

ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES
REGIONAL AND LOCAL DEVELOPMENT
STUDY (RLDS)

An Assessment of Challenges of Sustainable Rural
Water Supply: The Case of Ofla Woreda in Tigray
Region

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By
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Addis Ababa, Ethiopia

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DECLARATION

I declare that this thesis is my original work and has not been presented for any degree in any university, and all the sources of materials used are duly acknowledge.

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The thesis has been submitted for examination with my approval as a university Advisor.

Wondimu Abeje (PhD)

June 2006

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TABLE OF CONTENTS

ACKNOWLEDGEMENT	i
LIST OF BOXES, AND FIGURES	iii
LIST OF TABLES	iv
LIST OF ACRONYMS	vii
ABSTRACT	viii
CHAPTER ONE	1
1.1. Introduction	1
1.2. Statement of the Problem	2
1.3. Objective	5
Specific Objectives	5
1.4. Research questions	6
1.5. Significant Of the Study	6
1.6. Scope of the Study	7
1.7. Methodology of the Study	7
1.8. Description of the Study Area	10
CHAPTER TWO: LITERATURE REVIEW	18
2.1. The concept of Sustainability	18
2.2. Defining sustainability in Rural Water Supply System (RWSS)	20
2.3. Determinants of sustainability	23
2.4. Theoretical frameworks applied to assess sustainability in RWS	34
CHAPTER THREE: FINDINGS OF THE STUDY AND POLICY SETTINGS	39
3.1. Characteristics of the Sample Population	39
3.2. Major Findings of the study	45
3.3. Policy Setting	79
3.4. Proposed Development Activities in Ofla Woreda (1998-2002 E.C)	81
CHAPTER FOUR: CONCLUSION AND RECOMMENDATIONS	84
4.1. Conclusion	84
4.2. Recommendations	89
References	91
APPENDIXES	b

LIST OF BOXES, AND FIGURES

Box 2-1 : Definitions of Sustainable Development.....	20
Box 2-2: The Principal Functions of External Support to Rural communities.....	33
Figure 1-1: Location of Ofla Woreda in the administrative map of Tigray Region.....	12
Figure 1-2: Administrative map of Ofla Woreda	13
Figure 2-1: Conceptual framework of sustainable RWS and the determinant factors....	37
Figure 3-1: Selected Tabias for the study in Ofla Woreda	41
Figure 3-2: Demand Responsiveness of Rural Water services in Study areas of Ofla Woreda.....	47
Figure 3-3: Distance between Water Points under study and Beneficieries estimated by the researcher.	50
Figure 3-4: Responses in Percentage of respondents on whether the modern water projects reduce distance comparing with the previous unsafe sources.	51

LIST OF TABLES

Table 1-1: Distributions of Potable Water Projects (PWP) constructed with in 1993-1997 E.C in Ofla woreda by Pas (tabia) _____	8
Table 1-2: The number of WPs in the selected tabias from which 12 WPs were taken for the study _____	9
Table 1-3: Projected Population Size of Rural Ofla Woreda by 5 year Age Group, Sex;_ 15	
Table 1-4: Top ten diseases of Ofla Woreda for the year 1997 E.C (2004/5)_____	16
Table 1-5: percentage of school enrolment in Ofla Woreda by sex, 1997 E.C_____	17
Table 3-1: Age distribution of Respondents _____	39
Table 3-2: Sex distribution of respondents _____	42
Table 3-3: Marital status of Respondents in the study areas. _____	42
Table 3-4: Household Heads of Respondents' in the study areas. _____	43
Table 3-5: Household sizes of Respondents in the study areas. _____	43
Table 3-6: Water consumption capacities of Respondents under study. _____	44
Table 3-7: Daily Frequency of water collection and per capita water consumption of respondents in study areas. _____	44
Table 3-8 Development priority issues as expressed by Respondents in percentage ____	48
Table 3-9: Average Distances of previous Water sources for Respondents in the study area. _____	49
Table 3-10: Distributions of respondents to whether their nearer potable water point has been fenced. _____	53
Table 3-11: distributions of respondents on whether animals and passengers could enter to the area of WPs _____	54
Table 3-12: opinion of respondents on the construction quality of water projects. ____	55

Table 3-13 technology and machine types of water points studied in Ofla Woreda. ____	56
Table 3-14: percentage of Respondents exposed to trainings related to potable water, hygiene and sanitations _____	58
Table 3-15: Water points and Members of WCs that have access to training. _____	59
Table 3-16: staff of RWMEO of Ofla Woreda by sex and qualifications, 1997-98 EC. ____	61
Table 3-17: responses of respondents in percentage to whether there is occurrence of frequent failures for their water points. _____	62
Table 3-18: Responses of Respondents on Frequency of service failures occurred. ____	63
Table 3-19: Monthly water fee payment of respondents in Ofla Woreda. _____	64
Table 3-20: Responses in percentage of communities to water fee payments in study areas of Ofla Woreda. _____	65
Table 3-21: Distribution of Respondents on source of money for O&M of water services. _____	66
Table 3-22: some factors from respondents for not paying fee on time. _____	66
Table 3-23: Rural water services, status of function, and their financial management. 68	
Table 3-24: Participation of respondents in project development _____	69
Table 3-25 Types of Community participation in project implementation in the study area _____	69
Table 3-26: Participation of Women in WCs and perception of respondents. _____	70
Table 3-27: Respondents and their level of satisfaction. _____	72
Table 3-28: degree of satisfaction of Respondents in percentage on time given for service in a day. _____	72
Table 3-29: responses in percentage of Respondents on whether they spend more time standing to fetch water from WPs. _____	73

Table 3-30: Respondents and their satisfaction with general services of WPs _____	74
Table 3-31: opinion of Respondents on additional water projects in the study areas. __	74
Table 3-32: different Water uses of Respondents in the study areas. _____	75
Table 3-33: responses in percentage of Respondents on diversifications of water sources _____	76
Table 3-34: Opinions of respondents on the importance of alternative water source use for service sustainability. _____	76
Table 3-35: Respondents and their access to education on water use. _____	77
Table 3-36: opinion of respondents to the existing water service fees. _____	77
Table 3-37: opinion of respondents on whether it is possible for community to replace water services from their own fund _____	78
Table 3-38: distributions of respondents on ownership of the rural water services. ____	79

LIST OF ACRONYMS

ADF	African Development Fund
BOFED	Bureau of Finance and Economic Development
E.C.	Ethiopian Calendar
EWRMP	Ethiopia Water Resource Management policy
HH	Household
masl	meter above sea level
MPA	Methodology for Participatory Assessment
mm	millimeter
MOFED	Ministry of Finance and Economic Development
O&M	Operation and Maintenance
OWED	Ofla Woreda Education Department
OWHO	Ofla Woreda Health Office
OWWSSP	Ofla Woreda water sector strategic plan
PRWSPs	Potable Rural Water Supply Projects
REST	Relief Society of Tigray
RWMEO	Rural Water Mining & Energy Office
RWSSHP	Rural Water Supply, Sanitation and Hygiene Program
RWSPs	Rural Water Supply Projects
SPSS	Statistical Package for Social Science
TPL	Traditional Pit Latrines
WDP	Waste Disposal Pits
WSP	Water and Sanitation program
WSPs	Water Supply Projects
WSSP	Water Supply and Sanitation Policy

ABSTRACT

Potable water supply coverage in rural areas of Ethiopia in general and in Tigray region in particular is very low. Although investments in the sector are growing, the coverage still remains very low. In countries like Ethiopia where resources are very scarce, studies to identify factors, which affect continual use of potable water from existing projects, are not as such widely done. Objectives of this study is to identify challenges of sustainable use of potable water supply by assessing some typical factors related to utilization and community satisfaction; community participation in both planning and implementation phases; and technical follow ups available in water supply systems.

A three-stage procedure with both probability and non-probability sampling method was used to identify four tabias and water projects constructed between 1993 and 1997 E.C. in Ofla Woreda. Twelve water points and 180 HHs were selected randomly and in systematic base respectively from the sample tabias. Cross-sectional design with descriptive analysis was applied using different data collection methods in March 2006.

Very little role of local communities was seen in site and technology selections. Results showed that 75% of water points are located on 20 minutes minimum and 2 hours maximum distance from users; 66.7% of water projects do not have fences; but all except one have guards. Differences in construction quality had also been observed resulted from variation in supervision works; and 57% of water points have faced at least a one time failures in their life. Per capita water consumption in a day is less; more than 90% of the people take less than 20 liters (minimum standard set by WHO) of potable water. Thirty seven percent of water projects are perceived to have not less distance to beneficiaries comparing with previous unsafe sources but 100% of the people support the idea of paying for the water service. Results also showed that 94% of beneficiaries use unsafe water sources for other uses than drinking and food making to reduce pressure of frequent work of hand pumps and get benefit out of it. While the existence of Water Committees (WCs) and labor contribution of people are other strong side, where as lack of training for WCs, communities and operators at community level in addition to poor integration of Woreda staffs are found as weakness in the study areas. Enhancing community participation in every necessary decision and strengthening the technical and resource capacity of Woreda RWMEOs are strongly recommended to sustain benefits of rural water services.

CHAPTER ONE

1.1. Introduction

Water is life in general and potable water in particular is essential for life, health and human dignity. When human beings do not have access to potable water supply, they suffer a lot in the over all socio-economic and environmental existence. The main health problems, especially in developing countries like Ethiopia, are results of poor access of potable water; poor hygiene and sanitation practices. In these cases, supplying safe drinking water is of critical importance.

Realizing the critical importance of supplying potable water, national and regional governments, local and international NGOs invest many millions of capitals every year in developing countries to tackle the problem through the implementation of water supply projects.

However, supplying water projects alone would not contribute for communities especially in rural areas to have reduced the problem. The issue of functionality, utilization by intended beneficiaries and continuity of water projects to serve for longer period are very important issues to be considered and integrated to scale up intended impacts. Hence, integration between beneficiaries and project suppliers in decisions and contributions as well as management in all phases need to be addressed. The main objective of this study is to examine the above mentioned necessary issues of sustainability of rural water supply.

1.2. Statement of the Problem

Water is essential element in human livelihoods because of its necessity to life; food security and economic activities, etc. It is indispensable for crop production, industry, domestic processing, aquaculture, livestock, recreation, navigation and transport, and electricity supply. Safe water and sanitation also shape health through potable water supply, safe food preparation, hygiene, better nutrition, and entertainment.

However, due to various reasons human beings are suffering from serious problems resulting from inaccessibility of potable water. Consequently, around 60 to 70% of the rural populations in the developing world have had neither access to safe and convenient source of water nor a satisfactory means of waste disposal in 1980's (Churchill, A. et al, 1987).

The problem is severely aggravated in this century. 1.1 billion People of the world lacked safe water and 2.4 billion lacked adequate sanitation. Consequently, water and sanitation related diseases are widespread (Patrick, et al 2004). A study by Hans Van Damme 2001 disclosed that, nearly 250 million cases are reported every year, with more than 3 million deaths annually: about 10,000 a day. Moreover, diarrhea diseases affect children most severely, killing more than 2 million young children a year in the developing world. Many more are left underweight, stunted mentally and physically, vulnerable to other deadly diseases. A report from Water Partner International (2006) indicates the number of people who lack access to improved water supply could increase to 2.3 billion by 2025. Global Water Supply and Sanitation Assessment 2000 Report also indicates that majority of the world's population without access to improved water supply or sanitation

services lives in Africa and Asia: fewer than one-half of all Asians have access to improved sanitation and two out of five Africans lack improved water supply (WHO & UNICEF ,2000).

The condition of Ethiopia in this regard is not different from the general situation of the developing countries. The total population that has access to water services in 2000 was around 15,200,000 with a national coverage of 24%. The rural areas share was only 6,698,000 people. This means 87 % of the rural population has no access to potable water in Ethiopia (WHO, 2000). WASH (2005) report, also shows the consequence of this poor water supply coverage in the country is severe. It aggravates the infant mortality rate of 180 per 1000, very low economic productivity and low female enrolment ration in school This is more serious in the rural population that has virtually no sanitation facilities, while in the country as a whole only eight percent of the population has access to sanitation (Desalegn, 1999).

ADF (2005) reports that potable water supply in Tigray region is low, which was only 25%. Similarly, in the year 2003/4, rural water coverage of Ofla Woreda was not more than 11%. National Rural development policy in general and poverty reduction strategies of both national and the regional one recognize problem of low rural potable water supply as one and critical problem of the country in general and the region in particular. Hence, priority is given for the development strategies to expand the coverage of potable water supply in the country, especially in rural part to accelerate agricultural development in particular and rural development in general.

Under this national and regional development framework, large amount of fund from national and regional governments as well as local and international NGOs is flowing to rural areas of the country to reduce the inaccessibility of the rural community to potable water. Due to this, a number of potable water supply projects have been undertaken in rural Ofla Woreda especially after the Woreda level decentralization has been experienced.

Construction of potable water projects in rural area would definitely increase the access of the rural community to potable water and contribute to the health of citizen. However, this action alone could not bring the intended objectives accomplished. ADF (2005) report shows that 33% of the rural water services in Ethiopia are non-functional due to lack of funds for operation and maintenance, inadequate community mobilization and commitment, as well as lack of spare parts.

Thus, the issue of sustainability is critical when resource scarcity and equity matters are raised. Sustainability of rural water supply (RWS) projects and of the benefits they deliver are some of the overriding concerns of the sector. In recent years, there has been an increasing focus on, and understanding of, the design and implementation phases of RWS projects as part of efforts to make projects more successful and work more efficiently (Sara et al, 1997).

Sustainable use of water resources needs greater attention, such as better planning and follow ups, better operation, maintenance, and management.

As the level of investment in RWS by the international and national organizations increases, more specific information is needed about the sector. In addition, it is necessary to examine challenges that undermine long term sustainability of rural water supply projects both at the planning and implementation phases. To date, there will have no doubt that the need for such study in Ethiopia, focusing to assessing challenges of sustainable rural potable water use at both pre and post-project phases. This will be useful to have sufficient information before launching large investments in rural water supply works.

Bearing in mind the above issues, this study assessed typical factors against sustainable use of rural water supply on the base of the above argument in Ofla Woreda.

1.3. Objective

The general objective of this study is to assess the sustainability of rural water supply system and identify the challenges related to potable water supply system in rural Ofla Woreda.

Specific Objectives

- ☛ To assess the nature and level of community participation in the development of rural water supply system in the Woreda.
- ☛ To examine whether the provision of water service in the Woreda satisfies the needs of the target group
- ☛ To assess the nature of institutional supports given for local communities after water projects are completed.

- ☛ To identify problems related to potable water supply and management systems in the study area.
- ☛ To forward recommendations for sustainability of RWSS in the Woreda in particular and the region in general

1.4 Research questions

- ⊕ What were the roles of local communities in the development processes of rural potable water supply systems?
- ⊕ How do users evaluate the existing water services against their satisfaction?
- ⊕ What are the inconveniencies faced in the rural potable water supply systems to affect proper functioning and uses of the service.
- ⊕ What kind of external supports are available for the rural communities with what extent?

1.5. Significant Of the Study

Most studies focus on either the resource use or engineering aspects of water supply. In this regard, the study complements the planning, management, O&M aspects of rural water supply in addition to community and women participations. Hence, this research will contribute to the better understanding of problems and factors related to sustainable water supply system. The study will serve as reference for those working in the planning and design works of RWSS projects.

1.6. Scope of the Study

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

1.7. Methodology of the Study

A combination of both quantitative and qualitative research methods are employed in this study. The research design, sampling procedures, method of data collection and their source are discussed below.

Research design and sampling procedures

The research used a cross sectional research design and data were collected on more than one case at a single point in time. Different methods of data collection like structured questionnaire; interviews and discussions with beneficiaries, members of different water committees, and technical staff members; and personal observations were employed to produce primary data. Moreover, secondary data were also collected from documents, books, journals, and, others sources from sectoral offices, and concerned bureaus in and out side the Woreda.

Sampling frame of the study

From all existing 138 water schemes in the Woreda, water schemes constructed with in the last five years were selected purposely. In this study, water schemes built between 1993 and 1997 E.C. are considered because of three reasons. Large numbers of water projects have been installed in the Woreda after the Woreda-level decentralization was

implemented. The second is to observe if changes are up coming through time in the over all potable water development processes. The last is related to manageable size. As a result, a total of 122 water points constructed between 1993 and 1997 E.C. are studied. These water schemes are arranged to their corresponding peasant associations (or tabias) and four tabias are selected purposely for this study based on accessibility and feasibility factors. Ofla Woreda is topographically rugged and accessibility is very difficult not only on foot but also by vehicle. Economically, the budget set for this research is too small to cover remote areas if study tabias are selected randomly.

Table 1-1: Distributions of Potable Water Projects (PWPs) constructed with in 1993-1997 E.C in Ofla woreda by Pas (tabia)

Names of Tabias	Numbers of PWPs
Adigolo	11
Adishumberket	5
Darabekeda	6
Dinkaashena	6
Fala	9
Fkrewolda	5
Guara	6
Hashenge	6
Hayalo	4
Hugumburda	3
kidana	8
Lat	7
Menkere	5
Selambkalsi	8
Sesela	7
Smret	6
Tselgo	6
Wonberet	2
Zata	12
Total	122

Source: Ofla Woreda RWMEQ, 2006

Three water points from the above selected tabias were chosen based on simple random sampling method.. On aggregate, 12 water points incorporating functional (those delivering service) and un-functional were identified as unit of analysis for this research. From these WPs 4 are un-functional and the rest functional.

Table 1-2: The number of WPs in the selected tabias from which 12 WPs were taken for the study

Names of Tabias	Numbers of PWPs
Adigolo	11
Fala	9
Menkere	5
Zata	12
Total	37

Source: Oflla Woreda RWMEQ, 2006

Sample population

Beneficiaries are the main primary data sources in this study. Therefore, 15 households¹ are selected from each sample water points to have a total of 45 households from each of four tabias. Respondents are picked systematically in a distance of every seventh person to save time and increase representative ness of the study. Lastly, a total of 180 Households (HH) are included as a sample population for primary data source. Since a water-scheme is believed to serve for 500 people (or 100 HHs), equal share of households are taken from the sample water points.

¹ Questionnaires from different members of households were filled not only in their houses but also from the water services and from agricultural sites. And members of the 15 different HHs were first checked whether they belong to the specific water service under study before they were asked questions.

All research methods have their own advantage and disadvantages and it is common to try to reduce the disadvantages as much as possible. Therefore, method of triangulation is incorporated in order to fill the gaps of employed research methods.

Method of data analysis

Descriptive statistics based on percentages and ratios are used to analyze findings. Qualitative data collected from beneficiaries, technical staff members and water committees using structured questionnaire interviews and discussions were organized and entered in to SPSS to result descriptive statistics to examine the problem under study.

1.8. Description of the Study Area

The Tigray National State is found in the northern part of Ethiopia. Geographically, it is located between 12°15' -14°49' North latitude and 36°27' - 40°00' East longitude (Peter et al, 2000). The region covers an area of 80,000 sq. km and has a total population of 3.80 million, out of which 51% is with in the age range of 15-64(productive age group). 85% of the population lives in rural areas (Tigray region BOFED, 2005).

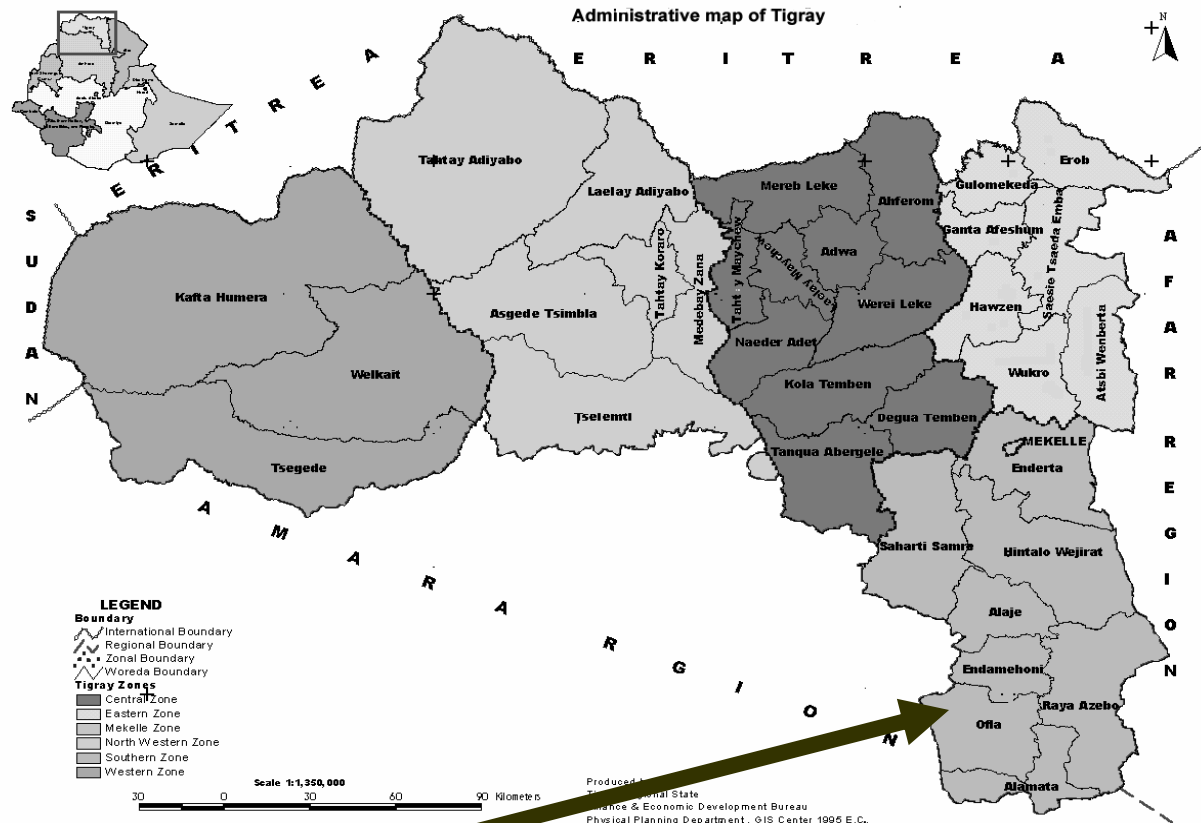
Altitude of the region ranges from 500 to 3935 meters above sea level to result for 11% Dega (high land), 40.5% woynadega (temperate) and 48% kola (low land) agro-ecologically. The average annual rainfall is between 650-980 mm (Tigray region BOFED, 2005).

In addition to Mekelle, the regional capital, there are five administrative zones: Western; Northwestern, Central; Eastern and Southern; comprising a total of 47 Woredas and 660 kebelles Each Tabia consists of small villages called Kushets (REST, 2003).

Ofla Woreda: Location

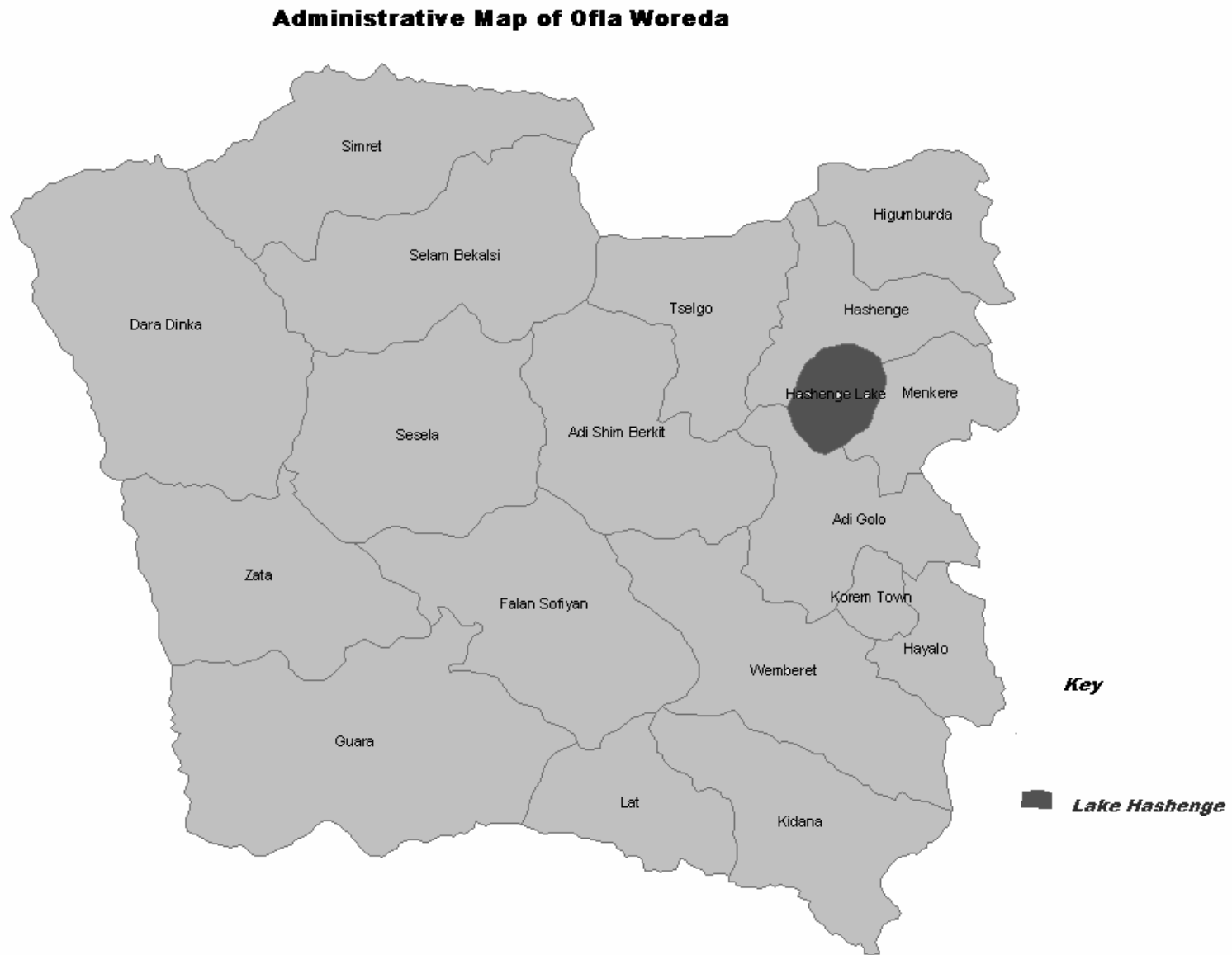
Ofla Woreda, which covers an area of 133500 hectare, is located in the southern part of Tigray. It is bounded by Endamhoni Woreda in the North, Alamata Woreda in the south, RayaAzebo Woreda in the East and Waghumra zone of the Amhara national state in the western direction.

Figure 1-1: Location of Ofla Woreda in the administrative map of Tigray Region



Ofla Woreda Source: Tigray Region BOFED, 2005

Figure 1-2: Administrative map of Ofla Woreda



Source: Tigray region BOFED, 2005

Topography, Climate & Vegetation cover of Oflla Woreda

The western part of Oflla Woreda is found within the domain of the northern highlands of Ethiopia bounded by the western side escarpment of the rift valley in the east. Altitude of Oflla Woreda rises from 1700 to 3288 masl, and it decreases eastwards from the west where the elevation reaches its peak. There are three agro-climatic Zones in the Woreda with greater domination of the high land or “dega” type. The dega zone comprises about 42% of the Woreda followed by “woina dega” and “kola” 29% each. Rainfall has two seasonal occurrences in a year. During the kiremt season, it ranges from 450-800mm and it reaches between 180-250mm during Belg season. The highest rainfall under normal condition usually recorded during the July month. The Woreda has moderate type of temperature that usually extends between 6°c to 32°c. Moreover, about 33.4% area of Oflla Woreda is covered by natural vegetation and is among the few areas to have such large tree cover in the southern zone of Tigray (OWWSSP, 2004/5).

Administration

Oflla Woreda has been divided into 19 Peasant associations (locally known as *tabias*) and 72 Sub Peasant associations (also known as *Kushets*) for administrative purposes.

Demographic characteristics

Based on the population and housing census of 1994, population size of the Woreda for the year 2005 is projected to be 138510. From this size, 70640 are females and 67870 are males. 52% of the population is found in the age range of 15-64 (the productive age group) with 44.4% young age of less than 15 years of age as cited in the table below. This

shows there is high level of dependency ratio as is true in the case of the country. In addition, the large share of the bottom age of the figure indicates there is higher fertility rate in the Woreda.

Table 1-3: *Projected Population Size of Rural Ofla Woreda by 5 year Age Group, Sex; Medium Variant: 1 July 2005*

Population of Rural Ofla			
Age	Total	Male	Female
0-4	23805	11777	12028
5-9	21235	10545	10690
10-14	16465	8352	8113
15-19	14781	7483	7298
20-24	12539	6301	6238
25-29	10392	5133	5259
30-34	8153	3874	4279
35-39	6648	3082	3566
40-44	5288	2370	2918
45-49	4444	1991	2453
50-54	3863	1802	2061
55-59	3262	1552	1710
60-64	2691	1314	1377
65-69	2068	1014	1054
70-74	1458	707	751
75-79	875	418	457
80+	544	276	268
Total	138510	67989	70521

Source: Tigray region BOFED, 1992 E.C

Health and sanitation

Health and sanitation coverage of Ofla Woreda are 64% and 1.25% respectively. Hence, health condition of the Woreda is poor in general comparing to other Woredas in the region. Information from the Ofla Woreda Health Office (OWHO) reveals that there were four health posts and six clinics in addition to one health center serving for the existing 138510 total population of the Woreda in 2005/6.

There is higher prevalence of communicable and non-communicable diseases in the Woreda. Health problems in general are related to poor nutritional status, poor water supply, poor environmental sanitation and poor hygienic practices. As is seen from the table below, diarrhea (Bacillary & Amoebic dysentery), Helimentic disease (Ascarias & Pin worms), skin disease (scabies) and eye diseases (trachoma) are results of the poor water supply, personal hygiene and environmental sanitation practices of the area.

Table 1-4: *Top ten diseases of Ofla Woreda for the year 1997 E.C (2004/5)*

S.N	Type of disease	Number of patients	Percentage share
1	Reproductive Tract Infections (RTI)	2253	14.7
2	Malaria	2083	13.6
3	Diarrhea	1890	12.3
4	Intestinal parasites	1813	11.8
5	Eye inflammatory	1368	8.9
6	Skin infections	1142	7.4
7	Tonsillitis	918	6
8	AFI	773	5
9	Gastric	750	4.9
10	Arthritis	662	4.3

Source: OWHO, 2005/6

Moreover, average family planning, DPT3 for children, Measles, TT2 for non-pregnant coverage in the Woreda was 38.2%, 63%, 72.4%, and 22.7% respectively for the year 2004/5(OWHO, 2006).

Education

In 1997 E.C, there were 54 schools in Ofla Woreda and the education coverage was 65.25% for grades 1-8 (OWED, 2005). In the same year student dropout was 2.88% and a student should travel 2.75 km average distance to reach school to attend. Although, there were sanitation and hygiene clubs in all existing schools, they don't have water and sanitation facilities. The absence of water and sanitation facilities has been mentioned as

one factor for females' drop out in the Woreda. Drought, migration, family divorce and distance of schools (especially for girls) are also mentioned for the large size of dropout rate.

Table 1-5: percentage of school enrolment in Ofla Woreda by sex, 1997 E.C

School level	Male in %	Female in %
Grade 1 to Grade 4	64.64	65.9
Grade 5 to Grade 8	25.79	25.47
Grade 1 to Grade 8	47.52	47.1

Source: OWED, 2005

As table 1-3 shows, there is a declining pattern of school enrolment rate as students go up to the higher grades.

Rural Road and Electricity

There is a total length of 119.5 km all weather roads in the Woreda that small numbers of tabias are accessed to it (OWWSSP, 2004/5). The Addis Ababa—Asmara road cross and serves eastern part of the Woreda, though not more than five tabias are access to it. One RR30 road extends from korem to Sekota, the western neighbor, from the main road. Generally, due to its rugged topographic nature of the Woreda large part of the population does not have road access.

There is no electricity in the rural area of the Woreda in general. However, Zata and Fala which are semi urban areas of the Woreda found in the Korem – Sekota Road are on the process of getting electricity in 1998 E.C.

CHAPTER TWO: LITERATURE REVIEW

2.1. The concept of Sustainability

Sustainability is a relevant issue in the rural water supply sector studies. It is one of the top concerns in development efforts although it is sometimes abused. As Sugden (2003), notes sustainability is one of the most over used and abused word in the development vocabulary. The concept of maintaining a service or benefit over time is not new, and sustaining the results of any investment has been the focus of attention in a wide variety of disciplines over many years.

Sustainability is a concept that has arisen from the debate on sustainable development, which became important from the 1970's onwards. However, for many organizations in the development sector, the United Nations document written in 1987, entitled "Our Common Future", is probably the most widely quoted definition (see box 1). This definition marks an important shift away from the idea of sustainability as primarily concern of ecology to one that emphasizes the economic and social processes of development (IISD, 2003).

A number of simple definitions for sustainable development have been developed by different organizations (see also box 1). Three aspects are found to be common elements in the definition of sustainability. Such elements are: - the scarcity of available resources, the interdependence of human activities of both the present and future generations, and issues of equity in distribution of a benefit.

The issue of sustainability first arose within the environmental movement and attempts to protect natural resources and ecological systems from over-extraction and shocks or

stresses. However, it has also been extended to incorporate other dimensions like economic, social and institutional. For example, the idea of economic sustainability which is achieved only when a given level of expenditure can be maintained over time or related to the resilience to risk of net benefit flows over time by World Bank (OED; 2003). The concept also incorporates institutional or management questions, in that sustainability is achieved when prevailing structures and processes have the capacity to continue their functions over the long term (DFID; 2000).

Recently, the issue of sustainability has found some space in the corporate sector, whereby businesses are considering impacts of their activities, not only in economic terms, but also with respect to environmental quality and social equity (see definition of the World Business Council). For many organizations, from both the public and private sectors, the practical application of “sustainability” translates into broader governance issues about how different institutions and actors can work to maintain economic, environmental and social benefits over time.

Brundlant Report "Our Common Future"(1987) defines, as

"Sustainable development is development that meets the needs of the present generations without compromising the ability of future generations to meet their own needs."

International Institute for Sustainable Development, USA; describes as

"To be sustainable, development must improve economic efficiency, protect and restore ecological systems and enhance the well-being of all peoples."

UK Government "A better Quality of Life"(1999) defines as,

"Sustainable development is a very simple idea. It is about ensuring a better quality of life for everyone, now and for generations to come."

World Business Council for Sustainable Development (2003),

"Sustainable development involves the simultaneous pursuit of economic prosperity, environmental quality and social equity. Companies aiming for sustainability need to perform not against a single, financial bottom line but against the triple bottom line."

In recent years, the sustainable livelihoods approach has become an important part of the global challenge of eliminating poverty. This approach considers the resilience of livelihoods to shocks and stresses over the long-term and the ability to manage available assets (including natural, physical, social, human and financial assets) both in the present and in the future, without undermining the natural resource base.

Sustainability of water supply projects has also been considered from a livelihoods perspective. As Nicole (2000) noted greater emphasis is placed on the role of water within wider livelihood strategies of communities.

2.2. Defining sustainability in Rural Water Supply System (RWSS)

There is a broad range of definitions of sustainability in RWSS used in different studies on the topic. Majority of these definitions are similar in nature, but there are slight

differences in emphasis, and in fact, there are a number of definitions, which are significantly different.

How we define, sustainability is important in setting parameters, which are then important for measuring and understanding the determinant factors that affect prospects of sustainability. As Hodgkin (1994) notes, there arise a problem for objective quantification of sustainability because of the fact that the adjective “sustainable” has strong normative connotations. That is to say, different groups of people (users of water, donors, national governments, local private sector companies, research institutions etc.) have different perceptions of sustainability based on the relative value attached to its achievements.

Different organizations may choose to see sustainability from different perspectives and attach strong values to different aspects of it like technical performance, health, empowerment, social equity or the environment to name but some.

As Black (1998) pointed out, sustainability in water supply and sanitation sector was primarily associated with financial aspects of service delivery and the need to make projects self-sufficient, by highlighting the need for users to contribute to cost sharing. However, when we see the ultimate goals of providing RWS services, the problem in the above definition will clearly be noticed. Improvement in health and the later positive impact on the broader wellbeing of rural populations can be the perceived benefits of water projects for many national and international agencies. Therefore, the logical definition of sustainability from the perspective of these institutions may be one that includes sustained health impacts. Where as, for many rural communities, the perceived

benefit of a project may simply be continued access of water nearby; which is closer to the definition that simply describes sustainability as whether or not water continues to flow over time.

As stated above, numerous examples of the definition of sustainability exist in the literature and a definition frequently cited comprises at least the main points in this regard. A development program is sustainable, when it is capable of supplying an appropriate level of benefits for longer period after the withdrawal of all forms of support from the external agency (OECD/DAC 1998).

This definition has been accepted by many researchers in the sector noting the concern in terms of sustainability is not so much to do with the “project” *per se*, but rather the water supply (and/or sanitation) system itself and the service it provides (Sara et al, 1997; Carter *et al* 1999).

Most of the examples cited above include definitions of sustainability, which describe a benefit resulting from the implementation of a project or establishment of a service. The most common of these benefits include water delivery itself, health benefits through reduced exposure to pathogens and others such as time saved, convenience and contribution to livelihoods.

All of these can be measured in one way or another, but these definitions do not tell us about the use and distributions of these benefits across different groups within a rural community. Therefore, some organizations define sustainability in a significantly different way. In here, the issues of use, gender and equity are starting to be questioned.

Mukherjee et al (2003) describes sustainability based on publication of WSP& IRC (2003) as the satisfactory functioning and effective use of services, and equity as everyone (men and women, rich and poor) ... having equal access to benefits from projects. Another publication by IRC(2003) in schouten et al(2003) includes, as part of its definition of sustainability, a statement that A system that reliably and sustainably meets the needs of 80% of the population while leaving the poorest 20% un-served cannot be counted a success. The incorporation of a measure of social equity in the definition of sustainability reflects, in part, a political or ideological position in terms of viewing access to basic services as a fundamental human right.

2.3. Determinants of sustainability

Every definition of sustainability of RWSS is usually followed by a qualifying list of key determinants or factors, of sustainability. There is a wide range of factors cited by authors, but some of the most common are:

- ✦ *Technical factors including design, performance and maintenance issues,*
- ✦ *Community and social factors including willingness to support projects,*
- ✦ *Institutional factors, including policy and external follow-up support,*
- ✦ *Environmental factors, including the sustainability of the water source,*
- ✦ *Financial factors, including the ability to cover recurrent costs, and*
- ✦ *Health factors, including the need to continue the provision of hygiene education to affect long-term behavior changes.*

Observing the above factors separately as pre and post implementation factors, they of course form the building blocks for areas of investigation and measurement.

Pre-implementation factors

Before a project is going to be decided for implementation, there are some steps to be passed by the planners and project coordinators. The pre-implementation factors are related to project rules that are essential elements of project design. They are essential because they provide incentives for communities to express and act on their demand for the services provided. The following are some of the main elements of pre-implementation factors related to sustainability of RWSS.

♠ ***Demand Responsive approach of rural water supply***: According to Sara et al (1997), a project is more or less demand-responsive to the degree that users make choices and commit resources in support of their choices. It in other words, requires the following development aspects: -

- Community members make informed choices whether to participate in the project, technology and service level options based on willingness to pay, when and how their services are delivered, how funds would be managed and accounted for, and how their services are operated and maintained.
- government plays a facilitative role, sets clear national policies and strategies, encourages broad stakeholder consultation and facilitates capacity building and learning; so that an enabling environment is created for the participation of a wide range of providers of goods, services and technical assistance to communities, including the private sector, and non-government organizations, and

- an adequate flow of information is provided to the community, and procedures are adopted for facilitating collective action decisions within the community

♠ ***Community and women's participation:*** - the issue of participation influence project planning, management structures and maintenance provisions. Participation refers to the many channels for voicing and exchanging opinion- in voting, articulating preferences, providing advice and counsel, and channeling feedback from the public to the decision makers. In its largest sense, participation represents a fundamental link between project beneficiaries and project suppliers (Campbell, et al, 1993).

In the planning stage, therefore, participation of communities in all and women in special case is very necessary. Why more attention for women is because, women take the central role in the collection, management and use of water, as well as with the general sanitation of the household (Fong *et al*, 2003). Furthermore, there is ample evidence to indicate that a more active involvement of women can optimize the results and impacts of RWSS projects (Mukherjee et al, 2003; DFID, 1998).

Besides, the World Development Report 1992(World Bank 1992) states that people's participation has three main advantages; it gives planner a more thorough understanding of local values, knowledge and experience, it wins support for project objectives and fosters community assistance in local implementation, and it helps resolve conflict over resource use. Gow et al 1994, in their study assure community participation also enhances equity and sustainability of benefits, and accountability.

- ♠ ***Technology Type:*** In order for water supply to be sustainable, appropriate technology must be used. The choice of technology type should consider the existing socioeconomic and environmental conditions of specific area. Technology type, operating and maintenance, capacity and acceptance of rural people and spare part accessibility issues are of importance for sustainability of the services given. Experience from African continent shows that in areas where technologies are adopted with out consideration of the above features, problems happened. What appeared to be lacking was the ability of both governments and user communities to maintain them. Affordability of both capital and repair costs is also a problem. Even where communities did attempt to take care of their pumps, this largely involved carrying out repairs after a failures ; preventive maintenance was hardly ever undertaken (Skinner in Harold et al,2003).

- ♠ ***Institutional Capacity and support:*** one way of enhancing sustainability of rural water supply schemes is the provision of inspirational support to their management bodies. Problems that are beyond the community level need to be addresses by supporting agencies like government stuffs. Studies indicate that lack of assistance to local community management body is one of the important reasons for the failures of improved water supply in every corner of the world. In this case, the capacity of the technical stuffs is in addition very important factor. The more the stuffs are capable, trained and professionals the better would be their effect for the sector.

- ♠ ***Use of baseline survey:*** from the external support agency, what could be taken as one having paramount importance is conducting baseline survey. Imputes of experienced

experts of hydrogeology, geophysics, engineering, development planning and sociology are vital in the course of data collection, water resource potential assessment, site selection, and to choose the right technology options(Sebsibe, 2002).

- ♠ ***Training to Households and local management bodies:*** Training provides knowledge of how to operate water system, and prevent major problems. It also informs the communities that it is their responsibility to maintaining the system, not the projects' or the governments'. It, in addition, educates people about potential health benefits of protecting the water source, and thus enhances their willingness to sustain the system. Therefore, in addition to training for water committee members, education about the linkages between unsafe water and disease should be integrated to water supply schemes of rural areas (Gebre Amanuale, 1977; Churchill et al 1987).

The Post implementation Factors

Considering factors outlined in post project phase, we can identify two broad sets of issues, which can lead to problems for community-managed RWSS after projects have been implemented.

- Those limitations within the community like community dynamics, political or social conflict, lack of cohesion, lack of capacity (technical, managerial etc), lack of financial resources; and
- Those constraints which are external to the community like lack of spare parts supply, lack of supportive policies and legislation, and lack of long-term support to help communities through major repairs.

Of course, in some instances there is a direct relationship between factors that are within the control of the community, and those of externals.

Factors from with-in community

If we re-consider the conditions highlighted to impact upon sustainability in the post-project phase, it is clear that several of these fall within the sphere of control, or influence of the community. Broadly speaking there are five main factors important from the community to take. These factors are-

- Preventative maintenance of communally managed water supply infrastructures
- Tariff collection and cost recovery to cover routine operation and maintenance of water supply infrastructure.
- Adequate capacity (technical, financial, administrative etc.) within the community necessary to manage a system or to engage with an external party to operate and manage the system on its behalf
- The continued involvement of community, women along with men, in all aspects of system management and maintenance
- Adequate levels of social cohesion, or social capital, required to achieve system management and the motivation, or willingness, to contribute resources, time and money.

A number of these elements are linked with, and to a certain degree conditional upon external factors. For example, there is relationship among adequate management capacity of community structures and continued technical support and training in key areas over time. Likewise, the success of cost recovery efforts, as a key post-project determinant of

sustainability, will be influenced by the extent to which individuals and committees are supported, re-trained, and guided in relation to tariff structures and broader financial management. If such (external) guidance is absent, then it is likely that the success of cost recovery efforts will slowly diminish over time and will not be able to overcome major thresholds, such as the need to increase tariffs to keep pace with system expansion, or to pay for replacement of major system components. Clear and widely disseminated rules and regulations will also benefit community management and tariff collection efforts.

A more active involvement of women can optimize the results and impacts of RWSS projects (Mukherjee et al, 2003; DFID, 1998). Therefore, it is not surprising that the continued involvement of women, both before and after project implementation, is identified as one important determinant of sustainability.

The remaining internal factors that can be considered as critical to the sustainability of RWS projects are closely related, and concern the willingness, or motivation, of a community to maintain their facility and the level of social capital of the community that enables successful collective action (in this case the maintenance of physical infrastructure and other project benefits). In comparison with all other factors identified as a post-construction, these are perhaps the most abstract and difficult to define or measure, although there is now a growing body of knowledge about how to go about this (Harold et al, 2004).

Several researchers point to motivation as one of the keys to sustained project benefits. It is only common sense that motivation or willingness to contribute to the maintenance of a system is based on a perceived benefit. In the case of a communal water supply system,

motivation and willingness must be generated on both an individual and collective basis, amongst both individual and household users who pay a tariff and community members who volunteer time and are involved in system management. Taking a broader perspective, external actors must also be motivated to contribute towards supporting community-managed RWSS; local governments may perceive a political benefit, the private sector a profit motive and central government may see sustainable service provision as part of their broader development agenda. For whatever reason, and from whichever perspective, motivation is clearly a critical factor in post-project sustainability (Harold et al, 2004).

Similarly, an adequate degree of social cohesion within a community is now considered as a fundamental factor in sustainability. The collective willingness to maintain a water supply system, is a reflection of social cohesion, and is dependent on the concept of community identity (Cater *et al*, 1999).

Factors from outside communities

The second set of factors to bear in mind when attempting to understand post project sustainability, are those that are believed to be exogenous to the community. The primary factors redundantly identified in many literatures are the following.

- Access to or availability of spare parts, tools and equipment for the community to carry out repairs
- The availability of some form of external follow-up support, which can be provided in many different ways and by a range of institutions; this includes two other important

factors, relating to continued training and support of community management structures and individual households for hygiene promotion and behavior change.

- The presence and strength of skilled technicians to carry out complex repairs
- The existence of a supportive policy environment, legal frameworks underpinning the legitimacy of water committees, and clearly defined roles for operation and maintenance
- A system source that continues to produce water of sufficient quantity and quality to satisfy users

Simply in terms of keeping the physical infrastructure working, an adequate supply of spare parts and maintenance tools is obviously important. Supply chains are now recognized as one of the key determinants of sustainability (Davis et al 2002), especially where the technology provided is imported, which has often been the case with large-scale hand-pump programs in Africa for example.

Another very important factor could be the provision of follow-up support to rural communities in the long-term. This is increasingly recognized as a critical factor in sustainability (Lockwood, 2002; Schouten et al, 2003). To these authors, the majority of rural communities cannot be expected to manage RWSS on their own indefinitely. In order to guarantee the sustainability of RWS projects and the associated benefits, it is necessary to provide support and guidance that addresses a range of issues. A number of other primary factors, such as continued training and capacity building, all fall under the umbrella of follow-up support. As Lockwood in Sara et al (1999) puts out, there are four main functions provided by such support mechanisms beyond technical support for the O&M of physical infrastructure.

The final external factor for post-project sustainability is sustainability of the water source itself. Obviously, deterioration of source water quantity will be of major concern in areas of low rainfall, or poor groundwater re-charge, where there is greater sensitivity to over-extraction. Nevertheless, even in relatively water abundant regions of the world, the source can fail to satisfy demand, either due to population expansion or due to abuse of supply for non-domestic purposes. Water quality may also suffer from contamination from agricultural by-products or chemicals. In either case, care must be taken in the design of projects to determine the likely of sustainability of the source over a long period. In fact, several recent project designs have incorporated water conservation components to address this specific issue. For example, the proposal made by World Bank for Maharashtra state in India includes water saving designs and the construction of recharge mechanisms, such as check dams and infiltration structures, in the watershed area of the projects, which are to be maintained for up to five years following project completion (World Bank, 2003).

Box 2-2: The Principal Functions of External Support to Rural communities

Technical Assistance: *providing advice and guidance on a range of topics in support of the community management structure, as well as providing independent advice in cases where some form of arbitration may be necessary.*

Training: *on-going training of the relevant committee members in a variety of disciplines from physical operation and maintenance to bookkeeping and hygiene promotion; capacity building at the community level.*

Monitoring and Information Collection: *regular monitoring of system performance and feedback of information for remedial action*

Coordination and Facilitation: *helping to establish linkages between community management structures and external entities, either from the state or from private sector*

Source: Lockwood (2002)

However, it is important to mention all factors for and against sustainability of RWSS; the relative importance of these factors in many cases is dependent on the individual regional context and also type of project.

In addition to presenting a list of factors, it would be more useful still to understand how these factors relate to different operating environments and how they might be treated by planners and program designers across different of rural population. In short, if we are planning to work in a particular type of community or region, what are likely to be *the most important* factors that will determine post-project sustainability?

There are ranges of issues that must also be borne in mind when considering why communities are able to sustain their RWSS systems over time. Hodgkin refers these as contextual factors. The common sets of issues include the following:-

- ✚ Poverty, income levels, economic development or human development indicators
- ✚ Demographic factors; population size, distribution and density
- ✚ Socio-cultural characteristics and levels of homogeneity
- ✚ Education levels
- ✚ Proximity to urban centers or main transport routes
- ✚ Water endowment, water source type and topography
- ✚ Complexity of system technology or design type
- ✚ Level of service (single point supply or household)

Whilst it would be difficult to attempt to cross-reference each of the above contextual issues, it is nonetheless useful at least to consider how the most significant of these issues might affect their relative importance.

2.4. Theoretical frameworks applied to assess sustainability in RWS

Wide variations of definitions of sustainability of RWS are reflected in the range of approaches employed by different organizations to assess the degree to which project benefits are sustained over time. This section considers how organizations and researchers have approached the measurement of sustainability and the methodological frameworks that have been developed.

Water Aid UK in 2003 has developed a tool for rapid assessment of sustainability of water supply projects. The development of this technique was largely in response to concerns over lack of clarity about what makes projects sustainable. The tool was

designed to provoke discussion and critical analysis on the part of those using the tool (Sugden, 2003).

The tool was designed to focus on only three factors, which Water Aid considers the most critical to affect sustainability; namely, *finance*, *maintenance* and *spare part supply*. These were selected, in part, based on WEDC's research into hand-pump projects in Africa, which concludes that these three main factors are in turn dependent on supportive policy being in place, institutional support and the right technology (Harvey *et al*, 2002). The assumption is that if these are working well, the other dependent factors must also be in place and functioning properly.

There was also a global study carried out by a joint team from the World Bank's WSP and the IRC. It uses a newly developed conceptual approach to measuring sustainability, the Methodology for Participatory Assessment (MPA), which grew out of the World Bank-supported participatory learning initiative starting in 1997. The study introduces new dimensions to the way in which sustainability is viewed, including a greater focus on gender and the equitable distribution of benefits (and burdens or costs) across all members of rural communities.

This study included a working hypothesis stating as "*communities better sustain their services when projects are more participatory, demand-responsive, and gender and poverty-sensitive*" (Gross *et al* 2001). The key difference in the MPA approach is the far greater reliance on participatory techniques and tools for eliciting information, as oppose to the more prescriptive approaches used in conventional surveys. The significant feature

of the MPA model is that it allows participatory data from a large set of communities to be analyzed.

The actual study involved sampling of households and individuals from different communities. It also uses results of focus group discussions and activities, with groups of rich and poor, men and women. The outputs from this survey work were then “quantified” by applying a scoring system that allowed for conversion to percentages and statistical manipulation, including regression analysis (van Wijk & Postma, 2003).

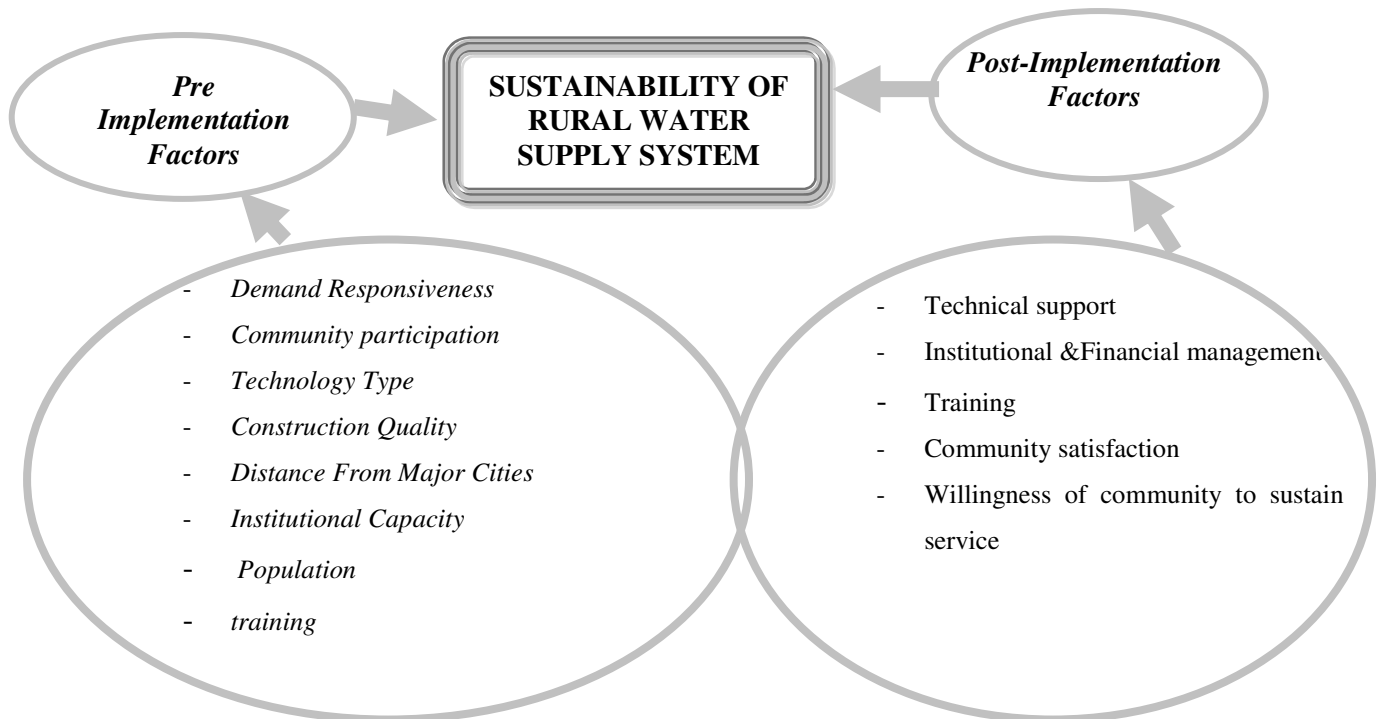
The research identified four main factors, among others, that significantly increased the success of community-managed RWS services:

- ✚ *Higher levels of demand-responsiveness in project implementation;*
- ✚ *Better gender and poverty focus during operations,*
- ✚ *Greater levels of participation; and*
- ✚ *Higher levels of user satisfaction*

If we look across these two studies and consider the main findings, it is possible to gain some insight into the relationships between sustainability and project-related variables and the factors influencing sustainability. The study by WSP/IRC largely considers assessment of sustainability in relation to project rules and implementation (i.e. *what happened before and during a project*). On the other hand, the WaterAid examples tend to focus more centrally on post-project issues relating to sustainability (i.e. *what happen after the project is completed*).

In case of this study, the researcher accepts the results of both studies to put a comprehensive picture of factors for sustainability. By extending this concept, it is possible to identify the following broad conceptual framework about the critical issues affecting sustainability:

Figure 2-1: Conceptual framework of sustainable RWS and the determinant factors



This research study considers “sustainability of projects and benefits” as a function of both pre and post implementation factors, and the status of the following determinant factors are going to be assessed merged in four general grounds contextually. Merging dominant factors in to four general fields such as, technical; institutional & financial; organizational and human power; and social categories helps discussions and analysis to be in a manageable and understandable shape.

To make it more clear, the following pre and post implementation factors are taken as of basic in most literatures to sustainable water supply for rural communities:

Technical aspects of sustainable water supply system: these factors are of more technical and mostly from out side of community's. This comprises;

- ✚ Project planning and implementations(including base line survey, demand responsiveness of water supply , community involvement and the like), technology type and spare parts availability, training and education given to Water committee and community before project implementation, physical condition of water supply projects
- ✚ institutional aspects of sustainability, which include financial administration of water committee including payment of tariff, Management capacity of the water committees, Operation &Maintenance (O&M) system
- ✚ Social aspects of sustainability, which include consistent and equitable participation of community especially women in all aspects of project development, consumer satisfaction and willingness of them to maintain service
- ✚ Organizational and technical aspects of technical agents including follow up support

CHAPTER THREE: FINDINGS OF THE STUDY AND POLICY SETTINGS

3.1. Characteristics of the Sample Population

From the existing 19 tabias of the Woreda, four were studied in this research work. The tabias were Adigolo, Menkere, Fala and Zata. The former two are located in the north and northeast of the Woreda, where as the latter two are in the west. From each tabia, 3 water points and 45 members of different households were selected using simple random and systematic random sampling methods respectively. Hence, a total of 180 households were taken for primary data source of this survey.

Table 3-1: Age distribution of Respondents

Age of respondents by sex			
Age	Total	Female	Male
15-19	3	3	0
20-24	9	7	2
25-29	34	23	11
30-34	41	24	17
35-39	21	14	7
40-44	25	12	13
45-49	18	9	9
50-54	10	8	2
55-59	7	3	4
60-64	5	2	3
65-69	3	2	1
70-74	0	0	0
75-79	2	0	2
80+	0	0	0
*Non response	2	1	1
Total	180	107	71

Source: researcher's own survey results

About 96.1% of respondents were in the economical productive or 15-64 age bracket.

That means data was gathered from the productive age group and indeed people of this

* Those respondents who did not put their replies for the question asked. In some parts of the questionnaire, respondents did not say replies due to a reason unknown.

age group are those expected to take actions in the development processes of rural water supply. The average age of respondents was about 37.55 with a standard deviation of 11.3.

Figure 3-1: Selected Tabias for the study in Oflla Woreda

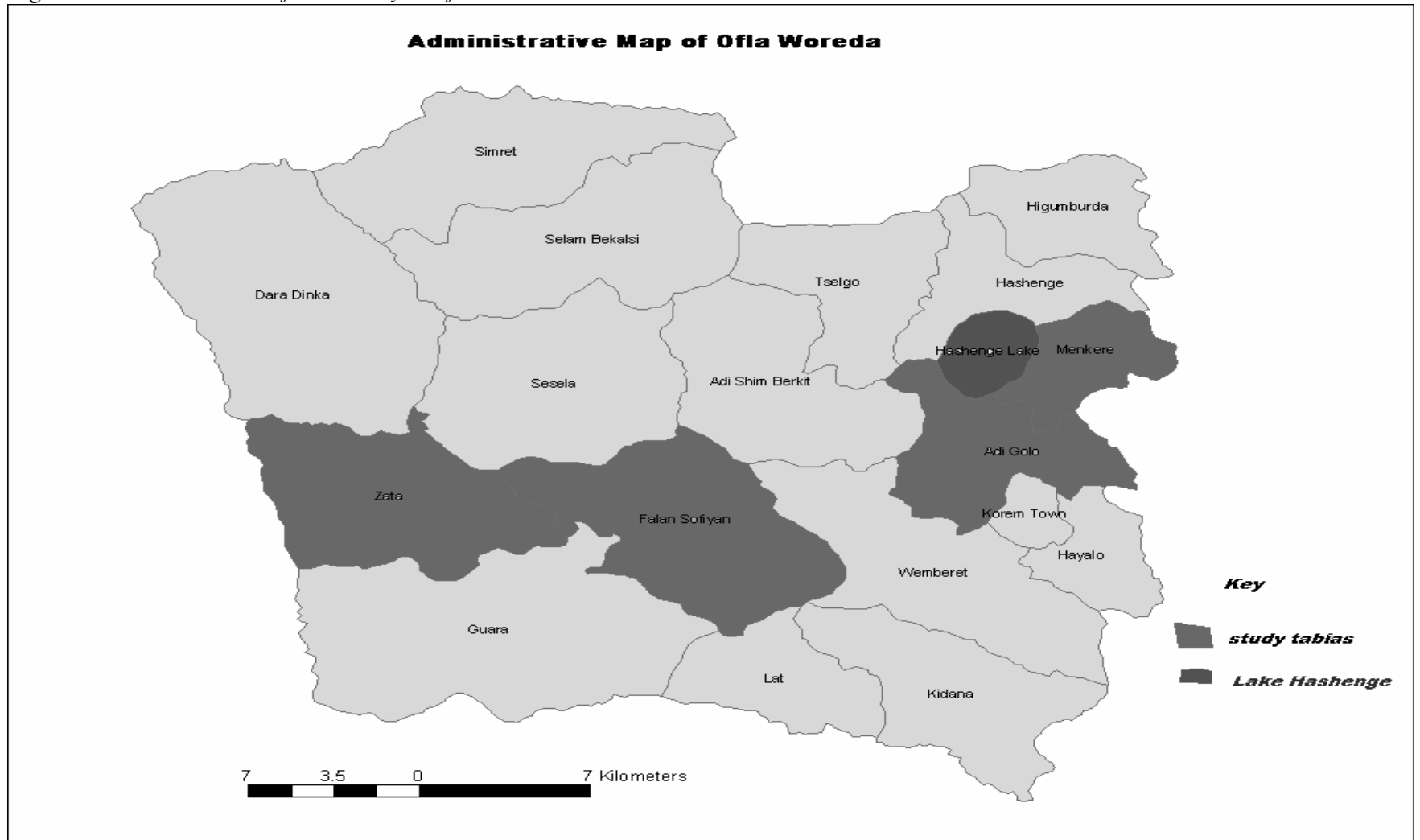


Table 3-2: Sex distribution of respondents

Sex of Respondents		
	Frequency	
	No.	Percentage
Female	108	60.00
Male	72	40.00
Total	180	100.00

Source: researcher's own survey results

Sixty percentages of respondents were females because of two reasons, 1) data have been collected during *belg* (March & April) season so that males were at work out side house. 2) It is women who suffer the burden of fetching water so that it has sense to take majority of their number in study of this kind. The national water supply policy and strategic plan of the Woreda also emphasizes on the full participation of women in development. Therefore, this study seemed to give strong sense for more inclusion of women in its data source.

Table 3-3: Marital status of Respondents in the study areas.

Marital Status of Respondents		
	Frequency	
	No.	Percentage
Married	136	75.56
Separated	30	16.67
Unmarried	4	2.22
Widow	7	3.89
No response	3	1.67
Total	180	100.00

Source: researcher's own survey results

Three quarter of respondents, as shown in the above table, were found to be married and 16.7% separated as seen in the above table 3-3.

Table 3-4: Household Heads of Respondents' in the study areas.

Head of the household	Frequency	
	No.	Percent
Female	42	23.33
Male	137	76.11
No response	1	0.56
Total	180	100.00

Source: researcher's own survey results

As is true in the face of the region and the country, males are the dominant household heads in the survey. Table 3.4 shows only 23.33% of the households were female headed with the rest taken by males.

Minimum household size of respondents was one, with the maximum of 11. Average household size is 4.87 with standard deviation 1.89. About 77.8% of the households of this survey lay in the household size of four and above. Average household size of respondents is lower than the regional one, which are 5.5.

Table 3-5: Household sizes of Respondents in the study areas.

Household Size		
Family size	Frequency	
	No.	Percent
1-4	81	45.00
5-8	92	51.11
9 and above	5	2.78
No response	2	1.11
Average size	4.87	

Source: researcher's own survey results

Rivers, lake (Hashenge) and natural springs were/are major sources of water in addition to the safe one. People use these unsafe water sources when safe water projects are not functioning. These sources are not separated for human and animal uses.

Table 3-6: Water consumption capacities of Respondents under study.

*Daily water taking capacity of the HHs in litter		
Water in litters	Frequency	
	No.	Percent
97 litters & less	174	96.67
More than 97 litters	6	3.33
Total	180	100.00
Mean	47.2	
Mode	44	

Source: researcher's own survey results

Average water-use-ability of households from the developed potable water projects was calculated to be 47.2 litters (2 jerry cans) in a day. The above table shows, more than 96% of households consume less than 97 litters of water in a day.

Table 3-7: Daily Frequency of water collection and per capita water consumption of respondents in study areas.

	Number of respondents	Percentage of respondents	Mean	Stand. deviation
Water collection frequency per day;				
Once	35	19.44	2.08	1.106
Twice	120	66.67		
Three and more times	25	13.89		
Per capita water consumption				
Less than 20 litters	162	90.00		
20 litters and more	18	10.00	11.14	8.97

Source: researcher's own survey results

* house hold water consumption was calculated based on the average household size of the study area found from the research and the minimum per capita water requirement set by WHO (i.e. 20 litters a day)

On average, people in the study area fetch water two times in a day from potable water sources on normal condition. At time of cropping and collection, water use capacity and fetching frequency increases. Average per capita water consumption is 11.14 liters a day, which was very low comparing with the amount recommended by WHO, i.e. 20 liters per day. Around 90% of people consume less than 20 liters of water in a day, as indicated in the same table.

3.2. Major Findings of the study

In this part, the main important elements that affect sustainability of rural water supply are discussed based on findings from the survey. For the discussion of this paper all the indicators of sustainability are grouped in to four general categories; such as technical aspect, institutional& financial aspect and social aspects as well as managerial and human power aspect.

Project planning and demand responsiveness of Rural Water supply:

Practices of baseline survey

Baseline survey is helpful for informed decisions and successful project implementation. It gives information about present status of community, water and environmental sanitation conditions to conduct feasibility studies. It is also a foundation for planning, channel to get information from community and so on.

There was no as such comprehensive and integrated way of making baseline survey at the lower level. Instead, large part of it was completed in office. They have two factors necessary to decide in which tabias new water project should be developed: Potable water coverage at tabia level and agro-climatic condition. Qolla parts have priority for their

higher water need than Dega and woynadega. Nevertheless, health indicators have poorly been included.⁴ Once deciding the tabia, the RWMEOs inform the tabia leaders for specific area selection which contributed to low share community participation. In this case, figure 3-2 reveals that the role of local community to decide specific site and technology and machine type of new water services was minimal. This was true in all water developments up to the year 2005.

Lack of enough budgets, trained workers and logistics were frequently cited reasons for the above-mentioned failure. Decisions on capital budget exacerbate the weakness. The Woreda has usually not made budget decisions at one time in a year. When some leftover budgets found from the treasury of sector offices, relocating it to capital projects like water development is common. Such a condition especially when the time is in the end of budget year, forces the office to complete projects within a short period to save the budget from being cancelled. Such hurry works would make them not even to consider the above factors and causes for improper completion of projects.

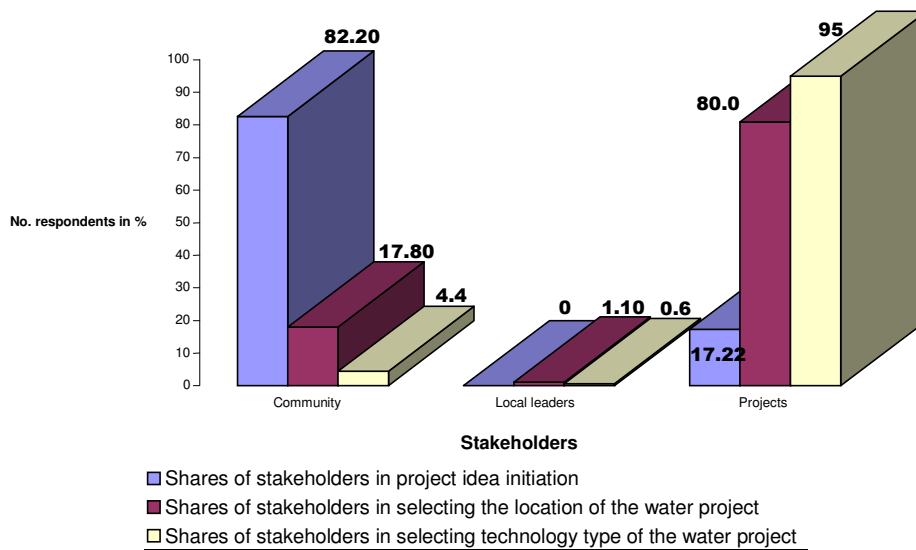
All development activities are for the people and exclusion of these communities from pre-development aspects as that of the survey means losing information for identification of problems and solutions too. Communities need to be participated in as much important steps like the above one as possible. Otherwise what is happening in the ground may mismatch with needs of communities and goals of development.

⁴ Even though the RWMEO of Ofla Woreda did not include a health-based criterion in the priority settings, they usually consider it in the general objectives of PWSP development.

Project initiation and informed choices

Demand responsive approach of service providing advocates to adopt clear and transparent rules to allow users indicate their priorities, technology type, and location of facilities that best fit their needs; with a clear understanding of the costs and responsibilities that these options bear. Sustainability is higher in communities where a demand-responsive approach is employed (Sara et al, 1997).

Figure 3-2: Demand Responsiveness of Rural Water services in Study areas of Ofla Woreda



Source: researcher's own survey results

In the case of our study area, there was huge potable water demand and communities have transferred this problem to the project implementers (RWMEO), although not in a mechanism which allowed them directly to do that.

Results of this survey show that large share of the people have been claiming for potable water service development before the time of construction of the existing water supply projects. Accordingly, 82% of respondents were frequently asking the development of potable water projects although not directly to the project implementers. Although not

directly, this involvement of peoples' demand in project initiation and other following decisions that need to be made about the water system, increases sustainability of the water services. This is encouraging side of development when organized in the initial stage as community participation helps project to be efficient in resource allocation, effective in implementation, equitable, sustainable of benefits, and increase accountability among stakeholders.

Almost in all areas, as shown in table 3-8, potable water service development was priority issue of the local people.

Table 3-8 Development priority issues as expressed by Respondents in percentage

What was your development priority to have before construction?	Frequency	
	No.	Percentage
Water	175	97.22
Other	2	1.11
don't know	3	1.67
Total	180	100.00

Source: researcher's own survey results

Nevertheless, some necessary project rules have gain small attention but are preconditions for sustainability of the potable water service (PWSS). Unsubstantial community involvement has been observed in project site and technology selection. Implementers have built up projects at a site, which is not equally access to all the people and this resulted for the exclusion of communities in remote areas from water service.

Table 3-9 below shows, 44% of the society spend more than an hour, and 29% needs between half and an hour to secure water needs from previous unsafe water sources.

Present water points were also 50 minutes far on average from beneficiaries, which was largely grater than the guideline put by WHO, i.e. 15 minutes.

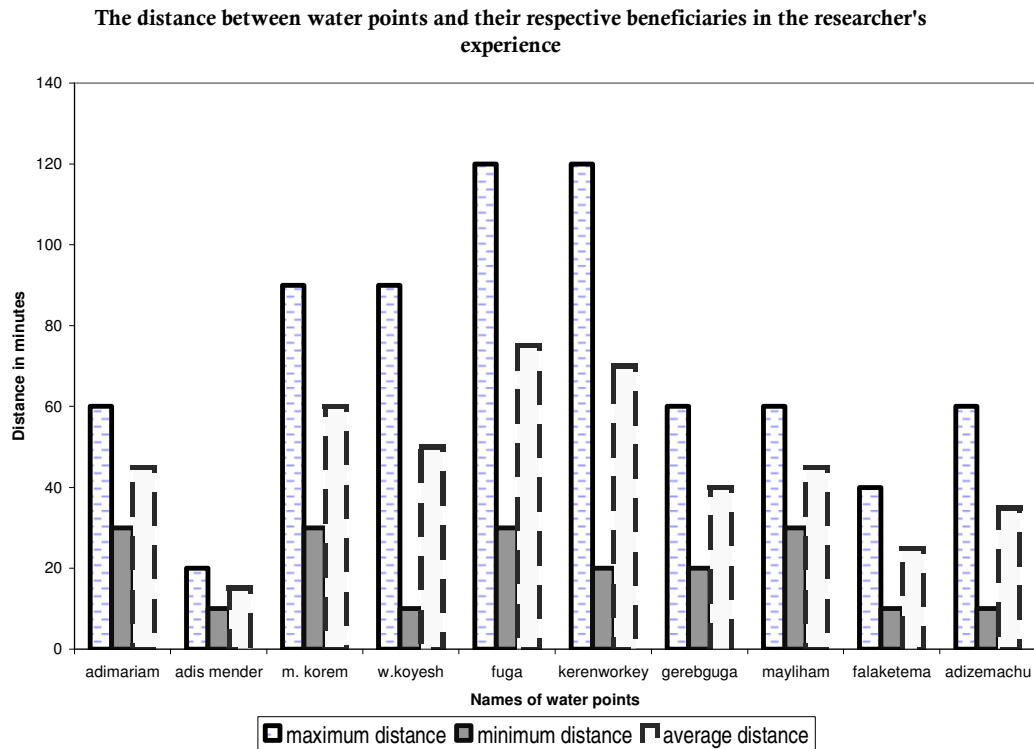
Table 3-9: Average Distances of previous Water sources for Respondents in the study area.

Time in minute	Frequency	
	No.	Percentage
10	1	0.56
20	6	3.33
30	41	22.78
35	3	1.67
45	14	7.78
60	33	18.33
75	1	0.56
90	26	14.44
120	35	19.44
180	7	3.89
210	2	1.11
360	4	2.22
No response	7	3.89
Total	180	100.00

Source: researcher's own survey results

As figure 3-2 above illustrates, only in 18% of the water service development did local communities participate to decide where the service should be set, considering the distance to their advantage.

Figure 3-3: Distance between Water Points under study and Beneficiaries estimated by the researcher.



Source: researcher's own survey results

Although average distance of modern WPs is less than that of the traditional water sources, figure 3-4 below specifies 37% of respondents, most probably those in remote and mountain areas, claimed there was no difference in distance between the former and the latter one. Considering this against sense of ownership, community health, management and financial involvement, it would have adverse role in the overall sustainability of the service. Therefore, strong consideration is important in this case.

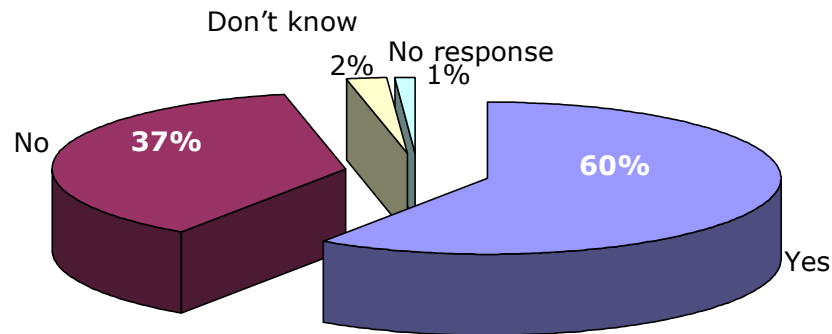
On equal distance, advantage of traditional unsafe water sources can get weight due to some subsequent settings next to the modern one. In some area of the study where rivers and hand pumps are on equal distance and together, there are people who bring water

back from the river taking advantages of zero payment and standing for short period of time to fetch water.

More over, when hand pumps are in very distant locations, they lack security. Animals and passengers can easily enter the compound and bring damages to water services.

Figure 3-4: Responses in Percentage of respondents on whether the modern water projects reduce distance comparing with the previous unsafe sources.

Have the new PWP's reduced distance in time comparing with the previous unsafe sources?



Source: researcher's own survey results

In this case, therefore, implementers ought to weigh up past experiences and take a lesson from it. Resources are limited especially in country like Ethiopia. Therefore, when development finances are decided to make difference in society, project implementers should not only see technical aspects only they should also consider the social aspects of development in order to hit targets of decisions.

Because resources are scarce so that there will no more be one side flow of it. Rather, whatever the amount it should better come from all directions including the beneficiaries. As the same time, to keep the people participating in resource provision, their satisfaction

has to be considered. Therefore, the above-mentioned inconsistencies need to be checked to the society's benefit. When that is addressed, sustainability of the water supply system would also be addressed.

Technology used for water supply and community's acceptance

Three technology types namely shallow well, Hand dug well and protected spring; are available in the Woreda. These technologies were unevenly distributed through out the Woreda due to factors related to topography, capital, community acceptance and so on. The inaccessible and rugged nature of the Woreda landform, capital and labor-demanding nature of shallow well and other factors forced the Woreda RWMEO to use Hand dug well type more than shallow wells. Similarly, use of spring development is also discouraging. The RWMEO is on its way to no use it in near future.⁵

Local communities prefer Hand dug wells than shallow wells and protected springs. The people do not consider spring development as one development alternative because they do not consider the change between the former unprotected natural spring and the protected one. Some users describe their understanding as:

'the spring water was there naturally and you do not change it except the construction.

We were using the natural water before and we are using it now, no change'.

Due to this, they do not even need to contribute in project construction time unlike that of the Hand dug well. In some areas, people broke tankers of springs and took the stones and wires for their home buildings according to the office.

⁵ The office does not want to keep technologies that do not have produced positive attitude from users.

Shallow wells require more capital to drill water base and the unavailability of capital budget discourage them to apply. It also requires logistics (vehicles) and ways to remote areas where it is not as such easy for contractors provided that budget is available. Shallow wells, when applied with Indian Mark II type, are also very difficult to pregnant, middle and old age women. This is also true for Afridev machine brand. A woman cannot collect water alone in *gerebguga*, *wotkoyesh*, and *mesegta* water points, where the former is shallow well with Indian Mark II and the later two with Afridev machine brands. There should at least be two females to pump and produce water. This inconsistency is the result of depth of water base⁶.

Physical conditions of Infrastructures of water supply

Among the technical aspects, physical condition of schemes is an important one. The study tells 75% of water points were located in areas at least 20 and at most 120 minutes far from settlements. In this case, projects lack closer eye contact from beneficiaries and are exposed to danger.

Table 3-10: Distributions of respondents to whether their nearer potable water point has been fenced.

Respondents' response	Frequency	
	No.	Percentage
Yes	97	53.9
No	83	46.1
Total	180	100.0

Source: researcher's own survey results

⁶ When water base gets far and far, it needs a number of pipes to supply the water from the ground and this nature of it usually requires more labor.

Guards and fences are other important factors to reduce damages for water service. However, about 46.1% of respondents said that their nearer water services have no fences at all, as indicated in table 3-10.

Table 3-11: distributions of respondents on whether animals and passengers could enter to the area of WPs

<i>Responses of respondents'</i>	<i>Frequency</i>	
	<i>No.</i>	<i>Percentage</i>
<i>Yes</i>	<i>109</i>	<i>60.6</i>
<i>No</i>	<i>71</i>	<i>39.4</i>
<i>Total</i>	<i>180</i>	<i>100.0</i>

Source: researcher's own survey results

The researcher also checked that 66.7% of water points (WP) in the study do not have any fence to prevent failures. In *maedokorem*, the water point is constructed in a place 30 minutes minimum and more than an hour maximum distance from beneficiaries on the side of subsidiary road. Here, travelers usually break keys to drink water when they pass and resulted for additional cost. Water committee (WC) members of that WP has indicated that their largest operational cost next to guard's salary is frequent replacement of keys.

There were guards usually employed to take care of service, however, it was beyond their control for it is not their only work. Guards were frequently those on the land of whom water points are constructed; and payment is given indirectly as compensation to former landowners.

Table 3-12: opinion of respondents on the construction quality of water projects.

Responses of respondents	Frequency	
	No.	Percentage
Good	88	48.89
Fair	63	35.00
Bad	28	15.56
No response	1	0.56
Total	180	100.00

Source: researcher's own survey results

The other infrastructural aspect important for water service is construction quality. In the study area, construction style varies from area to area depending mostly on supervision works. The office of RWME and users ranked water points constructed by Catholic Church to have the best construction quality. They are good because they have been built under strong guide and supervision from donor agency.

The researcher also observed difference in construction styles among existing water points. Water points constructed by Catholic Church have strong wire fences, outlay to prevent water logging, and notice board serving for WCs in addition to quality of its building. Where as others mostly constructed by contractors under the supervision of RWME office with capital budget from Woreda government hardly include these features.

According to RWME office, this kind of problem is common because of the following reasons. When capital budgets are coming with out notification and approaching to budget closing date, and due to lack of skilled technicians and logistics. The office has one motor cycle to serve all members of the staff in all areas of the Woreda. Due to these factors, supervision works of the office usually get insufficient and hence ineffective.

Observations of beneficiaries in table 3-12 support the above view that about 49% weigh up as good, 35% as faire and 15.56 as bad. Some of the bad qualities are having no outlays and fences located at open air near and with in streams.

One-third of water points comprising three shallow wells and one protected spring under study are not functional. Shallow wells in *mesegta* and *gerebguga* are among the structurally good construction type but un-functional since a year and half ago. The failures are not specified indeed but believed to be beyond capacity of the technical staff in the Woreda. As a result of it, people are fetching water back from previous traditional unsafe water sources.

Table 3-13 technology and machine types of water points studied in Ofla Woreda.

No	Specific area	Tabia	Technology type	Machine brand	Status of service
1	Wotkoyesh	Menkere	Shallow well	Afridev	Functional
2	Aditsahfelam	Fala	Spring	Spring	Functional
3	Adiwotwot	Fala	Shallow well	Afridev	Functional
4	Adizemachu	Zata	Spring	Spring	Not functional [#]
5	Kerenworky	Menkere	Shallow well	Afridev	Functional
6	Falaketema	Fala	Hand dug well	Afridev	Functional
7	Fuga	Menkere	Shallow well	Afridev	Not functional [*]
8	Gerebguga	Zata	Shallow well	Ind. Mark II	Not functional [*]
9	Hadismender	Adigolo	Hand dug well	Afridev	Functional
10	Maedokorem	Adigolo	Hand dug well	Afridev	Functional
11	May liham	Zata	Hand dug well	Afridev	Functional
12	Mesegta	Adigolo	Shallow well	Afridev	Not functional [*]

Source: researcher's own survey results

[#] The spring in Adizemachu was out of service from start and did not have any management body and financial resources until the study was conducted. It can not work unless constructed newly.

^{*} those non protected spring water projects which are un-functional were not delivering service at the time of study , however, they were giving service before failure and they have still the management bodies with some amount of money saved in local bank expecting repairs and maintenance works from the Woreda technicians.

Discussion with the technicians of the office of RWME approves serious problem of spare parts did not happen to this time. The office has some reserves and if problems beyond the reserve occur, spare parts in most cases for Afridev types and to some amount to Indian Mark II, type is available in the regional capital, 163 km away from the Woreda.

Although the office has said this, the reality seems to be different. It makes no sense for water services to stop functioning for more than a year when some one is saying spare parts are available nearer to it. It seems that less attention is given to action while water points are with in the radius of an hour distance.

Adizemachu protected natural spring is also un-functional from its start. The spring source was mismatched with tanker during its construction. So that the water, instead of flowing in to the tanker, run underground in side the soil. The people said the power become deteriorated after the construction and is difficult to get water on the surface.

Monitoring works seems to be weak when failures of projects to give service have been ignored for more than a year. Once huge capitals are invested to tackle problems of local communities, failures are common due to many reasons. However, monitoring statuses of water services and making repairs to them are easy and do not require as much resources as the initial takes.

Training to water committees and Households

Training is one factor for RWS sustainability. It includes not only trainings of the management bodies including community level but also that of the household level. This study reveals that the local communities have weak training exposure with regard to

potable water use, personal hygiene and environmental sanitation practices. Although there is a comprehensive module that includes technical, financial, hygienic and environmental sanitation issues for training of water committees (WC), the way it was given to the committee members is out of the reach of the community at the grass root level.

Table 3-14: percentage of Respondents exposed to trainings related to potable water, hygiene and sanitations

<i>Did you get any kind of training related with water use including source diversification?</i>		
	Frequency	
	No.	Percentage
Yes	11	6.11
No	143	79.44
Don't know	15	8.33
No response	11	6.11
Total	180	100.00

Source: researcher's own survey results

From the survey result, more than three-quarter of beneficiaries did not have any kind of training related to water use and diversification of sources. It was only 6% of them, which had access to training of such a kind. This shows there is lack of education and awareness creating practices in the Woreda, as put in the background part of the paper.

Despite the fact that RWME office set some reasons related to lack of trained workers, budget and logistics for this weak training and educational practices, there seem also to have weak integration between the Woreda health office and RWMEO in this aspect. The issue of community health is not the responsibility of the RWME office only but also the former. Therefore, they need to be integrated to address the issue for better.

Table 3-15: Water points and Members of WCs that have access to training.

Specific area	Tabia	Has WC	No. of members of WC	Women's share in WC	No. of members who get training	No. of Training given
Wotkoyesh	Menkere	yes	6	3	0	0
Aditsahfelam	Fala	yes	ND	ND	ND	ND
Adiwotwot	Fala	ND	6	2	ND	ND
Adizemachu	Zata	No	0	0	0	0
Kerenworky	Menkere	yes	6	2	0	5
Falaketema	Fala	yes	6	3	ND	ND
Fuga	Menkere	yes	6	3	5	3
Gerebguga	Zata	yes	6	2	6	2
Hadismender	Adigolo	yes	6	3	0	0
Maedokorem	Adigolo	yes	6	2	6	2
Medazata	Zata	yes	6	3	ND	ND
Mesegta	Adigolo	yes	6	2	6	3

Source: researcher's own survey results

ND = No Data

Water committee training was also weak because of inadequate support from the Woreda government. Woreda government supports only infrastructural development although proposals for training are submitted from the respected office; because it does not consider training as important for the infrastructure developed to achieve its goals.

Another problem that exacerbates this issue is the frequent turnover of members of water committee in the systems. In eight WPs, 50% of members of WCs did not obtain training and no one person has that in *wotkoyesh*, *adizemachu*, *Kerenworky* and *hadismender* water points, which would adversely affect the service. In other case, except one person, who seems to be new member, all members of the other four water committees have participated in training at least on one occasion. In three water services (*hadismender*, *adizemachu* and *wotkoyesh*) no training has been given to the WCs from the start and

the remaining five WCs have got trainings at least two and at most five times(see also table3-15).

In the same table 3-15, trainings have been given five times in kerenworky but there is no one trained in the existing water committee members. This shows there is lack of continuous utilization of trained members as a result of high turnover of members of WC. This implies abuse of resource in the Woreda where low budget support is given for training of such kind.

There are also no trained technicians at community level except some sort of exposure given with regard to maintenance of services when they face easy failures. All repair and maintenance works are taken care of by mechanics from RWME staff. Lack of enough budget and human power are reasons given for this.

However, from the year 2005/6 onwards changes are occurring in this case because of the intervention of Action Aid and World Bank in the Woreda to support the rural water sector. These agents fully support the idea of household and water committee training.

Organizational and Human resource aspects of technical staff

The office of Water Mine and Energy (RWMEO) of Ofla Woreda is the only responsible body for activities related to potable water development in the Woreda. Local and international NGOs help community of the Woreda through the channel of this office.

This RWMEO at one time was an independent entity merging two teams called *rural water* and *rural roads* to be named as *Rural Water and Road office* of Ofla Woreda up to 2004/5. After this year, it had been resized and included in one big sectoral department

such as *Rural and Agriculture development office*. In here, rural water and road office was minimized as a unit in the office having only six technical staffs to works related to potable water including small irrigation development.

After a year, this unit has given another structure to survive independently changing its name to '*Rural Water, Mine and Energy Office*' (RWMEO). It is separated from rural road unit and merged with two other responsibilities such as mining and energy aspects.

The staff size was unchanged and only six technical workers are therefore all the responsibilities in the Woreda. There are only two mechanics to insure repair and maintenance works. For the year 1999 EC, however, new structure is coming from the civil service commission of Tigray region to set the office with better setting.

Table 3-16: staff of RWMEO of Ofla Woreda by sex and qualifications, 1997-98 EC.

No.	Description	12 & 12+1		Diploma holders		BA/BSc holders		Total
		F	M	F	M	F	M	
1	Geologist	-	-	-	-	-	1	1
2	Hydraulic engineer	-	-	-	1	-	-	1
3	Irrigation engineer	-	-	1	1	-	-	2
4	Mechanic	-	-	-	2	-	-	1
5	Irrigation Forman	-	-	-	1	-	-	1
	Total	1	1	1	4	-	1	6

Source: Ofla Woreda RWMEO

Supports of Woreda technicians

In an area of huge population together with scarce resources, there will no longer be subsidies for operational works of social services. Woreda government and the regional one need to support local people through provision of infrastructure development (like rural water projects) and human power. The rest are to come from people who will use the service.

In life of services, it is common to find defects beyond control of local communities and need external technical supports. External follow-ups and supports have different forms. Repair and maintenance, training, auditing, and periodic technical supervisions are among them. Office of RWME takes this general concession after potable water projects from different sources are completed and handed over for communities. Communities do not have technicians to repair serious failures, and technicians from RWMEO take the responsibilities for such activities. Discussions with different WC members show that the office even takes care of small defects in the services.

Table 3-17: responses of respondents in percentage to whether there is occurrence of frequent failures for their water points.

Responses of respondents	Frequency	
	No.	Percentage
Yes	56	31.1
No	109	60.6
Do not know	15	8.3
Total	180	100.0

Source: researcher's own survey results

As stated above, two diploma holder mechanics were responsible for monitoring and regulations of water services to give necessary supports related to that. Water committees or beneficiaries have to report whenever they face any failures of services so that technicians would be able to repair as much faster as possible.

Repair time depends on the time interval of failures and report of beneficiaries. Whenever report reached the staff, the technicians will reach the area and give support although the staff has no vehicle, according to the head of the office. However, this does not work consistently because, there are water services like mesegta and gerebguga that did not get repair even if frequent reports were made.

Respondents said that majority of existing water services face failures at least once in their life. Accordingly, from table-17, 31% of respondents reveal that their water services face failures once a year and 20.6% say occurrence of failures are twice a year in the service.

Table 3-18: Responses of Respondents on Frequency of service failures occurred.

Occurrence of failures in a year	Frequency	
	No.	Percentage
Once	56	31.1
Twice	37	20.6
Three times	10	5.6
More than three times	2	1.1
No failures at all	60	33.3
From start	15	8.3
Total	180	100.0

Source: researcher's own survey results

In addition, 8.3% of water services had faced with failures from the start. This figure seems to be the adizemachu spring water, which was discussed before.

Generally, the issue of repair management seems to start its first move from beneficiaries. As far as beneficiaries are not able to report problems, the office does not have clear system for supervision and monitoring works.

Institutional and Financial Issues for Sustainability of Rural Water Supply

Tariff Collection, Cost Recovery, and Financial Management

A regulation from Bureau of Finance and Economic Development of Tigray region in similar framework with the national water supply policy as stated above; reads as '*...for any capital project requisition for rural people...the regional or Woreda government will support only 70% of the capital costs and the rest will be expected from the community ...*'. Although this principle was set since 1994 E.C., it seems failed to apply mainly due to

incapability of community to pay. The people would like to contribute in kind than in cash. So that, projects request service users to cover operational costs once infrastructures are built to enhance sense of responsibility and ownership. In addition, local people are becoming familiar with contributions for their own uses.

In the study areas more than 80% of water services have Water Committees (WCs) to regulate financial management. These WCs has given training related to financial management, minor repair and maintenance works, environmental sanitation, and hygiene education.

Theses water committees together with beneficiaries set service charges to support operational and expected repair costs. Three tariff structures are laid down to work in all water points. Three factors are taken as criteria to decide tariff structures: HH size, ability to pay and capacity of water consumption. Local restaurants, mills and the like take more water frequently in a day so that they pay more than the tariff majority of the people pay. People who are of large HH size pay one birr a month, those who are single and widowed pay 0.50 birr and those of newly married, old and poor people pay nothing. The privilege for the new married people is allowed for a year only.

Table 3-19: Monthly water fee payment of respondents in Ofla Woreda.

Tariff amount	Frequency	
	No.	Percentage
0	18	10.00
0.50 birr	37	20.56
1.00 birr	122	67.78
>1.00 birr	3	1.67
Total	180	100.00

Source: researcher's own survey results

Those local restaurants, mills and the like mostly pay a tariff of more than the normal but the maximum is 3 birr.

The collected money usually is used for operational costs of which salary of guards and expenses for tickets took greater part so far. Discussion with members of different WCs show, there was no time they remember spending large amount of money for repair and maintenance works.(except in one sunlight based water point in Menkere tabia, of course out of study area ; where spare parts are not available in the region at all). This is because; Woreda technicians with spare parts from office's own store undertake all repairs no matter the gap between failure time and service repair.

In addition, except two water services all have bank accounts and money saved with an average amount of minimum 500 and maximum 2000 birr for future uses.

Table 3-20: Responses in percentage of communities to water fee payments in study areas of Ofla Woreda.

	Do you support paying water fees?		Do you pay water fee?		Do you pay fee on time?	
	No.	Percentage	No.	Percentage	No.	Percentage
Yes	180	100.00	177	98.33	167	92.78
No	0	0.00	3	1.67	12	6.67
No response	0	0.00	0	0.00	1	0.56
Total	180	100.00	180	100.00	180	100.00

Source: researcher's own survey results

All of the respondents in table 3-20, support the idea of paying water fees with more than 90 % paying rate on time. This is encouraging because respondents believe money for operational and maintenance costs have to from service users.

Table 3-21: Distribution of Respondents on source of money for O&M of water services.

Where should the service get money for O&M?		
	Frequency	
	No.	Percentage
Service charge and additional contributions	157	87.22
Gov't & NGOs	17	9.44
Contribution of both	2	1.11
No response	4	2.22
Total	180	100.00

Source: researcher's own survey results

Not only are the community positive to pay service charge, they also have accepted to contribute resources (including money) not only for operation and maintenance costs but also for replacement of a service if it totally fails to work. However, some service users believe Woreda government is the owner of the water services so that they need whatever costs of the service to come from that Woreda.

Table 3-22: some factors from respondents for not paying fee on time.

Reasons for not paying fee on time
Poverty
Less harvest
No land for agriculture
Dissatisfaction with the service

Source: researcher's own survey results

Tariff setting for rural water services is one way of mobilizing resources from communities. All national and regional governments praise this kind of community involvement as far as they put issue of charges beneficiaries should pay for services they use. In the study area, communities are happy, we can say to pay and even to develop projects if existing water points are failed at all.

This is good in general from the point of view of the governments' intentions in one hand. Resources are scared, therefore, people should cover at least operational costs now and project costs gradually. However, respecting the will of community to pay, care

should be taken in levying contributions or tariffs in this case. The people are paying for water services that are not in short-distance to them, but they need potable water for betterment. Therefore, we should not only think of regulating services by local people but we should also consider the highest benefits for the payers. In this way, it is good to make people prepare for the next level of contribution i.e., sharing capital costs then the whole. As is seen from findings of the study, tariff amount is we can say accepted; because they are set based on factors that could bring the whole community in to common understanding. In this case, table 3-20 shows there are people who fully support the idea of paying service charge but unable to pay in practice. Thus, considering these all things may prevent exclusion of some parts of community from the service in particular and the socio-economic welling of development in general.

Table 3-23: Rural water services, status of function, and their financial management.

Specific area	Tabia	Technology type	Machine brand	Has WC	No. of members of WC	Women's share in WC	Has bank account	Saving amount in birr	% of current in payment	Status of service
Wotkoyesh	Menkere	Shallow well	Afridev	Yes	6	3	Yes	1000	>90	Functional
Aditsahfelam	Fala	Spring	Spring	Yes	ND		ND			Functional
Adiwotwot	Fala	Shallow well	Afridev	No	6	2	Yes	ND	>90	Functional
Adizemachu	Zata	Spring	Spring	No	0	-	No	0	0	Not functional
Kerenworky	Menkere	Shallow well	Afridev	Yes	6	2	Yes	1000	>90	Functional
Falaketema	Fala	Hand dug well	Afridev	Yes	6	3	Yes	ND	>90	Functional
Fuga	Menkere	Shallow well	Afridev	Yes	6	3	Yes	1800	>90	Not functional
Gerebguga	Zata	Shallow well	Ind. Mark II	Yes	6	2	Yes	ND	>90	Not functional
Hadismender	Adigolo	Hand dug well	Afridev	Yes	6	3	No	0	50-75	Functional
Maedokorem	Adigolo	Hand dug well	Afridev	Yes	6	2	Yes	500-800	>90	Functional
Maylham	Zata	Hand dug well	Afridev	Yes	6	2	Yes	-	>90	Functional
Mesegta	Adigolo	Shallow well	Afridev	Yes	6	2	Yes	2000	>90	Not functional

Source: researcher's own survey results

ND = No Data

Rural Water Supplies, Community Contribution and Satisfaction

Rural water supply and Community Contributions

Contribution of community in potable water development is believed to increase sense of ownership, which is another good factor for the service. Table 3-24 shows, there was higher level of participation in implementation period.

Only 29% of the respondents, in same table, did not have any kind of contribution in the development time. They did not have it because they did not know about that construction of water project. Sometimes, people did not see project workers working but the service completed and delivering service.

Table 3-24: Participation of respondents in project development

	<i>Do you have information on source of capital?</i>		<i>Did you participate in project implementation?</i>	
	No.	Percentage	No.	Percentage
Yes	60	33.3	127	70.6
No	120	66.7	53	29.4
Total	180	100.0	180	100.0

Source: researcher's own survey results

Community contributions take different forms; labor takes the largest percentage followed by local materials and food substances to project workers.

Table 3-25 Types of Community participation in project implementation in the study area

<i>Type of community participation</i>	<i>Frequency</i>	
	<i>No.</i>	<i>Percentage</i>
Money	2	1.11
Money & labor	3	1.67
Labor	64	35.56
Labor & local material	44	24.44
Local material	9	5.00
Idea	2	1.11
None	52	28.89
No response	4	2.22
Total	180	100.00

Source: researcher's own survey results

Women's Participation

It is true that the burden of water source inaccessibility and its consequences largely affect females. Females travel and spend more time to fetch water. In such cases, participation of females in both development and management of water service is crucial for sustainability. This issue, according to the survey result, has not been given the necessary focus especially in project design and preparation phase.

There is a rule that encourages equal participation of both males and females in the water committees. When WCs are going to be set the Woreda rural water supply office obligates to include three women out of the six total members. Accordingly, they take equal share in 33.3% WCs under study and they take two out of six seats in the remaining WPs. However, some people see this equal share in management seats negatively because they think females do not lend hand in works that require muscle.

In an assessment made to check what perception have local communities for the involvement of women in development endeavors like water supply, responses of users in table 3-26 show positive response.

Table 3-26: Participation of Women in WCs and perception of respondents.

	WC has enough no. of women members		Women participation and sustainability		Especial encouragement for female to be in WC	
	No.	Percent	No.	Percent	No.	Percent
Yes	67	37.22	119	66.11	97	53.89
No	13	7.22	17	9.44	13	7.22
don't know	98	54.44	44	24.44	70	38.89
No response	2	1.11	0	0.00	0	0.00
Total	180	100.00	180	100	180	100.00

Source: researcher's own survey results

Understanding of society to wards involvement of women and its contribution to keep the services working for longer period has to be appreciated. In this case, 66.11% of

respondents value participation of women to the good of the service, in same table. However, as discussed in the earlier part of this chapter, participation of community at grass root level in water development processes and water committee set up starts after project construction begins.

Rural Water Supply and Consumers' Satisfaction

As sustainability of rural water services requires active concern and involvement of beneficiaries, it is crucial to consider it against their satisfaction. Whilst service users get satisfied, they will easily be concerned and involved in pro-sustainability activities to the service needs.

Consumer satisfaction can be assessed from service takers in different ways using different indicators. Satisfaction with *color of water, test of water, amount of the water, time given for water service a day, general services of water points, whether they stand in line for long period of time to collect water, use of other additional traditional water sources, and need of new water point can be to mention could be the main of them.*

With this regard, the survey found that more than 87% of respondents are satisfied with the provided amount of water, 92% are satisfied with the test and color (see table3-27) ; and in table 3-28, about 94% of them are satisfied with the time avail in a day for water collection in water points. This community satisfaction is a tool for the overall sustainability of services and projects.

Table 3-27: Respondents and their level of satisfaction.

Degree of satisfaction	with the amount of the water		with the test of the water		with the color of the water	
	No.	Percentage	No.	Percentage	No.	Percentage
Very much	158	87.78	166	92.22	167	92.78
Somehow	19	10.56	5	2.78	4	2.22
Low	2	1.11	1	0.56	2	1.11
No response	1	0.56	8	4.44	7	3.89
Total	180	100.00	180	100.00	180	100.00

Source: researcher's own survey results

In another case, table 3-29 reveals that about 69% of respondents stand for long period to fetch water for daily uses. Excluding the time taken to travel to water point, in some areas like *maylham* of Zata, people stay for more than two hours to get water. Consumers' size and scarcity of resource are dominant factors indicated by beneficiaries to this.

Distance is also another factor to affect satisfaction and the system. In all water points under study, a woman travels fifty minutes on average to fetch water and back to her house. Especially in *kerenworky*, *fuga*, *maedokorem*, *gerebguga*, *mesegta* and *maylham*, it is very serious and respondents clearly show their dissatisfaction. A woman spends not less than two hours in *kerenworky* from her house back with water climbing a mountain.

Table 3-28: degree of satisfaction of Respondents in percentage on time given for service in a day.

Degree of Satisfaction with time given daily for water service		
	No.	Percentage
Very much	169	93.89
Somehow	2	1.11
Low	2	1.11
No response	7	3.89
Total	180	100.00

Source: researcher's own survey results

Landform of the Woreda is too rugged to get easy access each other and settlements are here and there and even opposite sides of a mountain but have single water point for both. Another problem is with a water system is that any body can found both hand pumps and rivers together. Water points in *falaketema, maylham, fuga, hadismender, gerebguga* are with in or on the edge of river streams and are exposed either to water pollution when rivers get full or danger of erosion, which is common in the Woreda. Clients of *maylham* and *fuga* are of this experience. In *maylham* when the stream is full the color and test of water from the hand pumps starts to change.

Table 3-29: responses in percentage of Respondents on whether they spend more time standing to fetch water from WPs.

Do you usually stand in line for long period?		
	Frequency	
	No.	Percentage
No	54	30.00
Yes	124	68.89
Don't know	2	1.11
Total	180	100.00

Source: researcher's own survey results

Although such and such kind of drawbacks are there with the general services of potable water in the Woreda, the degree of satisfaction especially in the cases of hand dug wells and shallow wells is very high. People enjoy with potable water from modern hand pumps. In table 3-30, eighty-six percent of the respondents are satisfied with the general services and only four percent are dissatisfied with it. Some clients in *maylham* reject fetching water from hand pumps and turn them selves to river. The reason mostly is due to long time stand because of large consumers' size on one hand and there is no time difference between the hand pump and the river, if it could make a difference. Table 3-

29, above, shows beneficiaries spending more time standing to fetch water, which of course could be the result of the mismatch between populations and existing WPs.

Table 3-30: Respondents and their satisfaction with general services of WPs

How do you evaluate your Satisfaction with the general services?		
	Frequency	
	No.	Percentage
Very much	155	86.11
Somehow	18	10.00
Low	7	3.89
Total	180	100.00

Source: researcher's own survey results

As a result, more than 73% of respondents in table 3-31, need additional water service projects. The people who are claiming additional water project are frequently those of remote areas, which they do not even have traditional unsafe water sources near to them. Any ways, locations of all water points under study are in flat surface areas and unintentionally exclusion of some part of community happened. Hence, as a solution staff members said the role of shallow wells could be considered if budget constraints are seen.

Table 3-31: opinion of Respondents on additional water projects in the study areas.

Do you think the community needs new water point?		
	Frequency	
	No.	Percentage
Yes	132	73.33
No	46	25.56
No response	2	1.11
Total	180	100.00

Source: researcher's own survey results

Large size of beneficiaries, distant location of water points and settlement pattern are the factors for the indicated need of additional water projects by people study areas. In

additional unfriendly nature of technology, riverside development of water points (Flood), water shortage and frequent service failures are also mentioned.

Willingness of Beneficiaries to Sustain Rural Water Supply System

Theoretically, when people think there is some value achieved over something, they start to take actions to preserve it in order to maintain for a long period. Similarly, when local people understand the benefit of rural water services to their life, they start to take care of the service from damage and the like.

Table 3-32: different Water uses of Respondents in the study areas.

Potable water is used for	Frequency	
	No.	Percentage
Drinks & food making	12	6.7
Drinks, food making & bathing	69	38.3
Drinks, food making, bathing & cloth wash	80	44.4
Drinks, food making, bathing & vegetation	4	2.2
Drinks, food making, bathing & Animal drinks	12	6.7
All uses	3	1.7
Total	180	100.0

Source: researcher's own survey results

In the case of the study area, table 3-32 large number of respondents (44%) makes use of water from hand pump for drink and food making, bathing and cloth washes. About 45% of respondents do not use that water for washing clothes. It was also only 6.7% use of potable water taken from the hand pumps devoted for animal use.

The beneficiaries assume that too much burden of water uses on the hand pumps would damage the infrastructure and its function. Therefore, to help the service continue for longer period, they used to diversify water sources. They mostly depend their water needs on rivers, lake and natural springs for close washing, animal uses and sometimes for

bathing. They believe this kind of water use diversification would reduce burden and frequent failures and help the modern water service in particular and the community in general.

Table 3-33: responses in percentage of Respondents on diversifications of water sources

Do you fetch water from traditional unsafe water sources?		
	Frequency	
	No.	Percentage
Yes	169	93.9
No	11	6.1
Total	180	100.0

Source: researcher's own survey results

Hence, 94% of respondents in table 3-33 use water from traditional unsafe sources for their extra uses. Similarly, there is greater value given for doing this to protect the water service in the communities' interest.

Table 3-34: Opinions of respondents on the importance of alternative water source use for service sustainability.

Do you think water source diversification helps the water points		
	Frequency	
	No.	Percentage
Yes	173	96.11
No	5	2.78
Don't know	1	0.56
No response	1	0.56
Total	180	100.00

Source: researcher's own survey results

This survey found that about 96% of respondents (in table 3-34) believe they can contribute for the services through water source diversification. It was only less than 3% of respondents, which do not give value for water source diversification in relation to the sustainability of the service.

Table 3-35: Respondents and their access to education on water use.

Do you have access to any training on water use and diversification?		
	Frequency	
	No.	Percentage
Yes	11	6.11
No	143	79.44
Don't know	15	8.33
No response	11	6.11
Total	180	100.00

Source: researcher's own survey results

However, the above table shows only 6% of respondents have got education with this respect. Beneficiaries are taking care of their potable water sources in order to extend their own benefit, it mean.

Table 3-36: opinion of respondents to the existing water service fees.

How do you evaluate existing service fees?		
	Frequency	Percentage
Expensive	27	15.00
Fair	68	37.78
Inexpensive	55	30.56
*No fee	30	16.67
Total	180	100.00

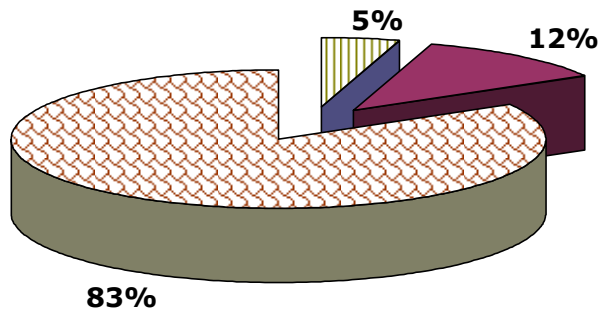
Source: researcher's own survey results

Willingness of people, in addition, is the result of different combinations of satisfaction measures. The balance between the economic ability of payers and water charges has to be considered, as it could cause dissatisfaction for people and affect the service. Fifteen percent of the people consider the tariff expensive, 38% & 30% fair inexpensive and the rest do not pay at all as illustrated in table 3-36. If these people are not included in fees that are fit for them, their future use of services may be difficult. Moreover, there were

* some PWSSs do not have arrangements to make users paying

areas with no payment which need arrangements. Their reasons for not paying should also be studied for the reason that it might be beyond economic one.

Figure 3-5: Responses in percentage of respondents on whether they have problem to pay the existing water fees



□ Have a problem ■ Sometimes have a problem ▨ Do not have a problem

Source: researcher's own survey results

Table 3-37: opinion of respondents on whether it is possible for community to replace water services from their own fund

Responses of respondents	Frequency	
	No.	Percentage
Possible	140	77.8
Not possible	40	22.2
Total	180	100.0

Source: researcher's own survey results

The motivation of local people to maintain potable water service is also indicated in table 3-37. Here, 77.78% of respondents verify they can re-establish water services with funds from their own if water systems get out of work.

Sense of ownership is another indicator of satisfaction and belongingness. Table 3-38, 80% of respondents believe rural water services belong to local community. In-fact water projects are communities' possession once they are completed and handed over to beneficiaries with operation, financial and managerial responsibilities.

Table 3-38: distributions of respondents on ownership of the rural water services.

Indicated owners of water projects	Frequency	
	No.	Percentage
Community	145	80.56
Local administrator	5	2.80
Woreda Government and NGOs	27	15.00
Others	3	1.70
Total	180	100.00

Source: researcher's own survey results

3.3. Policy Setting

Sectoral Policy Issues

Large number of the population of Ethiopia has no access to potable water. People have to travel long distances for many hours and fetch unsafe and unreliable water from rivers and other undeveloped sources. Even in urban centers where services are apparently better in relative terms, the supply and quality of water is inadequate and unreliable compared to the demand (EWRMP, 2001).

Giving solutions to these inadequacies will help achieve rapid socio economic development through better health care and productivity of the Ethiopian peoples. To attain sustainable and equitable solutions to these problems, water supply and sanitation policy has been developed. According to the EWRMP (2001), this policy is designed to provide impetus for the development of water supply in terms of coverage, quantity, reliability (sustainability) and acceptable quality taking the existing and future realities of the country into consideration.

Enhancing the well-being and productivity of the Ethiopian people and foster its tangible contribution to the economy through provision of adequate, reliable and potable water supply as well as sanitation services is the over all objective of the policy.

The objective also calls for carrying out of operation and maintenance of water supply and sanitation services in a sustainable and efficient manner, capacity building works in terms of institutions, and human resources development.

There are some fundamental policy principles to direct the equitable, sustainable and efficient development, utilization, conservation and protection of water resources in the community. In here, water is considered as both an economic and a social good. The policy calls for water supply projects to be rural-centered, decentralized management, participatory approach as well as integrated framework. It also describe for the participation of user communities; particularly women's participation in water resources management.

Policies Details

The EWRMP is a comprehensive and detailed policy framework that included different sectoral issues. Drinking water supply is among the different sector and its detailed policy issues are described below.

Finance and Tariff

The policy Promotes self-financing of projects at the local level, although space is given for subsidies to communities who cannot afford to pay capital costs only. However, all water supply activities need to follow cost recovery principle with costs related to

operation and maintenance. Tariff structures need to be flat, site-specific and determined according to local circumstances based on equitable and practical guidelines and criteria.

Institutions and management

Management of water supply systems are set to be at the lowest and most efficient level of institutional set up to promote the full participation of users and promote effective decision making at the lowest practical level.

Capacity Building

The policy promotes objective oriented training with special emphasis on community participation, administration and finance, and operation and maintenance. It also calls for the establishment and strengthening of water users' associations i.e. water committee.

Gender Issues

It promotes full involvement of women in the planning, implementation, decision making and training as well as empower them to play a leading role in self-reliance initiatives.

3.4. Proposed Development Activities in Ofla Woreda (1998-2002 E.C)

With a combination role of the ministry of water and World Bank, Rural Water Supply, Sanitation and Hygiene program (RWSSHP) has been adopted in 2004 aiming to improve water supply, sanitation facilities and hygienic practices through out rural Ethiopia. This program is dependable with the general framework of the Ethiopian Water Resource Policy in particular and the Rural and Agriculture Development policy in general.

Like the Rural Water Policy of the country, the RWSSHP recommends to have the community initiates, contributes, owns and manages development endeavors.

Participation extends from the point of planning to long-term management and ownership of water supply, sanitation facilities and hygiene practices. Program implementation follows a demand-responsive approach where by community members make informed choices to participate in selection of technologies and determining how services will be operated and maintained. To ensure proper management and sustainability of services, the water supply and facilities should be affordable and appropriate. It should also promote women involvement, conventionally located to users and institutional development at grass root level.

The program also calls for the integration of water supply with both sanitation and hygiene practices to result for optimum health impacts for all community members. Moreover, it initiates to take a lesson from past experiences in the water supply works to facilitate accomplishment of its objectives (Ofila strategic Plan, 2004/5).

The areas of focuses of this national program are rural area of the country and Tigray region is one of them. Nine Woredas in Tigray region are selected for program implementation and the regional bureau of water resources includes Ofila Woreda in to it.

Accordingly, the Woreda guided by the above-mentioned framework has prepared its own strategic development plan to boost the water supply works of the rural area. The strategic plan has four major groups of activities including potable water supply, sanitation facilities & hygiene practices, community participation and empowerment, and capacity development at the grass root level for the sustainability of the program and its results (Ofila strategic Plan, 2004/5).

The total budget of the program is birr 17,235,710. In the next five years 66 hand-dug wells, 46 springs, 30 shallow wells, 5 deep wells, 26 roof catchments, 9 reservoirs, 14 gravity springs, 66 rehabilitation of water supply schemes, 55 demonstration latrine and 3 school latrine going to be constructed. The budget also covers costs for purchasing of tools and equipments and also for training.

These all works will address the water shortage of the rural people of the Woreda and contribute for about 136000 beneficiaries. Community mobilization works are among the central in the program. In this case, the community will construct 15000 traditional Pit Latrines (TPL) and 15000 Waste Disposal Pits (WDP). In addition, there will be awareness rising activities for about 75000 people (Ofla strategic Plan, 2004/5).

CHAPTER FOUR: CONCLUSION AND RECOMMENDATIONS

4.1. Conclusion

The rural development policy in general and food security strategy of the region in particular declare improving potable water supply coverage to rural people as their priority. It is also mentioned that various factors are interacting in this sector to maintain intended objectives of rural water supply projects. Utilization of water sources mainly depends on their functionality. Functionality of water services also depends on the magnitude and type of community participation. The latter again depend on the will and level of understanding of technical bodies that could be influenced by policies and directions of a nation. These completely interlinked processes focus to sustain continued use of potable water supply projects in rural areas. Therefore, considering faire water service fee, distance from water points, involving community at all stages of water development, and building adequate skill and capacity to maintain water sources are essential factors to sustain the water system from supply side.

In the study areas, involvement of local communities to decisions related to development of rural water supply is weak. Findings show there was higher participation of local people in the initial stage. They need potable water so that they inform it to higher level decision makers. Other wise, they almost did not decide to where the water project should be with what technology and brand. Therefore, a number of projects are developed under supply-driven approach.

The study shows certain groups of communities, especially women and those in remote areas are paying the consequences. Average distance from water points is 50 minutes; however, there are more than 2 hours distance in some cases. Majority of the Woreda is rugged topographically that means the problem is more serious.

Three technologies (shallow well, Hand dug well and protected springs) are found in the Woreda but all do not have similar acceptance from beneficiaries. Women take the whole burden of fetching water; and they need easy and labor undemanding technologies. In the study area, women do not accept shallow wells especially with Indian Mark II. They demand more labor to the extent a woman alone can not manipulate and produce water. This is also true with Afridev brand when applied in shallow wells. Local people do not also have positive attitude to protected springs; because they don't accept the change in former and present form.

Both household and water committee training before and after project completion, plays an important role in ensuring sustainability. This study, however, shows there is poor background of training both at household and water committee level. There is weak, if not no, education on personal hygiene and environmental sanitation. The way training is given for water committees is inconsistent that some have got for several time and some have not even once. More over results show there is frequent replacement of members of WC, which results for ill-treatment of resource in the Woreda where low budget support is given for training.

Quality of construction is crucial to ensure continual service delivery. In the study Woreda, difference is common in construction quality among water projects. Water

projects constructed under strong monitoring and supervisions, like projects of the Catholic Church, have best quality ever seen in the Woreda. Where as, projects constructed by contractors have less construction quality due to weak supervision from the office. In addition, majority of water services in the study area face once and more than one time failures in their life; and 80% of water points do not have any fence to prevent services from damage problems.

The study found that the Office of RWME in Ofla Woreda has shortage of skilled work force, and logistics. It has also problem of budget support for routine and project works. There is no background of pre-construction survey making. There is also lack of monitoring mechanism to support communities after water projects are constructed. However, technicians from the office used to support communities in repair needs. The study also indicates, there is no trend of training for community level operators. But, existing of community level operators can share Woreda technicians reduce pressures coming from local communities related to simple repair and maintenance works.

The existence of a water committee affects overall sustainability of a water system. Water Committee is set to manage system's operation; including carrying out preventive maintenance, collecting tariffs, or payments for repairs, keeping financial records, and sanctioning people for non-payment. For rural water projects, the creation of a water committee elected by beneficiaries is a prerequisite to receive project assistance. The study found the existing of Water Committees in more than 75% of water projects each having six members; however, communities hardly decide on who should the member of the committee be.

Beneficiaries and members of water committees together set service charge. Household (HH) size, ability to pay and frequency of water consumption are criteria to decide service charges in all study areas. There are different tariff structures. Those who are of large household size pay one birr a month; those singles and widowed pay fifty cents a month; and rural restaurants and mills pay up to three birr a month. Member of WC collects tariff monthly or annually and save it in local bank after deducting monthly expenses. More than sixty-six percent of water services including some un-functional have bank accounts with some amount of money saved in it. Salary of guards and expenses for receipt take greater part of operational costs in the study area. The study did not find major expense made for serious repair costs; because it is the office of RWME who up to this time take the responsibilities in this case.

There is substantial contribution of local communities in project implementation phase. Beneficiaries contribute money and food supplies, labor, and raw material with out any call from other agents. In this case, contribution in labor takes the largest percentage followed by local materials and food substances to project workers.

Although, there is poor involvement of local communities, especially women, in the planning phase, there is a rule to encourage equal participation of both males and females in water committees. The study shows there are two and three women members in 50% and 30% of water services under study respectively out of 6 seats. Findings in addition, show local communities have positive attitude for the involvement of women in development activities.

The survey found that substantial numbers of respondents are satisfied with the quantity, test, and color of water and the number of hours avails for water collection in all water point. However, the study reveals that there is a long time stand of people to fetch water for daily uses. Without considering the time of travel, in some areas people stay for at least two hours standing to get water. Consumers' size (demographic factor) and scarcity of resource (inadequacy of existing services) are dominant factors indicated by beneficiaries to this. In addition, most of the water points are located with in or near to river streams and pollution occurs some times in some areas. So that, some clients reject and fetch water from rivers. Long time stand on one hand and an almost no distance difference between hand pumps and traditional unsafe water sources are reasons indicated. Despite such drawbacks, the degree of satisfaction with general services especially in the cases of hand dug wells is higher.

The study found that in all service points including those of un-functional, almost all the beneficiaries are willing, and happy with the service charge as far the service is provided. In addition, communities depend on rivers, lake, and unprotected natural springs for other water needs than drinking and food making to reduce pressure and frequent failures, which is resulted from concern and satisfaction. This study shows as well, there is some sort of variation in the economic status of beneficiaries and supporting the idea of paying fees, some respondents have problems to pay service charges. In other side, a large number of rural people support the idea of re-establishing water services with funds from their own if services are totally bring to an end.

4.2. Recommendations

The most important point of the study is that project rules matter, and their design and implementation can profoundly affect rural potable water project sustainability. These rules are eligibility criteria, decision-making roles, financial-management, service and technology options, set the framework and create incentives that will determine the success of a project. Therefore, this study suggests the following points for future success:

Strengthening demand-responsive approach of rural water supply will advance sustainability of projects. The role of project initiation and selection of service options, technology and site selection should be given to local communities rather than tabia administrators and office technicians.

There need to have strong involvement of local communities especially women in development endeavors from start to end. In addition, community-mobilization works need to be strengthened.

A large gap exists in most infrastructure construction styles. To have parallel systems and improve sustainability, project staff must set a design and construction standards that contractors and donor agencies would follow. In addition, strong supervision mechanism should also be designed by RWMEO to implement this standard.

Ofla Woreda water, mine and energy Office need to be equipped with adequate trained manpower and adequate resources. In addition, supervision mechanisms should be

established to ensure that services are maintained and project rules are implemented correctly when new projects are set.

Projects, especially those put up under Woreda government budgets, should include training as part of their project design. Training in O&M and hygiene education increases satisfaction of people with systems, and make them more will to pay costs of maintenance, and keep the system in better physical condition. At the same time, training members of the organization in charge of managing the water system will lead to better O&M and financial management. Therefore, training for both beneficiaries and members of water committees need more attention.

Existing of community level operators facilitate service recovery from failures. Therefore, a lot has to be done with this regard.

More works from the rural water, mining and energy office is also expected to persuade cabinets of Woreda government to have budget support for training of both water committees, local operates and beneficiaries.

At last but not least, Ofla Woreda RWMEO and Health offices need to have strong integration to address issue of health together. The issue of community health needs integrated works not only from the two mentioned sectoral offices but also from others.

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APPENDIXES

Appendix 1: Water points in Ofla woreda of southern Tigray, 1993-1997 E.C.

No.	Specific area	Tabia name	Status of service	Depth of water in meter	Machine type	Year of construction	Source of finance
1	abagerima	Zata	functional	45	Afridev	1995	Unicef
2	abakiros	Smret	functional		spring	1995	woreda gov't
3	abeayder	Lat	functional	ND	Afridev	1997	woreda gov't
4	abo mosa	Hashenge	functional	ND	Afridev	1997	Unicef
5	abo motae	Lat	functional	6	Afridev	1997	woreda gov't
6	adate brhan	Tselgo	functional		spring	1995	woreda gov't
7	ade babay	Hugumburda	functional	37.2	Afridev	1993	Catholic C.
8	adeki hayam	Adigolo	functional	ND	Afridev	1997	woreda gov't
9	Adi abo ale	Wonberet	functional	8.45	Afridev	1997	woreda gov't
10	Adi abo shremi	Wonberet	functional	ND	Afridev	1997	woreda gov't
11	Adi aknasone	Sesela	functional	ND	Afridev	1997	woreda gov't
12	Adi awalie	kidana	functional	ND	Afridev	1997	woreda gov't
13	Adi awso	Fala	functional		spring	1996	Irish Aid
14	Adi barbar	Fala	functional	ND	Afridev	1997	ND
15	Adi beri	Sesela	functional	ND	Afridev	1997	woreda gov't
16	Adi beri	Selambkalsi	functional	5	Afridev	1997	woreda gov't
17	Adi brhan	Fkrewolda	functional		spring	1995	woreda gov't
18	Adi chercher	Menkere	functional	ND	Afridev	1997	woreda gov't
19	Adi chirndog	Fala	functional	45	Afridev	1997	Unicef
20	Adi emney	Adigolo	functional	42	Afridev	1994	Irish Aid
21	Adi entude	Adishumberket	functional	4.5	Afridev	1997	woreda gov't
22	Adi felesti	Selambkalsi	functional	ND	Afridev	1997	woreda gov't
23	Adi geri	Sesela	functional	ND	Afridev	1997	woreda gov't
24	Adi hari	Adigolo	functional	ND	Afridev	1994	Irish Aid
25	Adi kushulu	adishumberket	functional	5	Afridev	1997	woreda gov't
26	Adi mares	Hashenge	functional	31.5	Afridev	1993	Catholic C.
27	Adi mariam	Adigolo	functional	61.5	Afridev	1993	Catholic C.
28	Adi nawtsa	Hayalo	functional	ND	Afridev	1997	woreda gov't
29	Adi shahshor	Darabekeda	functional		spring	1996	woreda gov't
30	Adi sharosher	Sesela	functional		spring	1995	Unicef
31	Adi shekaoro	Selambkalsi	functional	4	Afridev	1997	woreda gov't
32	Adi shera	Hashenge	functional	ND	Afridev	1997	Unicef
33	Adi teshene	Hayalo	functional	42	Afridev	1995	Unicef

Water points in Ofla woreda of southern Tigray, 1993-1997 E.C. cont...

34	Adi tsahfelam	Fala	functional		spring	1996	woreda gov't
35	Adi wotwot	Fala	functional	40	Afridev	1995	Unicef
36	Adi zeteri	Hayalo	functional	ND	Afridev	1994	Irish Aid
37	adiabay	Guara	functional	4.75	Afridev	1997	woreda gov't
38	adidesta	Adigolo	functional	24.8	Afridev	1993	Catholic C.
39	adiemba	hugumburda	functional	42.4	Afridev	1993	Catholic C.
40	adizemachu	zata	Not functional		spring	1996	Irish Aid
41	Agamte	Hashenge	functional	31.05	Afridev	1993	Catholic C.
42	arenkua	kidana	functional	ND	Afridev	1997	woreda gov't
43	aselale	Hashenge	functional	ND	Afridev	1994	Irish Aid
44	ashembk	adishumberket	functional	ND	Afridev	1996	Irish Aid
45	aukuya	Selambkalsi	functional	4.5	Afridev	1997	woreda gov't
46	awdikulu	kidana	functional		spring	1995	woreda gov't
47	Awli gara	Adigolo	functional	36	Afridev	1993	Catholic C.
48	Awli gara	Adigolo	functional	ND	Afridev	1997	woreda gov't
49	becheka kok	Smret	functional	4.8	Afridev	1997	woreda gov't
50	bekela mear	Darabekeda	functional		spring	1996	Irish Aid
51	bereya	Selambkalsi	functional		spring	1995	woreda gov't
52	besena	Guara	functional		spring	1995	woreda gov't
53	beshaku	Darabekeda	functional		spring	1997	Action Aid
54	chelo	Zata	functional	9.8	Afridev	1993	Catholic C.
55	cheraruba	Dinka ashena	functional		spring	1996	woreda gov't
56	dara mariam	Darabekeda	functional		spring	1995	Unicef
57	dekezba	Fala	functional	ND	Afridev	1997	ND
58	dekol	Zata	functional	ND	Afridev	1997	Action Aid
59	Deren worky	Menkere	functional	37.15	Afridev	1993	Catholic C.
60	dikasha	Dinka ashena	functional	7.15	Afridev	1996	woreda gov't
61	elgabo	Dinka ashena	functional	ND	Afridev	1997	woreda gov't
62	enariva	fkrewolda	functional		spring	1996	woreda gov't
63	engrari	kidana	functional	5	Afridev	1997	woreda gov't
64	fala ketema	Fala	functional	30	Afridev	1995	Unicef
65	fcheka	Tselgo	functional	ND	Afridev	1997	woreda gov't
66	flwotdaka	fkrewolda	functional	ND	Afridev	1997	woreda gov't
67	Fuga	Menkere	Not functional	43.2	Afridev	1993	Catholic C.

Water points in Ofla woreda of southern Tigray, 1993-1997 E.C. cont...

68	<i>gabla</i>	<i>Hayalo</i>	<i>functional</i>	<i>ND</i>	<i>Afridev</i>	<i>1997</i>	<i>woreda gov't</i>
69	<i>garda</i>	<i>kidana</i>	<i>functional</i>		<i>spring</i>	<i>1996</i>	<i>woreda gov't</i>
70	<i>gelkitu</i>	<i>Zata</i>	<i>functional</i>	<i>30</i>	<i>Afridev</i>	<i>1995</i>	<i>Unicef</i>
71	<i>gereb gebena</i>	<i>Darabekeda</i>	<i>functional</i>		<i>spring</i>	<i>1997</i>	<i>Action Aid</i>
72	<i>Gereb Guga</i>	<i>Zata</i>	<i>Not functional</i>	<i>64.6</i>	<i>Indian Mark II</i>	<i>1993</i>	<i>Catholic C.</i>
73	<i>gibia</i>	<i>Smret</i>	<i>functional</i>		<i>spring</i>	<i>1996</i>	<i>woreda gov't</i>
74	<i>gra daero</i>	<i>kidana</i>	<i>functional</i>	<i>46</i>	<i>Afridev</i>	<i>1997</i>	<i>Unicef</i>
75	<i>gra edaga</i>	<i>Menkere</i>	<i>functional</i>	<i>ND</i>	<i>Afridev</i>	<i>1997</i>	<i>Unicef</i>
76	<i>graido</i>	<i>Fala</i>	<i>functional</i>	<i>ND</i>	<i>Afridev</i>	<i>1997</i>	<i>ND</i>
77	<i>gunaguna</i>	<i>Smret</i>	<i>functional</i>		<i>spring</i>	<i>1995</i>	<i>woreda gov't</i>
78	<i>hadesti adi</i>	<i>hugumburda</i>	<i>functional</i>	<i>ND</i>	<i>Afridev</i>	<i>1994</i>	<i>Irish Aid</i>
79	<i>hadis mender</i>	<i>Adigolo</i>	<i>functional</i>	<i>ND</i>	<i>Afridev</i>	<i>1997</i>	<i>woreda gov't</i>
80	<i>hadush mender</i>	<i>Zata</i>	<i>functional</i>	<i>7</i>	<i>Afridev</i>	<i>1993</i>	<i>Catholic C.</i>
81	<i>Ja</i>	<i>Zata</i>	<i>functional</i>	<i>ND</i>	<i>Afridev</i>	<i>1997</i>	<i>woreda gov't</i>
82	<i>key medir</i>	<i>Zata</i>	<i>ongoing</i>	<i>ND</i>	<i>Afridev</i>	<i>1997</i>	<i>woreda gov't</i>
83	<i>kidana</i>	<i>kidana</i>	<i>functional</i>		<i>spring</i>	<i>1995</i>	<i>woreda gov't</i>
84	<i>Lat ketema</i>	<i>Lat</i>	<i>functional</i>		<i>spring</i>	<i>1995</i>	<i>woreda gov't</i>
85	<i>limno</i>	<i>Dinka ashena</i>	<i>functional</i>		<i>spring</i>	<i>1995</i>	<i>woreda gov't</i>
86	<i>maedo adi</i>	<i>Adigolo</i>	<i>functional</i>	<i>ND</i>	<i>Afridev</i>	<i>1997</i>	<i>woreda gov't</i>
87	<i>maedokorem</i>	<i>Adigolo</i>	<i>functional</i>	<i>ND</i>	<i>Afridev</i>	<i>1995</i>	<i>Unicef</i>
88	<i>may abo ale</i>	<i>adishumberket</i>	<i>functional</i>		<i>spring</i>	<i>1995</i>	<i>woreda gov't</i>
89	<i>may alekti</i>	<i>Lat</i>	<i>Not functional</i>		<i>spring</i>	<i>1995</i>	<i>woreda gov't</i>
90	<i>may alekti</i>	<i>Tselgo</i>	<i>functional</i>		<i>spring</i>	<i>1996</i>	<i>woreda gov't</i>
91	<i>may aslam</i>	<i>Smret</i>	<i>functional</i>	<i>5.33</i>	<i>Afridev</i>	<i>1996</i>	<i>woreda gov't</i>
92	<i>may chercher</i>	<i>Sesela</i>	<i>functional</i>		<i>spring</i>	<i>1995</i>	<i>woreda gov't</i>
93	<i>may daero</i>	<i>kidana</i>	<i>functional</i>		<i>spring</i>	<i>1996</i>	<i>woreda gov't</i>
94	<i>may liham</i>	<i>Zata</i>	<i>functional</i>	<i>5.5</i>	<i>Afridev</i>	<i>1997</i>	<i>woreda gov't</i>
95	<i>meda gei</i>	<i>fkrewolda</i>	<i>functional</i>	<i>6.5</i>	<i>Afridev</i>	<i>1997</i>	<i>woreda gov't</i>
96	<i>meda lat</i>	<i>Lat</i>	<i>functional</i>	<i>11</i>	<i>Afridev</i>	<i>1996</i>	<i>Irish Aid</i>
97	<i>meda mebay</i>	<i>Sesela</i>	<i>functional</i>	<i>9.5</i>	<i>Afridev</i>	<i>1996</i>	<i>woreda gov't</i>
98	<i>meda medo</i>	<i>Tselgo</i>	<i>functional</i>	<i>ND</i>	<i>Afridev</i>	<i>1997</i>	<i>woreda gov't</i>
99	<i>meda mesanu</i>	<i>Tselgo</i>	<i>functional</i>	<i>ND</i>	<i>Afridev</i>	<i>1997</i>	<i>woreda gov't</i>
100	<i>meda tsbet</i>	<i>Tselgo</i>	<i>functional</i>	<i>ND</i>	<i>Afridev</i>	<i>1997</i>	<i>woreda gov't</i>
101	<i>medalat</i>	<i>Lat</i>	<i>functional</i>	<i>46</i>	<i>Afridev</i>	<i>1997</i>	<i>Unicef</i>
102	<i>memeya</i>	<i>Selambkalsi</i>	<i>functional</i>		<i>spring</i>	<i>1996</i>	<i>woreda gov't</i>

Water points in Ofla woreda of southern Tigray, 1993-1997 E.C. cont...

103	<i>Mesekta</i>	<i>Adigolo</i>	<i>Not functional</i>	67.75	<i>Afridev</i>	1993	<i>Catholic C.</i>
104	<i>msanu</i>	<i>Fala</i>	<i>functional</i>		<i>spring</i>	1997	<i>Action Aid</i>
105	<i>ora mariam</i>	<i>Guara</i>	<i>functional</i>	ND	<i>Afridev</i>	1997	<i>woreda gov't</i>
106	<i>Pu-cheruba</i>	<i>Darabekeda</i>	<i>functional</i>		<i>spring</i>	1995	<i>Unicef</i>
107	<i>sebenako</i>	<i>adishumberket</i>	<i>Not functional</i>	5.85	<i>Afridev</i>	1993	<i>Catholic C.</i>
108	<i>sekele</i>	<i>Dinka ashena</i>	<i>ongoing</i>	ND	<i>Afridev</i>	1997	<i>woreda gov't</i>
109	<i>sekele</i>	<i>Guara</i>	<i>functional</i>	ND	<i>Afridev</i>	1997	<i>woreda gov't</i>
110	<i>sensah</i>	<i>fkrewolda</i>	<i>functional</i>		<i>spring</i>	1993	<i>Catholic C.</i>
111	<i>sesela ketema</i>	<i>Sesela</i>	<i>functional</i>	7	<i>Afridev</i>	1996	<i>woreda gov't</i>
112	<i>sheyala</i>	<i>Guara</i>	<i>functional</i>		<i>spring</i>	1996	<i>woreda gov't</i>
113	<i>shokuyati</i>	<i>Hashenge</i>	<i>functional</i>	28	<i>Afridev</i>	1995	<i>Unicef</i>
114	<i>tera</i>	<i>Selambkalsi</i>	<i>functional</i>		<i>spring</i>	1995	<i>woreda gov't</i>
115	<i>tsabran</i>	<i>zata</i>	<i>functional</i>	30	<i>Afridev</i>	1997	<i>Unicef</i>
116	<i>tsaedamede</i>	<i>Lat</i>	<i>functional</i>	4.5	<i>Afridev</i>	1997	<i>woreda gov't</i>
117	<i>tsatserka</i>	<i>Guara</i>	<i>functional</i>	30	<i>Afridev</i>	1997	<i>Unicef</i>
118	<i>wor teshka</i>	<i>Smret</i>	<i>functional</i>	6	<i>Afridev</i>	1997	<i>woreda gov't</i>
119	<i>wotkoyesh</i>	<i>Menkere</i>	<i>functional</i>	ND	<i>Afridev</i>	1997	<i>woreda gov't</i>
120	<i>woynu</i>	<i>Dinka ashena</i>	<i>functional</i>		<i>spring</i>	1995	<i>Unicef</i>
121	<i>zensivena</i>	<i>Zata</i>	<i>functional</i>	8.6	<i>Afridev</i>	1996	<i>Irish Aid</i>
122	<i>zukuta</i>	<i>Selambkalsi</i>	<i>functional</i>	7.4	<i>Afridev</i>	1996	<i>woreda gov't</i>

Appendix 2: Policy Setting

Overall Objective of Water Supply and Sanitation Policy (WSSP)

The overall objective of water supply and sanitation policy, as has been set in the EWRMP, is to enhance the well-being and productivity of the Ethiopian people through provision of adequate, reliable and potable water supply and sanitation services and to foster its tangible contribution to the economy.

Some of the Detail Objectives of WSSP are

- ☞ Provision of sustainable and sufficient water supply services to all the peoples of Ethiopia.
- ☞ Carry out operation and maintenance of all water supply and sanitation services in a sustainable and efficient manner.
- ☞ Promoting sustainable conservation and utilization of the water resources through protection of water sources, efficiency in the use of water as well as control of wastage and pollution
- ☞ Creating sustainable capacity building in terms of institutions, human resources development, legislation and regulatory framework for water supply and sanitation
- ☞ Enhancing the well being and productivity of the people by creating conducive environment for the promotion of appropriate sanitation services

Fundamental Principles of Water Resources Management Policy

The following are the fundamental policy principles that guide the equitable, sustainable and efficient development, utilization, conservation and protection of water resources in Ethiopia.

- ☞ Water is a natural endowment commonly owned by all the peoples of Ethiopia.
- ☞ Every Ethiopian citizen shall have access to sufficient water of acceptable quality, to satisfy basic human needs.
- ☞ In order to contribute significantly to development, water shall be recognized as both an economic and a social good.
- ☞ Water resources development shall be underpinned on rural-centered, decentralized management, participatory approach as well as integrated framework.

- ☞ Management of water resources shall ensure social equity economic efficiently, systems reliability and sustainability norms.
- ☞ Promotion of the participation of all stakeholders and user communities, particularly women's participation is the significant aspects of water resources management.

Policies Details

The EWRMP is a comprehensive and detailed policy framework that included different sectoral issues. Drinking water supply is among the different sector and its detailed policy issues are described below.

Drinking Water Supply Policy

❖ Planning Parameters and Standards (Engineering Issues)

Develop appropriate water supply planning parameters, design criteria and standards along with acceptable, desirable and permissible ranges and limits.

❖ Finance and Tariff

Finance

- ☞ Promote self-financing of programs and projects at the local level.
- ☞ Provide subsidies to communities who cannot afford to pay for basic services on capital costs only; based on established criteria and phase out subsidy gradually.
- ☞ Enhance self-financed and total cost recovery programs in urban water supplies.
- ☞ Ensure that all water supply undertakings will adequately address costs associated with operation and maintenance and be based on "cost-recovery" principles.
- ☞ Ensure transparency and fairness in the management of water supply services to enhance readiness to pay and participation by the users and communities in the financial management of systems.
- ☞ Ensure responsibility and financial accountability in the management of water supply services
- ☞ Promote the participation of local banks, other investors as well as popular and traditional self-help social associations (Idirs, rural credit services ...etc)

in the development of water supply through appropriate incentive mechanisms.

Tariff

- ☞ Ensure that Tariff structures are site-specific and determined according to local circumstances,
- ☞ Insure that rural tariff settings are based on the objective of recovering operation and maintenance costs while urban tariff structures are based on full cost recovery.
- ☞ Ensure that tariff structures in water supply systems are based on equitable and practical guidelines and criteria.
- ☞ Establish a "Social Tariff" that enables poor communities to cover operation and maintenance costs.
- ☞ Establish progressive tariff rates, in urban water supplies, tied to consumption rates.
- ☞ Develop flat rate tariffs for communal services like hand pumps and public stand posts.

Enabling Environment

❖ *Institutions and Stakeholders*

- ☞ Ensure that the management of water supply systems to be at the lowest and most efficient level of institutional set up, which provides for the full participation of users and to promote effective decision making at the lowest practical level.
- ☞ Develop coherent and streamlined institutional frameworks for the management of water supply at the Federal, Regional, Zonal, Woreda and Kebele levels and clearly define the relationships and interactions among them.
- ☞ Develop coherent and appropriate guidelines, standards, principles and norms for streamlining the intervention of loans, grants and other donations.
- ☞ Develop a framework for the sustainable and effective collaboration amongst all stakeholders including the public sector, donors, communities and the private

sectors at all levels as well as create and legalize forum for the participation of all stakeholders.

- ☞ Define and implement the respective roles of the various institutions and stakeholders at all levels including Federal, Regional governments, NGOs, private sector, etc.

❖ *Capacity Building*

- ☞ Build technical capacity in terms of water source investigation, design, engineering, water quality control, operation and maintenance, construction technology and facilities.
- ☞ Develop streamlined and coherent legislation and regulatory framework for improving water supply as well as to control pollution, degradation and depletion of water sources.
- ☞ Promote objective oriented training with special emphasis on trades-level training, community participation, administration and finance, and operation and maintenance.
- ☞ Assist in the establishment and strengthening of water users associations.
- ☞ Equip water supply organizations with the necessary facilities.

❖ *Gender Issues*

Promote the full involvement of women in the planning, implementation, decision making and training as well as empower them to play a leading role in self-reliance initiatives.

Appendix 3: Questionnaire for Beneficiaries

I. Socio-economic characteristics of Households

<i>No.</i>	<i>Zone</i>	<i>Woreda</i>	<i>P.A</i> <i>(tabia)</i>	<i>Age</i>	<i>Sex</i>	<i>Marital status</i>	<i>HH head</i>	<i>HH size</i>	<i>Educati</i> <i>on</i>
	<i>South</i>	<i>Ofla</i>			<i>1: female</i> <i>2: male</i>		<i>1: female</i> <i>2: male</i>		

II. Identification of Demand responsiveness and sustainability factors of the services (User group)

1. How many years have you lived in this area? _____
2. Whose idea was it to build the project?
 - a. The community
 - b. Local leaders
 - c. NGOs and Governmental offices
3. What were your major sources of water before the project?
 - a. _____
 - b. _____
 - c. _____
4. Whose idea was it to choose the source area of the project?
 - a. The community
 - b. Local leaders
 - c. NGOs and Governmental offices
5. Whose idea was it to choose the type/ technology of the project?
 - a. The community
 - b. Local leaders
 - c. NGOs and Governmental offices
6. Did you have other priorities than the water service?
 - a. Yes
 - b. No
7. if the answer for Question 6 is yes, what were they
 - i. _____

ii. _____

iii. _____

8. Did you know where the source of the project cost was?
- a. Yes
 - b. No

Identification of type of Participation of beneficiaries and Women

9. Have you participated in the development processes of the water project?
- a. Yes
 - b. No
10. What type of participation did you have during the project development?
- a. Cash
 - b. Labor
 - c. local materials
 - d. Idea
 - e. _____

Women's participation (for women only)

11. What function of participation did you have in the over all project development?
- a. Planning and management
 - b. implementation
 - c. utilization
 - d. none
12. What was the average Distance from your previous source of water? _____
13. Does the present source of water help you reduce the long time misuse to fetch water?
- a. Yes
 - b. No
 - c. Don't know
14. Are you member of the water committee?
- a. Yes
 - b. No
15. Do you think representation of women in the water committee is enough?
- a. Yes
 - b. No
 - c. Don't know
16. Do you think representation of more women in the water committee is good for the society?
- a. Yes
 - b. No
 - c. Don't know
17. What do you think are the reasons that make you and other women not participating in the WC? _____
- _____
- _____
18. Have you been given special encouragements to participate in the WC?

- a. Yes
- b. No

Issues of cost sharing and recovery

- 19. Do you support the idea that users should pay water fees?
 - a. Yes
 - b. No
- 20. Do you pay fee for the water service supply?
 - a. Yes
 - b. No
- 21. How much do you pay? _____
- 22. Where do you think should the service obtain money for repairs?
 - a. Tariff and additional contribution
 - b. local gov't
 - c. others
- 23. Do you pay water fees on time?
 - a. Yes
 - b. No
- 24. If answer for Q23 is No, what are your reasons?

- 25. Do you think the collected fee is properly managed?
 - a. Yes
 - b. No
 - c. Don't know

Community training and awareness creation

- 26. Is there any educational sessions given to your communities regarding use of clean water?
 - a. Yes
 - b. No
 - c. Don't know
- 27. Have you ever participated in educational sessions with regard to potable water uses?
 - a. Yes
 - b. No
- 28. If answer for Q27 is yes; how many times did you participate?
- 29. If answer for Q27 is No; what are your reasons?

- 30. Do you get benefit from the education given?
 - a. Yes
 - b. No
 - c. Don't know
- 31. If answer for Q30 is yes; what are the benefits _____

- 32. What type of container do you use to fetch water? _____
- 33. For what purpose do you fetch water?
 - a. HH drinking
 - b. bathing
 - c. washing clothes

- d. Animal drinking e. planting vegetables a&b a&c
- f. all uses

Consumer Satisfaction

- 34. What is your daily water use capacity? (in litters)_____
- 35. Do you use alternative water sources continuously?
 - a. Yes b. No
- 36. Are you satisfied with your water pressure?
 - a. Very b. Somehow c. No
- 37. Are you satisfied with number of hours avail?
 - a. Very b. Somehow c. No
- 38. What is your perception of color?
 - a. Good b. fair c. poor
- 39. What is your perception of taste?
 - a. Good b. fair c. poor
- 40. Are you satisfied with the quantity available?
 - a. Very much b. It depends on season c. No
- 41. What is your overall satisfaction with the service?
 - a. Good b. Fair c. Bad
- 42. Do you mostly stand in line a long time?
 - a. Yes b. No
- 43. Do you need new water points?
 - a. Yes b. No

Physical Condition

- 44. Do you think there is a contamination possibility in the service?
 - a. Yes b. No
- 45. Is there any protection of sources?
 - a. Yes b. No
- 46. Is there possibility of animal contamination?
 - a. Yes b. No
- 47. How do you evaluate the quality of the construction?

- a. Good b. Fair c. Bad
48. Is the system functioning?
a. Yes b. No
49. Is the system being repaired?
a. Yes b. No
50. is there any defects in catchment or wells
a. Yes b. No

Willingness to Sustain the System

51. Are you satisfied with the system?
a. Yes b. No
52. What is your perception on tariff level?
a. Expensive b. Fair c. Inexpensive
53. do you have problems in paying tariff (ability to pay)
a. Yes b. No c. Sometimes
54. Could replacement be done with funds in community?
a. Yes b. No c. Don't know
55. Does community have financial capacity to sustain the service?
a. Yes b. No c. Don't know
56. Who is the owner of the scheme?
a. community b. local Gov't
c. don't know d. others
57. Do you think the available water supply is sufficient for the community in the PA?
a. yes b. No
58. If answer for Q57 is No; what are the reasons?
a. _____ b. _____
c. _____ d. _____

Repair and maintenance

59. Does the water service give efficient service?
a. Yes b. No
60. Does it break frequently? a. yes b. No

61. If it breaks, how many times breaks occur in a year?
- a. One in a year
 - b. Twice a year
 - c. Three times a year
 - d. More than three times a year

Appendix 4: Points of Discussions with members of WCs and the Rural Water Staffs

Training, women participation and Financial Management

1. How many members are in the water committee? _____
2. How many members of the water committee are supposed to be women?

3. Do you think representation of women in the water committee is enough?
 - a. Yes
 - b. No
4. Do you think representation of more women in the water committee is good for the society?
 - a. Yes
 - b. No
5. What do you think are the reasons that make women not participating in the WC?

6. Have you been given special encouragements to participate in the WC?
 - a. Yes
 - b. No
7. What is the criterion for tariff setting? (Operational cost OR other)
8. Do you have differential tariff structure? (yes OR No)
9. Do you make tariff adjustments to meet costs?
10. What are the costs covered by tariff? (O&M + replace, O&M + repair, O&M + no saving, operations only, no tariff, & does not cover operations)
11. How do you evaluate the overall financial management of the system?
12. Do you make service cut-off for non-payment? (yes or No)
13. Do you have treasurer/bookkeeping? (yes or no)
14. What is the educational capacity of treasurer?
15. Do you have community bank account? (Yes or No)
16. Percentage of current in payment (More than 90%, 50-90%, Less than 50%)
17. Does the tariff cover O&M? (Yes or No)
18. What are the major costs of your system including salary of operators?

19. How do you regulate or punish those of nonpayer?
20. Do you get trainings and educations?
21. How many times did you get trainings?
22. How many members of WC get training? 0 = 0, 1 - 2 = 1, 3 - 5 = 2
23. What major problems do you have with regard to water service management?
24. Do the Woreda water staff and other organization give you follow up supports?

Points of Discussions with the Rural Water Staffs

1. How do you prepare water projects?
2. Do you make baseline survey before the project? What conditions do you examine?
3. Do you give education on personal hygiene and environmental sanitation to the target group? How and when?
4. How many times were the educational sessions given up to now?
5. How do you evaluate the quality of the construction?
6. Do you give Training to households and water committee?
7. How many members of the water committee were trained?
8. Do you make contractor supervision
9. Who selects the site for the water point?
10. What is the current coverage of water in the Woreda?
11. What are the existing types of water projects?
12. What is the standard of service delivery for the different project types?
13. Do you give support for the society after construction?
14. Who makes the water committee?
15. When and where do you take women's participation?
16. What is the structure of your staff?
17. Do you think the staff is enough and capable?
18. Do you train the village level operators?
19. Is there any curriculum for that?
20. Is there any problem you think with regard to RWS processes in the Woreda?

Appendix 5: Indicators sustainability and demand-responsiveness of RWS

The analysis will be based on indicators developed specifically for this study. Indicators are used to assess conditions of sustainability including demand-responsiveness of the community's water system. Demand responsiveness is considered from the perspective of household members and water committees.

Indicators of sustainability and demand-responsiveness of RWS

1. ***Project initiation:*** This assesses the degree to which community members felt responsible for initiating the project, as opposed to being selected by the project or government.
2. ***Informed choice:*** This assesses the degree to which individuals felt involved in decision-making processes surrounding the system, and how well they were informed about the implications of their decisions in terms of costs and responsibility for O&M.
3. ***Contribution:*** This assesses the contribution of local community to the initial capital investment. This includes cash, labor, and in-kind contributions.
4. ***Training:*** this assesses whether the community and the WCs get trainings regarding to hygiene and sanitation education as well as other management related trainings. It also examines the benefits of these offerings.
5. ***Women's participation:*** this is to examine whether women do have role in the development and management of the project.
6. ***Institutional capacity:*** this will evaluate the capacity of the rural water staff in the Woreda by looking at the existing structure and educational background of the members.
7. ***Water resource baseline survey:*** this is to assess whether the projects are implemented after need assessment and baseline surveys of the society where they are constructed.
8. ***Technology:*** assesses the friendliness of the existing projects by the society and technicians.
9. ***Access to or availability of spare parts:***

10. ***External follow up supports:*** this is one of the post implementation sustainability factors and it will assess whether the staffs and other organizations give follow-up supports to the WCs and the technicians in different forms.
11. ***Presence and strength of technicians:*** this will assess the existence, capacity and works of existing technicians in each water projects
12. ***Tariff collection and cost recovery:*** the service charges, amount and perception of the beneficiaries on that will be assessed here. It also compare and contrast the capacity of the collected tariffs to cover different operational and repair costs and also amount of savings.
13. ***Physical condition of system:*** This indicates the overall physical condition of the water system. It is based on information given by community and operators on issues such as construction quality, pressure level in the system, and leaks or defects in the masonry or pipe.
14. ***Consumer satisfaction:*** This indicates overall consumer satisfaction with the water system. It is based on expressed opinions on factors such as satisfaction with quantity and quality of water received, taste and color, and continued use of alternative sources.
15. ***O&M practices:*** This examines factors such as whether the community has a designated system operator, access to tools and spare parts, and information about follow-up support.
16. ***Financial Management:*** This assessment is based on a review of each community's financial records and interviews with the water committee and treasurer.
17. ***Willingness to sustain the system:*** This examines community support for sustaining the water system. It assesses the degree to which community members feel responsible for their maintenance of their system.

Appendix 6: Indicators and sources of information

<i>Indicators/ sub indicators</i>	<i>Sources of data</i>			
	<i>HHs</i>	<i>WCs</i>	<i>Operation workers</i>	<i>staffs</i>
<i>Demand responsiveness and sustainability factors</i>				
<i>Project initiatives</i>	✓	✓		
<i>Informed choice made</i>	✓	✓		
<i>Contribution to project</i>	✓	✓	✓	✓
<i>House Hold(HH) training</i>	✓	✓		
<i>Water committee training</i>		✓		
<i>Women's participation</i>	✓	✓	✓	✓
<i>Institutional Capacity and support</i>		✓	✓	✓
<i>Water resources and baseline survey</i>		✓		✓
<i>Technology</i>	✓	✓	✓	
<i>Access to or availability of spare parts</i>			✓	✓
<i>External follow-up support</i>		✓	✓	
<i>presence and strength of skilled technicians</i>		✓		✓
<i>Physical condition</i>	✓	✓	✓	✓
<i>Tariff collection and cost recovery</i>		✓		
<i>Consumer satisfaction</i>	✓			
<i>Operation and maintenance</i>		✓	✓	
<i>Financial management</i>	✓	✓		
<i>Willingness to sustain the service</i>	✓			