance and sharing of costs, involve community members directly in all key decisions, develop a sense of communal ownership of the project, and uses appropriate technology that can be maintained at the village level. Also

important are educational and participatory efforts to change behavioral practices (USAID, 2009).

The human body's basic water requirement depends on climate, work load and environmental factors. If the work load is high and the season is dry the family use large amount of water per day, whereas the family size increases the amount of water consumed by one person per day decreases relative to the one that small number of family sizes. However, Gleick (2006) defined the minimum requirement for human body and found that it is between 3 and 10 liters per day. The amount of water needed for other purposes, including cooking or hygiene, is more variable and depends on cultural habits, socio economic factors and types of water supply in terms of quantity, quality and availability. Gleick (2006) stated that the international acceptable standards for water requirements for basic needs, commonly referred to as basic water requirement (BWR). BWR is defined as water requirement in terms of quantity and quality for the four basic needs of drinking water, human hygiene, sanitation service and modest household needs. This standard is defined by WHO guide line as 20 liters per capita per day (Admassu et. al, 2002). When springs are used for multiple purposes such as domestic use, livestock watering, irrigation and tanker supply, care should be taken to prevent contamination of water used for human consumption (Muthusi et.al. 2007). Relative to hand dug wells natural or developed springs is easily contaminated by different contaminant agents.

The effective operation and maintenance (O & M) of rural water supply systems is crucial element for the sustainability of the water project. The community management of rural water supply systems on operation and maintenance (O & M) is not successful, if financing resources are not available and frequent supports are not provided (Binder, 2008). Budgeting sufficient funding for rural water supply systems is an important issue for sustainability and proper maintenance but not only one. Binder (2008) stated that "increasing the budget allocation for rural water supply systems is very important, but that is not the only thing to meet the challenges of achieving the Millennium Development Goals (MDGs)." Enhancing the capacity of the operators' related to the choice of appropriate institutional management is also mandatory to achieve the Millennium Development Goals (MDGs).

3. Methodology

3.1 Description of the study

The study shall be conducted in Benishangul Gumuz Regional State; Metekele Zone in one of the seven woredas which is called Mandura woreda. The woreda is located in the north western part of the region with an altitude ranging from around 1500 to below 1000 m.a.s.l. The terrain of the majority of the woreda is undulating in the north eastern direction and the slope gets gentle and becomes flat in the south western part of the woreda.

Mandura woreda is more mountainous and rolling as compared to the other woredas. Only seasonal streams drain from the eastern watershed to the west and southwest. There is high

topographic drop in westwards. The size of the flat plain area is small as compared with the Pawi worda. Gilgel Beles River passes through the worda capital (Gilgel Beles).

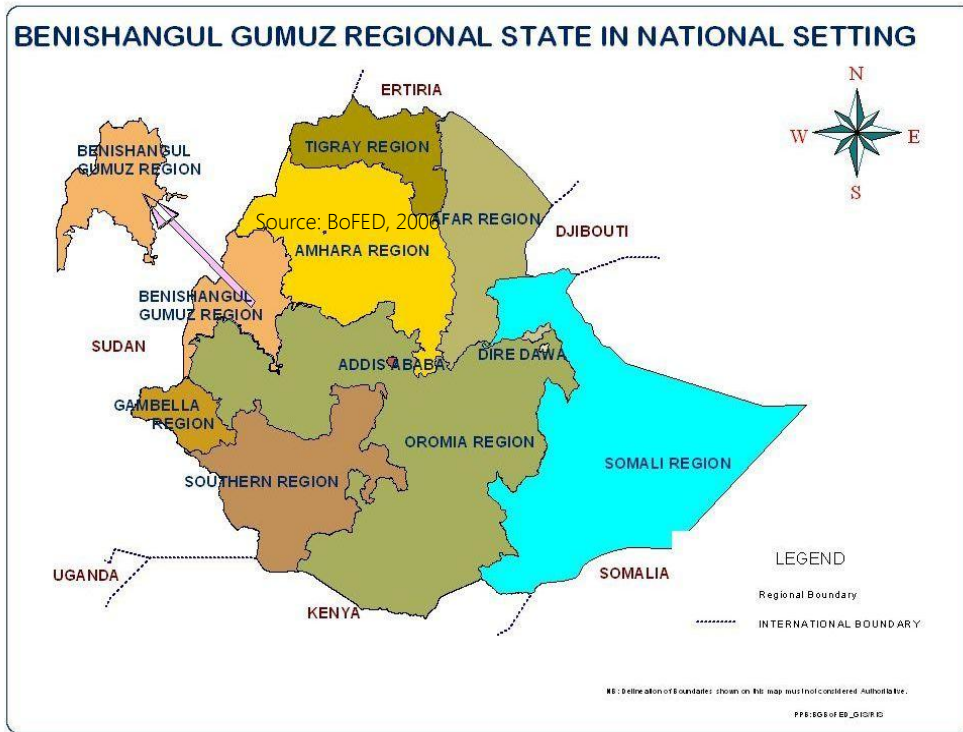
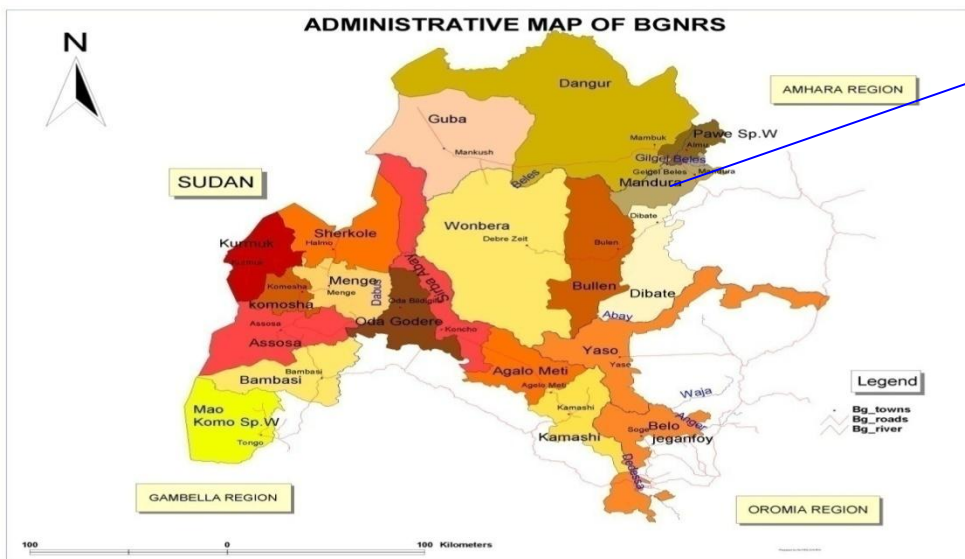


Fig.1: Location of the study BGRS



Reason for choosing this area for investigation: - rural water supply facilities were not sustainable in Metekele Zone and failing at high rate after huge resources investment. This has created a continuous water shortage and access to safe water has reduced significantly in the area. In other terminology the study is selected purposively.

3.2 Research Design and sampling method

3.2.1 Research Design

Nest design will be used to study the sustainability of water sources in the rural setting of Mandura woreda

3.2.2 Sampling method

3.2.2.1 Selection of Sample Kebeles

In Mandura Woreda, there are about 21 kebeles. Out of the total 21 rural kebeles, in 20 kebeles Finn-WaSH BG Program has significantly involved in provision of water supply and sanitation from the time of 2009/10-2001/12. 8 kebeles will be selected using purposive sampling method.

3.2.2.2 Selection of Sample Water Supply Schemes

As per data obtained from Mandura WMERDO Head, the total number of protected water supply schemes in the woreda at the end of 2003 E.C were 147 (111 Hand Dug Well (HDW), 26 Shallow Well (SW), 1 Deep Well (DW) and 9 Protected Spring (PS).

List of the 21 water supply schemes (16 HDWs, 4 SWs and 1 PS) found in the eight selected kebeles will be obtained from WWD staff. Of the total water supply schemes exist in the selected sample kebeles, 11 (4 functional and 7 non-functional) schemes, which are managed by the community, will be selected purposively.

The reason for selection of non-functional schemes is to know major problem for scheme failure, measures taken by communities and implementing agencies to sustain the service.

8.3.4 Selection of Sample Households and Determination of Sample Size

According to Regional Water, Mines and Energy Resources Development Bureau as well as Mandura Woreda Water, Mines and Energy Resources Development Office the average number of people or HH beneficiaries expected to be served by protected HDW are 50 HHs (250 people), SW and PS 70 HHs (350 People) each and Deep Well (3000-4000 people). However, as lists of HH beneficiaries obtained from the respective water committees of the selected sample schemes which also served as a sampling frame reveals more than average or standards set by the local governments. From a total of HH beneficiaries of each sample scheme, 30% of them (216 HH beneficiaries) will be used as study units. Due to homogeneity of the sample population in

terms of socio-economic, cultural-setting and residing within similar agro-ecology a systematic random sampling is found as an appropriate to select sample from each scheme.

For FGD purposively 3 water, sanitation and hygiene committees (2 from functional and 2 from non functional scheme, and the third from water, sanitation and hygiene committee's members which were serving for both functional and non functional schemes) whose members comprising 5-7 will be contacted for discussion. This will be done with the intention that water, sanitation and hygiene committee members have better information on sustaining the functionality of the schemes and related issues.

Similarly, two women groups will also be purposively selected for discussions as women's are the principal users of water and associated with water problems. In addition, 8 key informant interviewees shall be purposively selected from water implementing agencies at different level (3 from regional water bureau, 2 from zonal water staff, 2 from Mandura WWD and 1 from NGO (i.e. Finn-WaSH BG). This is to get pertinent information related to institutional issues.

3.3 Data collection tools and procedures

Techniques used to collect primary data's that would meet the research objectives will be HH survey, FGD, Key informant interview, field visit/observation and secondary data.

Household Survey: Closed and open ended structured questionnaires will be prepared to generate the required information from the sample HHs. the structured questionnaires prepared in English will be translated into Amharic. Prior to the actual data collection thorough structured interviews, the developed structured questionnaires will be pre-tested to ensure the validity and clarity of the questionnaires.

To carry out structured interview, 5 enumerators will be recruited and trained for one day.

FGD: The primary data collected from the sample HHs will be enriched by additional information gathered through FGD. Accordingly, with the help of checklists/unstructured questionnaires, discussions will be held with water, sanitation and hygiene committees and selected women's. Discussions will be mainly made on different issues that are related to water supply management and related problems undermining sustainability of their schemes and/or reasons for failure of their schemes to provide service as well as associated problems women's are facing.

Key Informant Interviews: A key informant interview will be particularly important in getting information pertinent to the institutional aspects of water supply sector. Hence, views of water supply agencies (heads and experts) will be very important as they have a better knowledge and experience on problems and prospects of RWS issues. To obtain the views of key informant interviewees, checklists will be prepared and information will be collected through unstructured interview.

Filed visit and observations/visit: - To understand the realities of the water supply system field visits will be conducted.

Secondary data: Secondary data will also be collected to complement the primary data. The major sources of secondary data source shall be from Government and NGOs publications, non-published documents, annual reports, archives, books, Websites, project documents such as proposals, WaSH baseline survey, Plans, monitoring and evaluation reports, rural water statistics abstracts, kebele level data, minutes and related sources shall be employed as a secondary sources.

The collected data involves both the qualitative and quantitative data. The quantitative data mainly employed data obtained from HH survey while qualitative data employed FGD, key informant interviews and personal observation. .

3.4 Data analysis method

Both quantitative and qualitative methods of data analysis will be used. The primarily data collected from HH survey will be organized, categorized based on the nature of data and coded. The survey data will be analyzed using statistical packages for social scientists (SPSS) software version 13.0. Descriptive statistics such as percentage, ratio, frequency and cross tabulations shall be used to quantitatively analyze the data. On the other hand, qualitative data obtained from key informant interviews, FGD and personal observations will be analyzed qualitatively to strengthen data obtained from HH survey.

4. Work plan

The research is planned to be implemented as per the following time Frame

No.	Research Activities	Time Frame
1.	Field work on data collection	May - June /2012 (a month)
2.	Data clearing,, editing and processing	June ,2012 (25 days)
3.	Organizing and writing the report	July- August,2012 (min 1 ½ month and max 2 months)
4.	Submission of the first draft report	End of August, 2012 (3 rd week of August)
5..	Include comments by the advisor and finalizing the report	September 2012 (15 days)
6.	Submission of the final report	September,2012 (15 days)

5. Budget plan

Budget Required	Unit Measure	Quantity	Unit Price in Eth.Birr	Total Cost in Eth.Birr
Stationery materials	Lump sum	1	600	600.00
Enumerators /data collectors per-diem	Man/days	5	1,000	5,000.00
Transport allowance	Man/days	5	2,000	5,000.00
Photo copy of relevant resource materials	Lump sum	1	500	500.00
Binding of reports	Lump sum	1	500	500.00
Overhead expenditures	Lump sum	1	3,000	3,000.00
Contingencies / Price felicitation (10 %) of the total				1,460.00
Total				16,060.00

Annex 7. List of people contacted (interviewed)

No	Name	Organization	Title/Responsibility
1.	Ismeal Abdukerim Gurba	Metekel Zone Water, Mines and Energy Resources Development Office	Office Head
2.	Tariku Mengistu	Mandura Woreda Mines and Energy Resources Development Office	CDF supervisor
3.	Deeje Aknawu	Mandura Woreda Mines and Energy Resources Development Office	MWWMERDO Acting Head
4.	Endegawork Zewude	Regional Water Bureau	Planning and Programming Head
5.	Addis Temteme	EFFICIENT DBF WaSH Consultancy Partners	Community mobilization and Gender advisor in Finn-WaSH BG Programme
6.	Woyeitu Jebesa	Mandura Woreda Mines and Energy Resources Development Office	Water expert
7.	Ayantü Beyene Feleke	Mandura Woreda Mines and Energy Resources Development Office	Water expert
8.	Girma kebede	EFFICIENT DBF WaSH Consultancy Partners	Sanitation and Hygiene Education Advisor in Finn- WaSH BG Programme

Annex 8: Questionnaire for Households

Objective: The purpose of this questionnaire is to assess the impact of technical, institutional and financial issues on sustainability of rural water supply schemes in Mandura woreda . The study is conducted for M.A Degree in Rural Development Studies at Indira Gandhi National Open University (IGNOU). It is expected that the study will come up with viable findings on problems to sustainability and will contribute to the socio-economic development efforts by supporting governments' attempt to increase the coverage of water supply to all community in the long-run. The study is conducted only for the academic /development/ purpose and the respondents and response is not deployed for other purpose. . The information you will provide is very essential for the success of the study. Therefore you are kindly requested to answer all questions and give reliable and complete information on the issues.

Instruction for Interviewer:

1. Introduce your self
2. Inform the respondents, the questionnaire is only used for the purpose of development and improving the living standard of the society and tell them that their name and response is not deployed for other purpose.
3. Circle their answer among alternative choices and describe the opinions of informants for questionnaires that require explanation.

Name of interviewer_____

Date of interview_____

Interview conducted: Woreda_____

Kebele_____ 'Got' _____

Questionnaire identification no._____

Thank you in Advance!!

Annex 8. Questionnaire for households

Instruction: The questionnaire has got two parts:

1. Make a choice or circle your answer for questionnaires that has given an alternative choice that reflects your filling.
2. Give relevant information for questionnaires that have no alternative choices or that require explanation.

Part One: Background Information

Q1. Sex _____ 1. Male _____ 2. Female _____

Q2. Age (in complete years) _____

Q3. What is your current marital status? _____.

1. Single 2. Married 3. Divorced 4. Separated 5. Widowed

Q4. Size of the household (family)? _____.

Q5. Ethnic group? _____.

1. Gumuz 2. Agewu 3. Amharic 4. Oromo 5. Others, specify _____

Q6. Religion? _____ 1. Muslim 3. Protestant

2. Orthodox Christian 4. Catholic 5. Others, Specify _____.

Q7. Educational Level? _____.

1. Unable to read and write (Illiterate) 4. Junior school (7-8) Complete
2. Able to read and write 5. Secondary school (9-12) Complete
3. Primary school (1-6) complete 6. College graduate/Joined higher institution

Q8. Rank your (families) source of income in accordance with their importance?

1. Farming _____ 3. Government employee _____ 5. Traditional gold Mining _____
2. Business /peaty trade 4. Daily labor _____ 6. Others, Specify _____

Q9. Which two most social services are you need to be provided? **1st** _____ and **2nd** _____
(Health, Water Supply, Toilet/Sanitation, Education, Electricity, Road, Telephone, Others)

Q21.7.If “Yes”, how many times the water supply scheme get non-functional? _____

Q21.8.What do you think the problems to non functionality?

Q21.9.In which season/s did you faces the problem of water supply mainly? _____.

Q22. On average for how long the scheme was in state of disrepair once non-functional?

1. For one to two months
2. For three to six months
3. For seven to nine months
4. For ten months to one year
5. For more than one year
6. If other, specify_____.

Q23.How do you evaluate current status of the scheme in providing service to the intended beneficiaries?

1. Without having the problem, the scheme is functioning properly
2. With having the problem, the scheme is providing service
3. Because of major problem/breakdown, it is not functional
4. Without having the problem / breakdown, it does not provide service because of some reasons.
5. If others, specify_____.

Q24. Rank the problems to the scheme according to their severity that undermined the proper and sustainable functioning of the water supply scheme?

No	Type of the problem	Rank							
		1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th
1.	Breaking down of spare parts of the water supply scheme								
2.	Insufficient water source								
3.	Poor management practices/ Ineffectiveness of water committees`								
4.	Poor quality of scheme construction								
5.	Lack/weak institutional support & coordination among stakeholders								
6.	Lack of spare parts& tools to carry out Operation & Maintenance								
7.	Lack of qualified technicians								
8.	Lack of adequate finance to afford spare parts and carry out O & M								
9.	Inappropriate technology								
10.	If other specify								

Part Three: Community factors related to water supply

Q25. Who provided the water supply scheme?

- 1. Community
- 2. Government
- 3. NGO
- 4. 1 and 2
- 5. All in collaboration
- 6. If others, specify_____.

Q26. Who initiated to provide the water supply to the community? _____

- 1. Community
- 2. Government
- 3. Nongovernmental organization
- 4. 1 and 2
- 5. All in collaboration
- 6. If others, specify_____.

Q26.1. Did you have a demand for the water supply before construction of the present scheme?
1. Yes 2. No

Q27. In which season was the water supply scheme developed (constructed)?

1. During the dry ('Bega') 2. During the wet ('kiremt') 3. If other, specify__.

Q28. Have you participated in the provision of the water supply scheme?

1. Yes 2. No

Q28.1. If your response to Q28 is "Yes", at which phase you participated?

1. during planning 3. Post-construction 5. In all phases
2. During Construction 4. 1 and 3 6. If others, specify__..

Q28.2. What were your contributions in provision of the water supply?

1. Labor 3. Local material/stone, sand, wood/ 5. In all
2. Finance 4. Labor and local material 6. If other, specify_____.

Q28.3. If your response to Q28 is "No", why do you think the reason for not participating?

28.4. Do you feel sense of ownership to the developed scheme? 1. Yes 2. No

Q29. Do you think the water supply is adequate to the beneficiaries? 1. Yes 2. No

Q30. Who selected the site of the new water supply scheme?

1. Community 3. NGO 5. All in collaboration
2. Government 4. 1 and 2 6. If other,
specify_____

Q31. Had the management system put in place for the developed water supply scheme?

1. Yes 2. No

Q31.1. If your response to Q31 is "Yes", who manages the scheme?

1. Community/water committee alone 3. NGO
2. Government alone 4. Both 1 and 2 5. If other,
specify_____

Q31.2. Is/are the management body adequately perform their duties and responsibilities?

1. Yes 2. No

Q31.3. If your response to Q31 is "No", what do you think the reason?

Q32. Do the community receive adequate external support service from government to enable them effectively manage their water supply scheme?

1. Yes

2. No

Q33. What supports did the community get from the government organizations in relation to managing the water supply schemes to make properly functional and sustainable?

Q34. What supports did the community get from the NGOs in relation to managing the water supply schemes to make properly functional and sustainable?

Q35. Did the supports given to the community from government and nongovernmental organizations have some form of continuity? 1. Yes 2. No

Q36. What types of supports are needed by the community to support the water supply scheme functional for long period of time?

_____.

Part Four: Regarding the Financial Issues of the Scheme

Q37. Who financed the developed water supply scheme?

1. Community

3. NGO

5. All in collaboration

2. Government

4. 1 and 2

6. If other, specify_____.

Q38. Do you pay for the developed water supply service?

1. Yes

2. No

Q38.1. If your response is "Yes", how much money you pay per month on average and/ per container you use to fetch water?

Birr/month _____ or Birr/container you use to fetch water _____

Q38.2. Do you think the payment is fair? 1. Yes 2. No

Q38.3. How much money are you willing and able to pay for the service per month and per container you use to fetch water?

Birr/month _____ or Birr/container you use to fetch water _____

Q38.4. Do you/your family/ regularly pay for the water supply service?

1 .Yes

2. No

Q38.5. If “No”, why do you not pay regularly?

Q38.6. If you do not pay for the water supply service, why you did so?

Q39. How is the payment made for the developed water supply service?

- 1. All the households pay the same amount per month
- 2. Flat rate where varieties of payment are made for water per household based on the amount of water used
- 3. If _____ other, specify_____

Q40. Who set the price of the water fees?

- 1. Community alone 3. NGO alone 5. All in collaboration
- 2. Government alone 4. Both 1 and 2 6. If other, specify_____

Q41. Do you think the water fees collected from the beneficiaries is adequate to purchase spare parts, pay care takers, and carry out operation and maintenance and other costs of the scheme? 1. Yes 2. No

Q41.1. If your response to Q41 is “No”, why do you think the reason? -----

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Q42. What costs of the water supply scheme are covered by fees collected from users?

- 1. Only costs of minor repairs only 4. Costs of technicians/local mechanics only
- 2. Costs of major repairs only 5. Costs of spare parts only 7. None of these costs
- 3. Salary of caretakers only 6. All costs of the scheme 8. If other, specify_____

Q43. Who manage the water fees generated/collected from the users?

- 1. Community alone 3. NGO alone 5. All in collaboration
- 2. Government alone 4. Both 1 and 2 6. If other, specify_____

Q44. Do you think the scheme managers have the capacity to manage the finance?

1. Yes

2. No

Part Five: Regarding Technical Issues of the Scheme

Q45. Who selected the type of the existing technology (scheme type)?

1. Community alone 3. NGO 5. All in collaboration
2. Government alone 4. Both 1 and 2 6. If other,
specify_____

Q46. How do you evaluate the construction quality of the water supply scheme?

1. Not good 3. Very good
2. Good 4. If other,
specify_____

Q47. Is the technology (the scheme) easily operable and manageable by the users?

1. Yes 2. No

Q48. Is/Are there local technician/s that has/have taken basic training to carry out repairs and maintenance when the water supply scheme encounter problem or nonfunctional?

1. Yes 2. No

Q48.1. If your response to Q48 is “Yes”, is/are they live with the community?

1. Yes 2. No

Q48.2 Are any of them females? 1. Yes 2. No

Q48.3. Is/are he/she/they equipped with adequate tools to carry out repairs when needed?

1. Yes 2. No

Q48.4. Does/Do he/she/they have technical skill/s to handle major repairs?

1. Yes 2. No

Q48.5. If your response to Q48 is “No”, who carries out repairs and maintenance when needed? _____.

Q49. Are spare parts easily available at community level when needed?

1. Yes 2. No

Q50. Where does the community get spare parts to carry out operation and maintenance?

1. Purchase on market
2. Given by Regional/Zonal /Woreda water Desk (Government agency)
3. Donated by NGOs 4. If other, specify_____

Q51. Are spare parts affordable at community/beneficiaries level when needed?

1. Yes

2. No

Q52. Which major technical problems do the community encountered to make the water supply scheme properly function and sustain the benefits from the supply?

1. Lack of adequate spare parts and tolls

5. All of the above

2. Inappropriate technology

6. If other, specify_____.

3. Inappropriate designs/poor construction quality

4. Lack of technical skill to carry out operation and Maintenance

Q53. Do you think the water supply source now you are using has quality problem?

1. Yes

2. No

Q54. What do you recommend to alleviate the problems that the water supply is experiencing and to make the scheme proper functional for long period of time?

Thank you again!!

Annex 9: Checklists for Interview and Group Discussions

I. Checklists for Interviewing Key Informant from Government Officials (Regional, Zonal, and Woreda) water sectors

Date of interview _____

Name of the organization represented _____

Position of the respondent _____

1. What are the major goals or objectives of the establishment of your organization in relation to rural water supply?
2. What the policy stipulates about costs of water supply, cost recovery of O and M as well as recurrent expenses?
3. What technologies do you provide mainly? Why?
4. Did the government agency adequately prepare the community to manage and sustain their water supply schemes? (Yes/No), if `No`, what is the reasons?
5. What types of institutional supports are given to the lower governments/community in sustaining the functionality of the schemes? And how frequent are the supports?
6. Are spare parts and toolkits readily available, affordable at regional/Zonal/woreda and Community level? (Yes/No), if `No`, where do you get it?
7. Are there spare part store at regional/Zonal /Woreda and Community level? If “No”, why?
8. Are there competent private sectors who provide spare parts and able to do water supply construction in the region?
9. What problems are faced by your organization/office to support the rural water supply service functional for long period of time (sustainable)?
10. How do you see the coordination of your organization/office with the lower governments and stake holders to support the service?
11. What requests are mainly reported to your office from the lower government offices/Community in relation to water supply?
12. How do you evaluate the status of the schemes implemented by your office and others?
13. Are there well trained technicians who can carry out major repairs that are beyond the financial and technical capacity of the community/woreda water desks?
14. What are the major problems for rural water supply schemes failure in the region/ in the woreda?

15. What responsive measures have been taken by the Regional Water Bureau, /zonal water office and woreda water desk to improve the status of the schemes?
16. What are the major problems associated with the provision and management of the schemes in the region, and at woreda level?
17. What intervention measures do you recommend to alleviate the problems and to improve the benefits from the constructed scheme?

Thank You!!!

II. Points of Discussion with Rural Water, sanitation and Hygiene Committee's

Date of discussion _____.

Kebele _____ 'Got' _____

1. How many people/household are using the scheme?
2. When was the scheme constructed?
3. Who decided the members of committee?
4. Does it have formal recognition?
5. Do you have job descriptions?
6. Are there activities that you do regularly? (Yes/No), If `Yes` could you mention the major once?
7. Are there care takers who are supported with the necessary tools so that they can carry out repairs when scheme break down/face problem?
8. Did/are the users pay user fee regularly? (Yes/No), If `No` why do you think the reasons and what measures have been taken to alleviate the problem?
9. What supports (technical, financial and others) have been given to the community/committee from the external (government and Non government organizations) to sustain the water supply service?
10. How does the committee evaluate community participation in general and women's participation in particular at all phases (pre implementation, during implementation and post construction) of the scheme?
11. How money is collected and saved for community purpose?
12. Did the government (regional, zonal and water desk) adequately prepare the community/Committee to manage and sustain the water supply? (Yes/No), If `No` why do you think the reasons?

13. From your experience, what major problems are encountered in relation to water supply scheme?
14. What solutions do you recommend in order to alleviate the problems and to sustain the functionality of the scheme?

III. Points of Discussion with Selected Women's

Date of discussion_____.

Kebele_____”Got”_____

1. Have women's participated or consulted in rural water supply projects? If yes, what were your contributions, and if not, why women's are not consulted/ participated?
2. Who is responsible to fetch water for domestic purpose mainly?
3. Where do you get water during dry and wet season?
4. Does the management of the scheme involves women's and treats users fairly?
5. How do you evaluate the advantages of having the new scheme verses the traditional sources?
6. Have you faced the problem with the water supply scheme non- functional? (Yes/No), If “Yes”, what do you think the major reasons and where do you get water at that time?
7. How do you evaluate the overall performance of the scheme?
8. From your experience, what major problems are encountered in relation to water supply schemes to make them properly functional and to sustain the benefits gained from the water supply?
9. What do you recommend to alleviate the problem of the scheme and make it functional for long period of time?

Thank You!!!

IV. Checklists for Interviewing Key Informant from Nongovernmental Organization Working on Rural Water Supply.

Date of interview _____

Name of the organization represented _____

Position of the respondent _____

1. When did your organization established at regional level?
2. What are the major goals or objectives of the establishment of your organization in relation to rural water supply?
3. What the policy stipulates about costs of the water supply, cost recovery of O&M as well as recurrent expenses?
4. In which woredas and kebeles have you intervened?
5. How many water supply schemes have been implemented by you organization since intervention time and how many people/house holds have benefited from the served as a result? And how do you evaluate the status of the schemes?
6. What technologies you mainly use and why?
7. Are spare parts and toolkits readily available, affordable at woreda and community level? (Yes/No); if “No”, where do you get it?
8. What request are mainly reported to your office from the lower government offices and community in relation to water supply?
9. What supports/contributions did you get from the government and local communities in relation to provision of water supplies?
10. What trainings and supports do/did you give to the community to manage the schemes properly by themselves and carry out repairs when needed to make schemes functional and sustainable? How frequent are the supports?
11. What are the major/main problems for rural water supply schemes failure in the region/ in the woreda?
12. What major problems did you observed from your experience in relation to provision of water supply and management that undermine the proper functioning of the schemes or that contribute to non functionality?
13. What solutions do you recommend to alleviate the problems and improve the status of the schemes to serve the community for long period of time?

Thank You!!!