



**SUSTAINABILITY OF RURAL WATER SUPPLY SCHEMES; THE
CASE OF BOLOSO SORE WOREDRA, WOLAITA ZONE,
SOUTHERN NATION NATIONALITES AND PEOPLES REGION,
ETHIOPIA**

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Table of Contents

Acknowledgements.....	I
ACRONYMS	V
List of Figures	VI
List of table.....	VII
ABSTRACT.....	VIII
CHAPTER ONE	1
1. INTRODUCTION	1
1.1 Back ground and Justification of the Study.....	1
1.2 Statement of the Problems.....	3
1.3 Research Questions	4
1.4. Objectives of the Study	4
1.4.1The General Objective	4
1.4.2 The Specific Objectives	4
1.5 Significance of the Study.....	5
1.6 Scope and limitations of the Study	5
1.7 Organization of the study	6
CHAPTER TWO	7
2. REVIEW OF RELATED LITERATURE	7
2.1 What is Sustainability?.....	7
2.2. Sustainability of rural water supply and sanitation as a concept	9
2.3. Rural Water Supply Schemes Management	10
2.4. Water Supply and Sanitation in Africa	11
2.6 Experiences of Developing Countries in Sustainability of Rural Water Supply	12
2.6.1. Sustainability of Water Supply in Ethiopia.....	14
2.7. Factors affecting sustainability of water supply schemes	15

2.7.1 Technical factors	16
2.7.2 Social factors	17
2.7.3 Financial factors	19
CHAPTER THREE	22
MATERIALS AND METHODOLOGY OF THE STUDY	22
3.1 Description of the Study Area.....	22
3.1.1 Location	22
3.1.2 Climate.....	24
3.1.3 Soils.....	24
3.1.4. Geography.....	24
3.1.5 Natural vegetation and wild life.....	25
3.1.6 Socio-economic Characteristics	25
3.2. Data Collection and Analysis Methodology	27
3.2.1 Data collection methods.....	27
3.2.2 Village level maintenance trainees and water and sanitation committees	27
3.2.3 Organizations which provided water and sanitation services	27
3.2.4 Domestic Water Supply Coverage.....	28
3.2.5 Sampling procedure and sample size	28
3.3 Method of Data Analysis.....	30
CHAPTER FOUR.....	31
4. RESULT AND DISCUSSION	31
4.1 Characteristics of respondents.....	31
4.2 water use and accessibility.....	34
4.2.1 Water supply source and consumption	34
4.2.2 Time and distance required for fetching water	36
4.2.3 Amount of water fetched per day	37

4.3 sustainability factor of water supply schemes.....	38
4.3.1 Technical factors	38
4.3.2. Financial factor	42
4.4 social factors	45
4.4.1 Community participation in rural water supply	45
4.4.2 Water Committees and Community water supply Management and governance	48
4.4.3 Management problems of water schemes	49
CHAPTER FIVE	51
CONCLUSION AND RECOMMENDATIONS.....	51
5.1 Conclusions	51
5.2 Recommendations	53
REFERENCE.....	54

ACRONYMS

ADF	African Development Fund
ARD	Agricultural and Rural Development Office
BH	Bore Holes
BOWMEO	Boloso sore water, mine and energy office
CM	Community Management
CSA	Central; Statistical Agency
FGD's	Focus Group Discussions
GTP	Growth and transformation plan
HDW	Hand Dug Wells
HHS	House Hold Survey
IWRM	Integrated Water Resources Management
KII	Key Informant Interviews
MFED	Minister of Finance and Economic Developments
MDG	Millennium Development Goal
MoWR	Ministry Of Water Resources
NGO	Non-Governmental Organization
O&M	Operation and Maintenance
PS	Protected Springs
RWSS	Rural Water Supply Schemes
SNNPRS	Southern Nations Nationalities and Peoples State
SW	Shallow Wells
UNICIEF	United Nation Children Fund
UPS	Unprotected Springs
VL0M	Village Level Operation and Maintenance
WASH	Water, sanitation and hygiene
WSDP	Water Sector Development Program
WZWMED	Wolita zone water, mine and Energy development office

List of Figures

Figure .1: Location Map of Boloso Bore Woreda (Source: Extracted from Ethio-GIS by the Author) -----	22
Figure 2.1 conceptual/theoretical frameworks-----	24
Figure (4.1) Educational level-----	33
figure 4.2.1 is there problem in house hold water -----	36

List of Annexes

Appendix 1 Questionnaire for beneficiary households	
Appendix 2 focus group discussions	
Annex 3 Functional and Non-Functional Schemes of Boloso Sore Woreda	
Annex 4 The Number of Water Points in the selected kebeles	

List of table

Table 3.1: Distribution of Sample HHs in the Selected Kebeles-.....	30
Table (4.1a): Sex and marital status of the respondents	31
Table (4.1b): current occupation and family size of the respondents	32
Table (4.2.): water s supply source and consumption of the respondent source	34
Table (4.3: Time to fetch in liter's with respondents-----	35
Table (4.4): amount of water in liter's with respondents	38
Table (4.5): Availability of spare parts' with respondents	39
Table (4.6) technology selection with respondents	41
Table (4.7), below shows the service time of water supply scheme-----	42
Table (4.8) community attitude toward cost recovery	43
Table (4.9) financial management with respondents	44
Table (4.10) construction phase with respondents-----	46
Table (4.11) water committee organized-----	49
Table (4.12) Management problems of water schemes with respondents	49

ABSTRACT

Sustainable rural water supplies ensure the ongoing provision of a service that is fundamental to improving health, reducing the burden of carrying water long distances, and enabling users to live a life of dignity. Although sustainable water supply and sanitation services is a basic requirement for development, there are only very few systems implemented over last 25 years in rural areas of Ethiopia that are still functioning. The objective of the research was to assess sustainability of rural water supply schemes. The research was conducted in the Boloso sore Woreda in south nation nationality and peoples region. Data obtained from household survey were mainly analyzed quantitatively while data from focus group discussion and physical observation were analyzed qualitatively. In this study a survey was undertaken covering 4 kebele in which more than 120 respondents were questioners examining a range of aspects such as community participation, operation and maintenance practice, functionality level of schemes, community preferences and thoughts and major problems in water supply schemes.

Therefore, result need give to attention sustainability of rural water supply schemes and water supply systems were sustainable in which the community participated in all stages of the project, selected members of the community were educated in operating the system and spare parts and man power were available and manpower from the agency are special factors to sustain the system.

Key word: Water, Rural water supply schemes, sustainability, Ethiopia

CHAPTER ONE

1. INTRODUCTION

1.1 Back ground and Justification of the Study

Water is a precious resource and vital for life. Without it we would die within days. Access to a safe and potable supply of drinking water is universally recognized as a basic human need for the present generation and a pre-condition for the development and care of the next. Water is also a fundamental economic resource on which people's livelihoods depend. In addition to domestic water use, households use water for productive activities such as farming and livestock rearing in rural areas, or horticulture and home-based micro enterprises (MWR, 2012). According to World Health Organization the United Nations Millennium Development Goals (MDGs) object at reducing the proportion of people without sustainable access to safe drinking water and basic sanitation by 50 per cent by year 2015. Water supply schemes are credited with availing water to millions of households all over the world especially in rural areas. It is noted that the Sri Lankan Government has set ambitious goals to provide access to safe drinking water and basic sanitation facilities to 85% of the population by year 2015 and 100% by year 2025 in tandem with the MDGs . Against the backdrop of the importance of access to safe water, it is argued that a significant number of water schemes and other related community water projects do not delivers benefit to the society over the long term in developing countries. It is also reasoned that the genesis of this failure can be partially attributed to poor understanding of the issues of water sustainability. Ethiopia has abundant surface and ground water resources potential of which groundwater has a lion-share. The country's annual renewable fresh water resources amount to some 122 BCM/yr in the twelve river basins. However, only 3% remains in the country. The rest, 97% is lost in runoff to the lowlands of neighboring countries (MWR, 2012). The goal of the water supply and sanitation sector is to improve the social well being of the populace, enhance the performance of the national economy and ensure equitable provision of adequate quantity and quality of water services to all competing user groups on a sustainable basis.

In many countries, water shortages stem from inefficient use, degradation of the available water by pollution and the unsustainable use of the resource (Dessalegn, 1999). Supplying water

projects alone would not contribute for reduce the problem of sustainability of schemes. Rather the issue of functionality, utilization by intended beneficiaries and continuity of water projects to serve for longer period are very important to be considered. Hence, integration between beneficiaries and project suppliers in all phases needs to be addressed to come up with sustainable utilization of the resource.

According to an ADF (2005) report, the millennium Development Goals (MDG) objective of Ethiopia is to increase the improved water sources coverage from 2004 levels of 25% water supply and 8% sanitation to 62% for water supply and 54% sanitation 2015. Like that in 2010 the government presented the equally ambitious Growth and Transformations Plan one (GTP-I) 2011-2015 aimed at increasing drinking water coverage in rural area, from 65.8% (baseline at 2010 to 98% at 15 liters per person per day with in radius of 1.5km, to increase urban water supply access coverage from 91.5% to 100% at 20 liters per person per day within radius of 0.5km and thereby increase national water supply from 68.5% to 98.5% (MFED,2010)

Growth and Transformations Plan one (GTP-I) also targeted to improve sanitation by 84% at 2015 starting from 2010 with the following sequences 13.3%, 27.5%, 41.6%, 55.7%, 69.9% and 84% per year. Perhaps, different studies in the country shows that the total water supply coverage in the country is increased from 68.5% at the year 2010 (Ministry of Finance and Economic Development,2010 and Joint Monitoring Program for Water Supply and Sanitation,2010). Like that the sanitation coverage in the country increases from 12% to 56% within the years between 2008 to 2010 (Ministry and Economic Development,2010).

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 rural water supply by the international and national organizations increases, more specific information is needed about the sector. In addition, it is necessary to examine factors 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 woliata zone, focusing to assessing sustainable rural potable water use at both pre and post-project implementation 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 tries to assess the impact of typical factors such as institutional, technical and financial factors against sustainable use of rural water supply schemes. Therefore, this study will be assessing way to proved water to population sustainability of water supply schemes.

1.2 Statement of the Problems

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 rural water supply by the international and national organizations increases, more specific information is needed about the sector. The low water supply coverage forced the rural community to depend on unsafe and unprotected water sources like rivers, ponds, and springs which can easily be polluted. This can cause health related problems of the community in particular and impede the socioeconomic development endeavors of the country at large. Construction of potable water projects in rural areas is the first step to increase community access and contribute to the water of its members. However, this alone would not achieve all the intended objectives. Therefore, identifying the main problems of rural water supply and the roles of community participation in access to safe and adequate potable water in which the study focused was very important to take measures that enhance the current situation in the specified area.

The provision of safe water supplies and improved living standards in Boloso Sore Woreda are needs great focus and attention though it is constrained by a number of factors. According to a 2014 inventory, of the schemes available in Boloso sore Woreda 85% are functional. This rate seems good. But the high functionality rate figure likely indicates a system that is more or less able to cope with the relatively small number of water supply system that are available. This water supply schemes figure shows that the number of non-functional water supply schemes also increases (as above from 15%); perhaps indicating that established systems for maintenance will be need to be improved or strengthened.

Major reasons for non-function water points including lack of major and minor repairs, poor technical, institutional, financial and organizational aspects, and management skills. In addition problems associated with improper design specifications also have great impact. The other major problem with regard to water supply schemes in study area is lack of relevant registered data base.

Besides these, in some Boloso Sore Woreda kebeles it is not possible to dig wells as there is no water near the surface, and the ground is too hard.

The availability of data base dictates how much the existing schemes are functional and enables to know what should follow next. Hence it helps in sustainable provision of safe water to the inhabitants.

1.3 Research Questions

1. What actions should be taken to improve the water supply schemes services in Boloso sore woreda?
2. To what extent the institutional, technology and financial have impact on sustainability of water schemes?
3. How is the governance system of rural water supply schemes in the woreda?
4. What are the role of stakeholders in sustainability water supply

1.4. Objectives of the Study

1.4.1 The General Objective

The general objective of this study is to assess sustainability of water supply schemes to provided water in a sustainable way.

1.4.2 The Specific Objectives

The specific objectives of the research are as follows:

- To identify the functionality and service level of existing water supply schemes in the Woreda?
- To examine water governance system in the rural water supply schemes at the woreda
- To examine the institutional, technological and financial factors impacting on sustainability of schemes in the woreda;
- To identify problems related water supply schemes and management systems in the study area:

1.5 Significance of the Study

The result of this study expects to increase the knowledge and up to date information on problems of sustainability rural water supply schemes and its adverse impacts on the Boloso sore woreda. It will also serve as a working document to policy makers in the water sector. Input to improve management systems on sustainability rural water supply schemes Boloso sore woreda water, mine and energy of office and the Non Governmental Organizations.

The study will further serve as benchmark data for any further investigation, as a useful material for academic purposes, and as an added literature to the existing knowledge.

Finally, it will help to tackle sustainability rural water supply schemes problems, fill the gaps by identifying the reasons for lack of rural water supply system in the woreda and come up with the possible recommendations.

1.6 Scope and limitations of the Study

The study assessing sustainability rural water supply schemes in Boloso sore woreda. During assessment, main problem that was encountered in the course of this study was lack of adequate information due to improper document handling by the Woreda's Water, Mines and Energy Office. Due to poor documentation of the data in the offices, it was laborious to get the necessary and relevant information.

Because of the absence of in depth previous research on sustainability water supply schemes in the study area, it was difficult to assessment of study or deal with another side of the previous study. It is also worth mentioning that lack of sufficient amount of money and time had an objectionable upshot on the study.

1.7 Organization of the study

This study contains five chapters. This chapter provides the introduction of the sustainability water supply and sanitation situation in Ethiopia. The chapter also describes justification, objectives and hypothesis of the study and the second chapter incorporates literature review part. Chapter three comprises methodology part that includes: background of the study area, sampling design, data sources and type, methods of data collection and analysis. Chapter four deals with: background of the sample household respondents, and Factors hindering sustainability water supply schemes and related issues in the study area. Finally, chapter five incorporates conclusions and recommendations.

CHAPTER TWO

2. REVIEW OF RELATED LITERATURE

2.1 What is Sustainability?

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. 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).

The term sustainability is one that is used loosely to cover a whole range of topics. It is frequently used to refer to project sustainability the capacity of a project to continue to deliver its intended benefits over the long term (Bamberger and Cheema, 1990). As this study focuses on water systems (not on projects), sustainability in rural water supply system refers to the maintenance and management of the water supply system as well as the provision of an acceptable level of services throughout the design life of the water supply system. A number of simple definitions for sustainable development have been developed by different organizations.

Brundtland 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 (2003); describes as "To be sustainable, development must improve economic efficiency, protect and restore ecological systems and enhance the well-being of all peoples."

As a water service definition: This would mean that water continues to be available for the period For which it was designed in the same quantity and at the same quality as it was designed,(Abrams,L.1998)

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.”

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 (OECD;2013).

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; 2013).

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.

2.2. Sustainability of rural water supply and sanitation as a concept

Sustainability pertains to multiple aspects of a rural water supply, with institutional, social, technical, environmental and financial dimensions (WELL, 1998). This accounts for the fact that understanding and measuring sustainability is so difficult, and why solutions are highly context specific. Sustainable rural water supplies ensure the ongoing provision of a service that is fundamental to improving health, reducing the burden of carrying water long distances, and enabling users to live a life of dignity (Haysom, 2006). Therefore, in our context, sustainability is best defined pragmatically as “whether or not something continues to work overtime” (Abrams, 1998).

The sustainability by Carter et al (1999) for rural water supply and sanitation services According to these authors, a motivated community is the one that needs the service more and therefore considers the scheme as its own property. As a result schemes constructed by community motivation are likely to be sustainable. Effective O and M is essential for sustainability and village level O and M is one of the ways through which sustainability can be achieved. In cases of scarce government resources the money collected from cost recovery can be used for capacity building such as sanitation education and village level maintenance training which can play great role in sustaining the services. Services can't be always managed by the community alone

Water supply development projects need to extend their scope beyond simply the provision of sustainable water supply infrastructure. The greatest beneficial on the health of the local population is derived from an integrated multidisciplinary approach that works in close collaboration with the local population (Gleitsmann et al, 2007). Demand-driven approaches are effective since communities are capable of making decisions, maintaining services, and making their contributions to capital costs, operations and maintenance. In addition, a strong and well-structured information campaign is necessary to empower communities to make an informed choice (UNESCA, 2005).

Livingstone et al. (1993) explained that poor program conceptualization, unimaginative planning, use of inappropriate technologies, and rigid management approaches had contributed to high rates of program failure. Implementation approaches which resulted in non-sustainability of water supply projects should be identified so that they would not be repeated in the future.

At the same time implementation approaches, which resulted in sustainability of water supply projects should be identified so that they can be used as a base for future project implementations.

The chances of achieving the Millennium Development Goals by halving the proportion of people without access to safe water by 2015 will be seriously hampered unless levels of sustainability can be greatly improved, (Haysom, 2006). Therefore, it is necessary to follow approaches which can lead to the sustainability of rural water supply and sanitation.

2.3. Rural Water Supply Schemes Management

At the earth summit in Rio de Janeiro in June 1992, world leaders committed themselves to a comprehensive program to provide sustainable water supply and sanitation services to the hundreds of millions of the world's population who currently lack them. As the summit all states and support agencies have urged to implement activities aiming for universal coverage outlined agenda 21 that is a strategy for sustainable development in 21 century. A guiding principle in the achievement of services backed by measuring to strengthen local institutions in implementing and sustaining water and sanitation programs (IRC, 1993).

Community management in rural areas is at least, the driving paradigm for the water and sanitation (WATSAN) sector. Community management is all about putting communities in charge of developing systems that respond to their needs. Water for productive uses is high on this list frequently even higher than is treated water for domestic use into account the downside, not taking likely productive use into account can lead to system under design and, in turn, to failure livelihoods approaches, which emphasis the capabilities as well as the needs of people and take in consideration the complex nature of the communities and intra-community relationships, can help optimize the community involvement in system design and implementation. Similarly to community management (with which they are frequently linked), demand responsive approaches are all about matching systems to people with the primary goal of achieving sustainability. Productive users of water have a crucial role to play in turning water into the cash with which to spare parts and pay for routine maintenances.

Clearly, establishing the link between water supply and economic benefits also seems to increase people's willingness to pay for their water in the first place (IRC, 2003). Some evidence revealed that properly supported communities have both ability and willingness to manage their own water systems. Community management of the rural water supply services is considered as one of the options for achieving sustainability of the water services. Agency resources that are used for provision and maintenance of insufficient services can be diverted to a much more effective facilitating role, bringing greater cost-effectiveness and more wide spread and sustainable benefits.

Less demand for reconstruction or rehabilitation of broken down systems means more satisfying and more productive work on new schemes. Similarly, Studies in Tanzania and Thailand suggested that the water supply systems which provided the most reliable services were those and maintenance of the schemes, but met them in full (Dwarkin, 1989a, 1980b).

2.4. Water Supply and Sanitation in Africa

According to UNESCO (2010), every person needs 20 to 50 liter of potable water a day for their basic needs: drinking, cooking and cleaning, but more than one in six does not have access to such amount of potable water. Africa has the lowest total water supply coverage of any region, with only 62 percent of the population having access to improved water supply.

The situation is worst in rural areas, where coverage is only 47 percent. According to the JMP (2010), around 2.6 billion people do not have access to basic sanitation; and as a result of poor access to basic sanitation 1.5 million peoples die each year. Many of these people live in south East Asia and sub-Saharan Africa. Sanitation coverage in Africa also is poor, only 60 percent of the total population in Africa has sanitation coverage, with coverage varying from 84 percent in urban areas to 45 percent in rural areas (JMP, 2010).

According to the World Bank (2010) 70 percent of the world's poor people live in rural areas. Thus, if development is to be achieved, attention should be given to rural water supplies and sanitation since any development activities address the poor.

The 2010 updated estimate of JMP (2010) shows that rural Ethiopia has 8 percent access to basic sanitation and 26 percent have access to potable water in 2008 which shows an improvement from previous years. Of the total population of Ethiopia, 85 percent is estimated to live in rural

areas, thus, the above data explains that only 26 percent from these 85 percent of population have access to potable water and basic sanitation.

The World Bank has outlined some challenges in scaling up the ease of access of the rural potable water supply and basic sanitation. The basic challenge is ‘how to scale up water supply and sanitation to the rural poor?’ In order to address the question, Ethiopia is one of the poorest countries which get assistance from the World Bank to address the issues of water and sanitation to achieve the MDGs. The approach taken is different between urban and rural areas. In urban areas water boards have been established to have responsibility for increasing the water supply and sanitation. In rural areas, efforts are made to provide financial assistance to rural districts which helps to establish water supply and sanitation committees and build facilities (World Bank, 2011). Despite this assistance by the World Bank and other aid organizations, and the Ethiopian government to increase the easy access to potable water supplies and basic sanitation in rural areas, there are still rural districts that do not get potable water and basic sanitation. There are rural areas which consider having ease access to potable water and basic sanitation as a privilege rather than as a right.

The other challenge in providing potable water services and increasing basic sanitation access to rural areas are infrastructural problem. As Buddeke (2010) stated, socio-economic development is closely linked to infrastructure which many rural areas lag far behind. Ease of access to potable water and basic sanitation is one type of infrastructure which also depends on the other types of infrastructure like roads. Thus, the unavailability of such infrastructure is a challenge to any private or government organizations.

2.6 Experiences of Developing Countries in Sustainability of Rural Water Supply

The Millennium Development Goal of halving by 2015 the proportion of people without sustainable access to adequate and affordable safe drinking water will be hard to achieve in rural Africa due to low levels of existing coverage, but this will become almost impossible if sustainability levels cannot be improved (Reed, 2004).

It is estimated that 35% of all rural water supplies in sub-Saharan Africa are not functioning (Baumann, 2005), and despite the frequency with which it appears in development discourse, the reality of sustainability remains elusive.

Recent field studies in Ghana, Kenya, Uganda and Zambia have indicated that the actions of many stakeholders in the rural water supply sector undermine the provision of truly sustainable services (Reed, 2004). Much talk of sustainability is simply rhetoric, since it is often in the self-interest of NGOs, bilateral and multilateral agencies, governments and the private sector to limit the sustainability of rural water supplies. Hence, a history of top-down service delivery by governments and NGOs frequently leaves a legacy of dependency in the villages on external assistance. Consequently, in the event of a failure in the water supply the villagers do not make any attempt at repairs as it is not perceived to be their responsibility.

An innovative approach to achieve sustainable rural water supply, based on a reward scheme for communities and local governments, is on the cards in India. The reward scheme is expected to address some of the most critical challenges facing rural water supply in India. A recent Planning Commission report showed that by the end of the 10th Plan, while high access to public infrastructure in rural water supply (95%) had been achieved, in reality some 280,000 out of 1,422,000 habitations provided for, soon "slipped back" due to poor operation, maintenance and failure of water sources, while a further 277,000 habitations face severe problems of water quality. These observations are confirmed by the results of sector assessments studies led by World Sanitation Program and UNICEF across 16 states in India during 2004-2007. (World Bank, 2010)

To address this situation, the Department of Drinking Water Supply (DDWS), Government of India, proposed the launch of the Sajal Gram Puraskar in July 2007, to reward communities and local governments that achieve "sustainable" rural water supply. In presenting the new scheme, Mr. A. Bhattacharyya, Joint Secretary and Mission Director, DDWS, emphasized that, "there is a need for action plans to ensure sustainability, as well as protection of drinking water sources and systems." DDWS has sought inputs from state governments and various donors on the structure and modalities of the proposed awards scheme. Water and Sanitation Program - South Asia (WSP-SA) is providing inputs to the department on indicators of sustainability and the eligibility criteria for the awards. (World Bank, 2010)

The provision of water legislation is also very crucial in ensuring that the concerns and interests of rural dwellers are genuinely addressed. Fortunately the legislative process in Tanzania has made public hearings mandatory at the level of standing parliamentary committees and they are open to everyone that wants to participate (Palamagamba, 2005). The experience in the process

of enacting the Land Act, 1999 and the Village Land Act, 1999 in Tanzania has shown that where people are organized and consistent in pushing their arguments leads the Parliament enact a law that takes into account interests of the people. In the case of the land laws it was the women civil society organizations which took the lead in pushing for reforms (Ibid). Equally in the case of water laws if the women civil society will appreciate that water is as critical as land to women interest in Tanzania and champion the cause it will help in shaping the laws to the interest not only of women but the entire rural population and the indigent urban population (Ibid). Report by Harvey (2003), linking poverty levels to water resource use and conflicts in rural Tanzania, said that to ensure sustainability of water services there is a need to emphasize demand driven and community participation approaches. He commended one of the successful project known as Uroki-bomang`ombe Water Scheme (UBWS) in Tanzania where the community willingness and their participation in activities were high. Communities participated in all stages from planning to implementation. However, it is emphasized that there must be common features for the success of the water supply and sanitation services under a community management approach.

Management skills on how to handle group dynamics, institutional arrangements and monitoring and evaluation of the systems are the important element for success and sustainability of community managed water supply and sanitation services (Schonten and Morriarty, 2004). It is however noted that successful community management of water supply services needs on-going support and guidance even if communities are well trained and organized to operate the system (Harvey, 2003). Local governments, NGOs and private sectors are the important organs to ensure institutional support for the sustainability of water supply service under community management approach.

2.6.1. Sustainability of Water Supply in Ethiopia

The water supply and sanitation sector in Ethiopia is one of the least developed and is mostly characterized by service deficiency of physical infrastructure as well as by inadequate management capacity to handle policy and regulatory issue and to plan, operate, and maintain the service (Desalegn, 1999).

The Ethiopian government (subsequently the regional governments) adopted the National Water Resources Management Policy in 1999 (MoWR, 1999) so as to increase and sustain water supply

services in both rural and urban areas. The overall goal of the policy is to enhance and promote ‘efficient, equitable and optimum utilization of water resources’ for sustainable socioeconomic development. The policy follows the principle that the water supply sector has to ensure that every Ethiopian citizen has access to water of acceptable quality to satisfy their basic human needs.

The government later adopted the Universal Access Program (UAP) to scale up the water supply and sanitation coverage of the country and achieve 100% water supply coverage in most of the rural regions by 2012 (MoWR,2014). UAP includes the SNNPR region. To attain this target, the UAP assumes that, to make water supply schemes sustainable, hand pumps have to be made locally and repaired by local technicians and, generally, pumps and generators have to be standardized in relation to village-level operation and maintenance for sustainable service. It has been estimated that 33% of rural water supply schemes in Ethiopia are non-functional at anytime, owing to lack of funds for operation and maintenance, inadequate community mobilization and commitment and a lack of spare parts (MoWR, 2007). With regard to this issue, the UAP aims to rehabilitate and maintain existing water supply schemes in the first two years of its seven-year plan, so as to develop a maintenance culture and increase the sustainability of both the newly constructed and the existing water supply schemes (MoWR, 2006).

Like any other sector, water supply needs institutions (organizations) which are responsible for the provision of water supply and sanitation: Planning, financing, monitoring, and maintenance of water supply and sanitation activities. In this case water sector is characterized by complex institutional arrangements, and a variety of channels and sources of funds are used to finance the sector (OECD, 2003).

2.7. Factors affecting sustainability of water supply schemes

Sustainability pertains to multiple aspects of a rural water supply, with social, technical, and financial dimensions (WELL, 1998). This accounts for the fact that understanding and measuring sustainability is so difficult, and why solutions are highly context specific.

Other factors such as the on-going use of traditional sources of water, poor legal system, poor systems of cost recovery and the distaste for the water from the improved source also contribute to undermining sustainability (Parry-Jones et al, 2001). Some of the major determinant factors are described below

2.7.1 Technical factors

The use of appropriate technologies which are low cost, easy to maintain, simple to use and readily available is one response to the challenge of sustainability. Appropriate technologies are integral to the concept of village level operation and maintenance which emerged in the Water Decade (1981 – 1990). Many of its basic principles are still guiding the water sector today, though a tension persists between the ease of maintaining a system and its durability (Reynolds, 1992). The village level operation and maintenance conceptualization of the community as an island also neglects to recognize the role of external support agencies, such as the government, in achieving sustainability (Webster et al, 1999). Technical issues relating to the design and construction of rural water systems are the most obvious determinants of water system sustainability (Ripple, 2008). Poor construction quality or the use of low grade materials may lead to the failure of the water system before the end of its design life. Similarly, design flaws including shallow wells or boreholes, and overestimates of the water sources may cause a system to fail from the outset (Ibid).

2.7.1.1 Types of Technology

In order for rural water supply to be sustainable, appropriate technology must be used. Where the technology deployed is remote from the users' capacity to maintain, operate or pay for it, prospects of sustainability of services are equally remote. Therefore, it is experience with a number of projects that can ultimately lead to a better choice of technology (Harold et al.).

According to the World Bank, Village Level Operation and Maintenance (VLOM) type pumps can be repaired and maintained easily by village level caretakers requiring minimal skills and few tools. Spare parts are easily available in markets and are cost effective. Skinner in Harold et al. (2003) indicated that 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.

2.7.1.2 Availability of Spare Parts

The availability of spare parts is a critical factor to keep the system infrastructure working properly. An adequate supply of spare parts and maintenance tools is obviously of primary importance to long-term sustainability. Supply chains are now recognized as one of the key determinants of sustainability (Davis and Liyer, 2002), especially where the technology provided is imported, which has often been the case with large-scale hand pump programs in Africa, for example. The majority of recent World Bank proposal documents focus attention on the creation and support of spare part outlet chains, normally based on private sector providers, precisely to fill this perceived weakness. Linked to the issue of spare parts, is the question of sector standardization, which is part of the broader policy environment.

2.7.2 Social factors

Community participation in management of water projects could be the appropriate tool for achieving sustainability of water projects and can be used as a pedagogic tool for scaling up service provision in rural areas due to its flexibility and suitability. Due to the fact that rural communities are poor and living in a diverse and rapidly changing physical and social environment, it is impossible to devise a single blue-print that meets the needs of all. Only by supporting locally determined and tailor-made solutions can the right match between costs and benefits, resources and needs be made. (Schonten and Morriarty, 2004)

Participation is viewed as a tool for improving the efficiency of a project, assuming that where people are involved they are more likely to accept the new project and partake in its ongoing operation. It is also seen as a fundamental right; that beneficiaries should have a say about interventions that affect their lives (Pretty, 1995).

Kumar (2002) asserts that participation is a key instrument in creating self-reliant and empowered communities, stimulating village-level mechanisms for collective action and decision-making. It is also believed to be instrumental in addressing marginalization and inequity, through elucidating the desires, priorities and perspectives of different groups within a project area.

The central role played by women in the provision, management and husbandry of water, primarily in the domestic and household context, has gained widespread recognition in recent years; especially since the UN Decade (1980-1990) for Women (UN, 1997). One of the main reasons for this is that it is usually women who are the main collectors and user of water.

The way to find out women and decision-making in water related matters might be to simply ask how, by custom, women do contribute to community matters. Even though the division of labor between men and women shows both cross-cultural (or cross-country) as well as cross-regional variations (within a country), it is a widely accepted fact that women, in most cultures, take the responsibility of collecting water from various sources and managing it at home. In fact, there exists a wealth of evidences that show the existence of a tight and close relationship between women and water. Nane Annan, wife of UN Secretary General, Kofi Annan, powerfully spelled out the importance of water to women and girls in Johannesburg, at the world summit on sustainable development, 2002. In a speech she argues that women bear the brunt of the burden of lack of safe water, and their involvement is key to achieving the aims of the Water, Sanitation and Hygiene (WASH) for all campaign.

2.7.2.1 Management and Governance

There is general agreement in the literature that management is an important element in all water development schemes, determining success or failure. Quite frequently in Ethiopia, planners are emphasized the agronomic, engineering or technical aspects of water project and most of the important decision have been made by technical experts, with little regard to issues of management and beneficiary participation. Moreover, where participation has been tried, it has meant peasants to set up users bodies and elect officials, both of which have little say in project management. Participation of this sort has rarely involved participation decision making or in management. In brief, such practices have proved counterproductive and have contributed to the failure of many water schemes. If water projects, are to be managed efficiently and are to be sustainable it is important to promote beneficiary participation based on new principles (Ramato, 1999). The principle underlining this option is that the main stakeholders should be actually involved in the management of water supply projects on the one hand, and on the other in the formulation of the rules and responsibilities governing the operation of such projects. There are two elements involved here, management and governance.

Management refers to the day to day operation of project where as governance involves the establishment of working rules and responsibilities the choice of conflict resolution modernisms, the selection and control of technical staff, and mechanisms for accountability of users and officials. Participation offers people the opportunity to meet their responsibilities, as well as the opportunity to claim their rights (Eng. Fidaa Haddad, 2007).

2.7.2.2 Management and Operational Skills

Management capacity is essential for two largely different groups of people in the community: first for technical people such as pump minders, care takers operators, network managers, engineers, etc; and second for the managers themselves, the committee who are responsible for overseeing the former while also taking more strategic decisions such as what tariffs to set, or what services, level to adopted. Typical roles of committee include: representing the community in contacts with government officials, support agencies and he private sectors; coordinating roles with other community institutions and decision-making bodies; ensuring efficient and effective overall management; ensuring equity of water use and distribution; ensuring equity in decision making; financial planning, calculating and organizing contributions; organizing and supervising effective O&M; enforcing rules and regulations; maintaining accurate records, including financials records, minutes of meetings and important data such as member lists; promoting hygiene and effective use of facilities and holding and leading regular meetings (Ton, S and Patric M, 2003 as cited Melkamu. D, 2008).

An important difference between these two groups of people is that of voluntarism and professionalism while management committees are almost in variably voluntary on in the simplest systems should O&M be an unpaid task. In more complex systems it represents a full-time job for one or more people. As this role is increasingly played by community members, finding money for these people represents an important part of cost recovery. (Ton. S and Patric. M, 2003 as cited in Melkamu .D, 2008).

2.7.3 Financial factors

The widespread failures in water supplies have been attributed to a number a flaws in the project; the intervention was not desired by the community, the capital and/or recurrent costs are too high for the community, lack of ownership results in neglect of maintenance and repairs, the promised

benefits don't materialize, education programs are too short and trained members of the community move away or lose interest (Carter et al, 1999).

To sustain water supply schemes, it is vital to have the involvement of all segments of the community, in the form of full participation and control over the scheme's operation and maintenance, overall management, strategic decision making, ownership and cost sharing for operation and maintenance and construction activities (Lockwood, 2004).

The sustainability of a rural water system depends on the willingness of users to provide the necessary time, money and labor to keep the system functioning. This willingness may be affected by socio-economic factors such as income level, ethnic homogeneity, or the willingness of villagers to work together (Palamagamba, 2005).

More commonly, however, the willingness will depend on consumer satisfaction with the service, usually compared to the previous water source in a community. When communities perceive a significant improvement in water services, they are usually more willing to pay for operation and maintenance. Willingness-to-pay is also affected by community perceptions of ownership or sense of entitlement to free services from the government.

2.7.2.1 Cost Sharing and Cost Recovery

The issues of cost sharing and cost recovery are crucial in the process of enabling the community to manage their systems after completion. It must, however, be clear that does not imply total financial responsibility of the community. It does mean that some contribution from users is needed to establish commitment, which through time should increase to reach the intended level of making the developed systems sustainable (Evans, 1992: Sebsibe Alemneh, 2002).

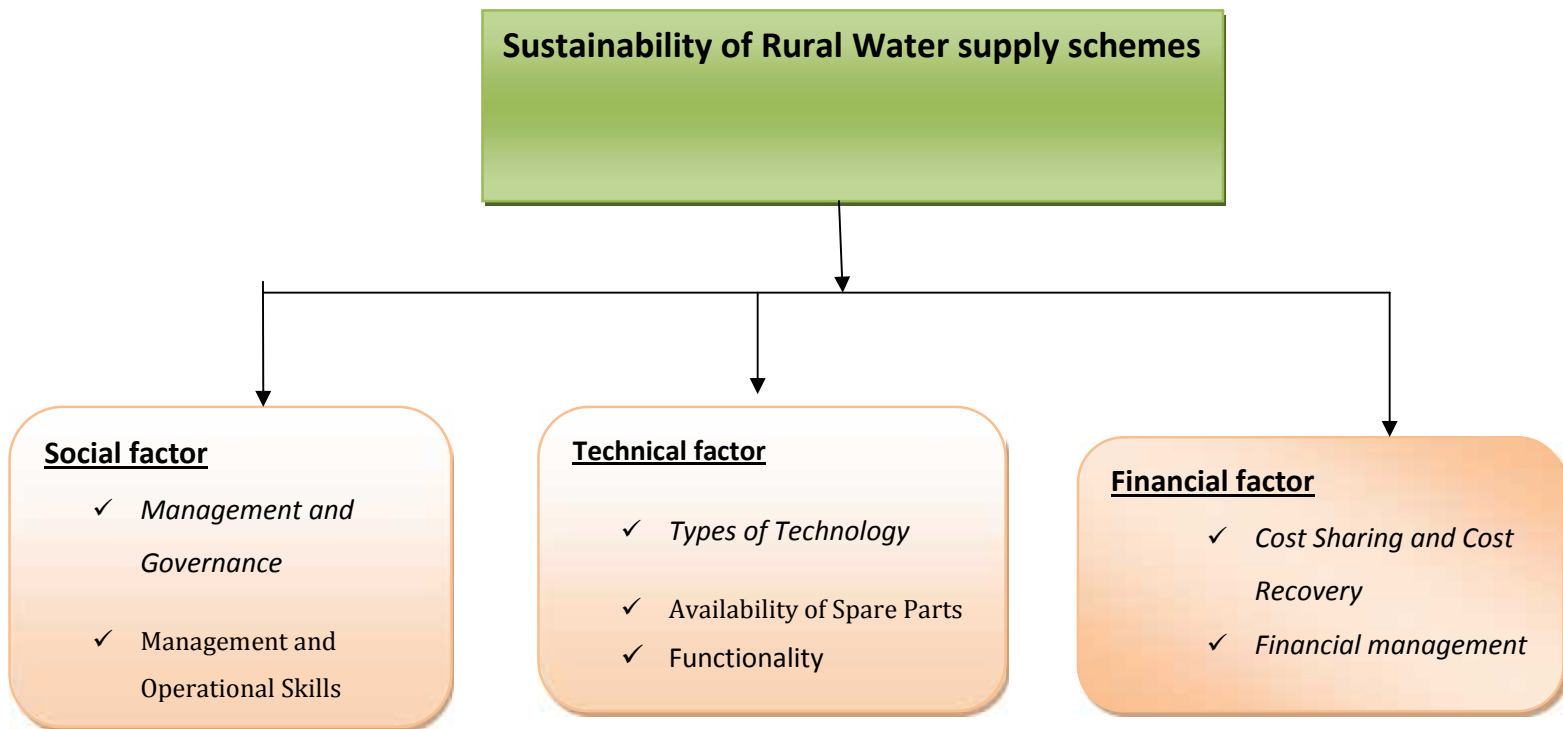
The provision of an improved water supply is neither cost free nor sustainable unless the costs are recovered. These costs comprise operation costs, repair and maintenance costs and replacement and/or rehabilitation costs (Briscoe and de Ferranti, 1988). World Bank evaluation report states that sustainability can only be ensured if tariffs generate enough resources to operate the system, finance the expansion of the service to new customers and ultimately replace the infrastructure after its useful life (Paraguay ICR, 1999).

2.7.2.2 Financial management system

In order to cover Operation and Maintenance costs and other important replacement costs, the collected money from user community should be managed properly and used for the intended purposes.

Necessary training should be given for water committee for prudent financial management. Or else, there should exist transparent working and accountability mechanism in order to avoid miss-utilization and embezzlement of collected money (Davis and Brikke 1995).

Figure 1; conceptual framework



CHAPTER THREE

MATERIALS AND METHODOLOGY OF THE STUDY

3.1 Description of the Study Area

3.1.1 Location

Boloso Sore is one of the woredas in the Southern Nations, Nationalities and Peoples' Region (SNNPRS) of Ethiopia. Part of the Wolayita Zone, Boloso Sore is bordered on the south by Sodo Zuria and Damot Sore, on the west by Boloso Bombe, on the northeast by the Kembata Tembaro Zone, on the northeast by the Hadiya Zone, on the east by Damot Pulasa, and on the southeast by Damot Gale. The administrative center is at Areka. Boloso Bombe and Damot Sore woredas were separated from Boloso Sore in 1999 E.C. Astronomically, the woreda is located between $6^{\circ}05'0''$ and $7^{\circ}11'0''$ N Latitude and $37^{\circ}0'0''$ and $37^{\circ}50'0''$ E Longitude. Areka, the capital of the woreda, is found along the Soddo Hosanna road to South West of Addis Ababa at 299 km, North of Soddo, at 29 km and South West of Hosanna Town at 155 km. The woreda covers an area of about 273.26 km^2 . Administratively, it is sub-divided into 29 kebeles.

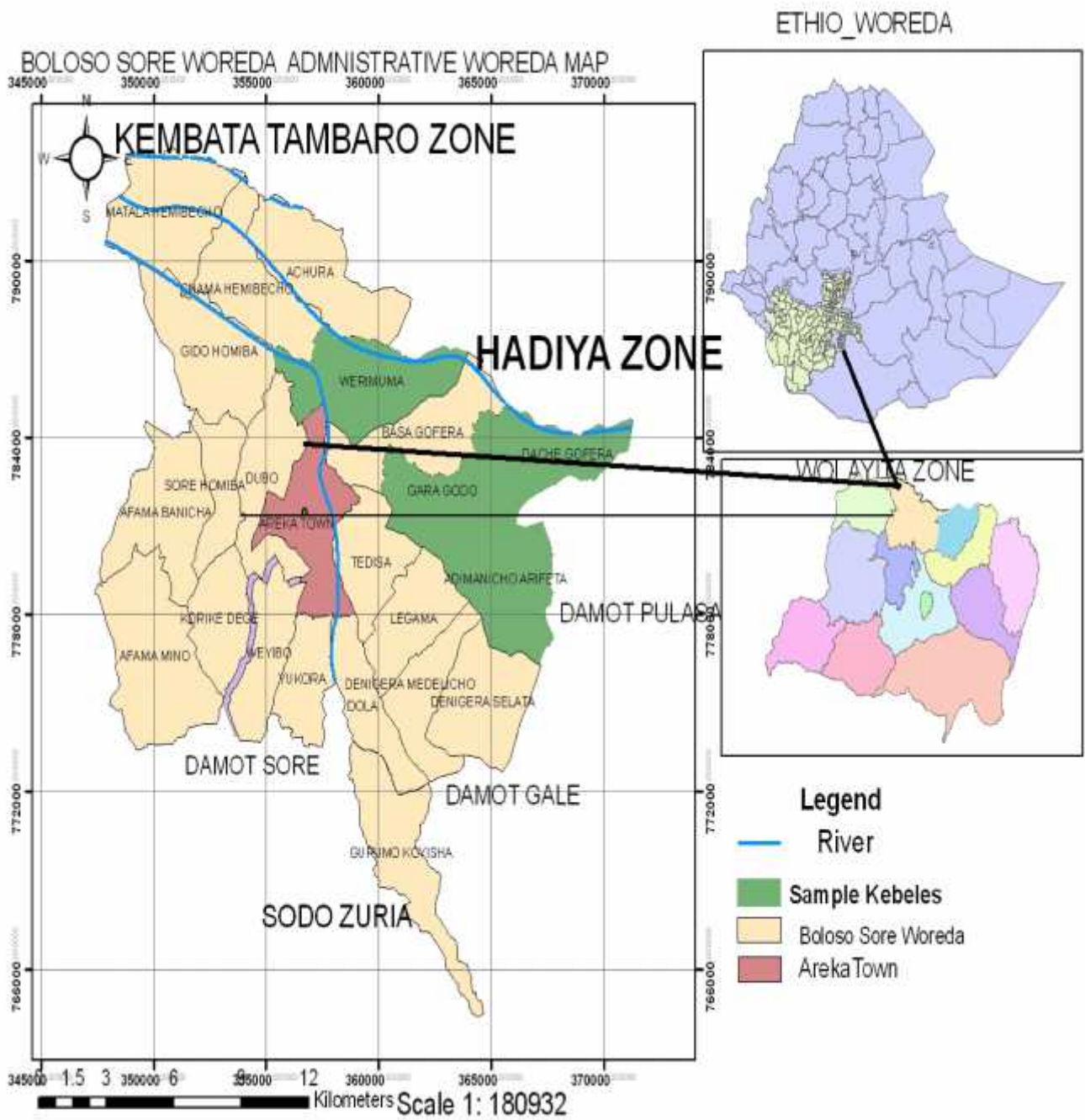


Fig.1: Location Map of Boloso sore Woreda (Source: Extracted from Ethio-GIS by the Author)

3.1.2 Climate

Based on traditional zonation the study area was divided into different agro-climatic regions on the base of temperature and altitudes. The recent study area is divided into two traditional climatic zones as Dega and Woina-Degakebeles. Mean monthly temperatures vary from 16°C, during the coldest months and 25.6°C, during the hottest (warmest) month. Average annual rainfall is also found 1,636 mm. The altitude ranges between 1500-2900m above sea level (ARC, 2013).

The seasonal rainfall occurs in the woreda in two distinct rainy seasons: ‘Kiremt’ rains (also called the ‘big rains’) occurred in summer (roughly in June, July and August) and ‘belg’ rains (also called the ‘small rains’) occurred in spring (roughly from mid-February to mid-May). *Kiremt* is the main production season, but the occurrence of rain during the *belg* season is equally important as it has implications on the food security of the households. Mean annual rainfall in the area varies between 100 mm and 1,400 mm (Lemma, 1999).

3.1.3 Soils

Different types of soils are found in the study area. They vary in their color, texture and ph value. Its texture includes clay, loam and well drained soil, whereas its color comprises red soil, black soil, grey soil and dark soil. The ph value of the soil is less than 5.5(acidic). Organic content of the soil is from 3-10 percent (WBoA, 2011). Soil erosion in the area has different magnitudes at different land uses in each of three agro-climatic zones. In Dega soil erosion is high in farm land, moderate in grazing land and low in forest land. To control erosion two conservation methods are applied in the study area; these are physical and biological methods. The physical conservation measures include; terracing, check dame, soil band, stone bands, and biological measure includes; reforestation, aforestation and the others (WBoA, 2013).

3.1.4. Geography

The relief of the woreda has many characteristics; it includes plains, mountain ranges, plateau and valleys. The plain area with slopes ranging 0-2° constitutes 40 percent while the slope area ranging between 3-4° account 50 percent of the total area. Mountain area with the slop of 16-30° and valley with the slope of 50° are 3 and 7 percent of the total area respectively.

The elevation of the area ranges from valley with altitude of 740 m asl to the high land of 2900m asl(WBoA, 2012).As far as the surface drainage is concerned, the woreda has both permanent and seasonal rivers. The permanent rivers are Woybo, Shapha, Soke and Ajache. All of these rivers are tributaries of Omo River. The seasonal rivers include Magera, Malchaye, Tokisa and the others. The Rivers of the area have an irrigation potential of 730 ha and they can support 1660 households. However, what used at present only 550 ha (WBoA, 2013). This topography in some keble not suitable to dig water and the community travel long distance to fetch water.

3.1.5 Natural vegetation and wild life

Natural vegetation of the study area includes; eucalyptus tree, sycamore, podocarpus, olive, juniper, acacia, strawberry, rose, beach, sisal, cardiac, and etc. but due to population demands these trees are in destruction. People use the wood for fuel, construction, support of crops, agricultural tools, timber and etc. The exploitation of forest is high in the area because of youth's early marriage and using for construction of house and high demand for agricultural land.

As much as wild animal is concerned, the area including Columbia monkey, Ape, Hyena, Rhino, Civet Cat, Wild Goat and etc. Wild Goat , Rhino, Civet Cat , Columbus monkey are in extinction due to illegal hunting for food, fame and decoration(WBoA, 2012).

3.1.6 Socio-economic Characteristics

3.1.6.1 Population and Culture

Boloso Sore is one of the most densely populated woredas of the regional state. According to the 2007 census, the total population of the woreda is 196,614 of which 100,273 are male and 96,341 female with the density of 527 persons/km² . This makes it the third densely populated woreda in the zone after Damot Gale and sodo zuriya. About 92 per cent of its total population lives in rural areas.

3.1.6.2 Existing Water supply schemes

In the study area, Boloso sore woreda consumption water is collected from deep wells; shallow hand dug wells, springs and minor rivers. Overall water supply coverage of the woreda in 2007 are 73.7% (BoWME, 200). There were 60 hand dug wells are functional and 15 non functional, 66 shallow wells functional and 8 functional, rope pump 4 functional and 6 non functional, on spot 48 functional and 11 non functional, 9 bore wall are functional and 2 non functional and 29 medium spring total of 269 functional and 46 non functional water supply schemes constructed by the regional government and NGOs in recent years. However, it has been noted that a large number (15%) of the water supply schemes are non-functional at any given time, implying negative impacts on coverage and on the attainment of the UAP. To this end, the aimed to increase the sustainability of water supply schemes.

The maximum distance from any house hold to the nearest water point put by the Unicef is 500 meters (HCMSDR ,2004).But in Boloso sore average distance of water schemes from the house hold are located in areas 1.5 kms (BoWME,2007) far from settlements. In this case, the schemes lack closer eye contact from beneficiaries resulting in exposure to danger.

The community uses water as per the schedule of water committees. They also check and balance the activities of water committees with the help of the Keble Administration, to which the water committees are accountable. The kebele Administration supervises the overall activities of the water committees. The roles and responsibilities of the Woreda Water, Mine, and Energy Office constitute overseeing all the water supply schemes in the Woreda and providing backstopping support for water committees. These include: controlling and supervising water supply scheme design and construction; managing water supply schemes; providing maintenance support and relevant trainings for users and water committees; and controlling the quality of water supplied for domestic activities.

The office of Water, Mine and Energy of Boloso sore woreda is the only responsible body for activities related to water supply development activities. Local and international NGOs help community of the woreda through the channel of this office.

3.2. Data Collection and Analysis Methodology

The data was collected through both primary and secondary methods. Data source and type, sampling size, data collection instruments and method of analysis are discussed below.

3.2.1 Data collection methods

Qualitative and quantitative data from both primary and secondary sources used as input for the research thesis. Primary data were obtained through questionnaire household surveys, and group discussion with beneficiaries, : village Water supply and sanitation committee, village level operation and maintenance trainees committee, representatives of each organization and extension staff operating in the specific communities. The secondary data was obtained from official statistics and reports available in the project implementing organization' offices of Boloso Sore woreda Water, Mine and Energy office, Boloso sore woreda Administration, Boloso sore Woreda office of Agriculture and Rural Development, SNNPR Region Bureau of Water, Mine and Energy, SNNPR Region Bureau of Finance and Economic Development and other sources from sectoral offices.

3.2.2 Village level maintenance trainees and water and sanitation committees

A pre-tested structured checklist was needed for conducting formal surveys with village level maintenance trainees and this checklist used to gather information on water and sanitation committee in each village. The checklist used for village level maintenance trainees included information on the trainees experience in maintaining the scheme, belief of the trainees on their ability to maintain a system, constraints of village level maintenance and their perspective in sustaining water supply service.

3.2.3 Organizations which provided water and sanitation services

The questionnaire was include information on the general approaches that the organizations followed in providing the services in the villages selected for this study area, more specifically community participation in project activities, operation and maintenance, supporting mechanisms after handing over the schemes to the community, opportunities and constraints in working to sustain rural water supply and sanitation services, perspectives in sustaining rural water supply and sanitation services.

The non-governmental organization that include international medical corps(IMC) these organizations were working in maintenance and operation of water supply schemes and sanitation with woreda Water, Mine and Energy Office has always the responsibility to follow up the works of any organization in the woreda.

3.2.4 Domestic Water Supply Coverage

Average per capita consumption was used to assess the domestic water supply coverage of the woreda. The data on individual domestic water consumptions, total water consumption (m³), total production (m³), and total number of customers were as collected from the Boloso sore Water, Mines and Energy Office bill documents for analyzing average per capita consumption. The following formula was applied for the determination of per capita consumption (litre/person/day).

$$\text{Domestic water consumption (l/dl/d/c)} = \frac{\text{Annual consumption (m}^3\text{)} * 1000\text{l/m}^3}{\text{Population number of the rural} * 365} * \frac{1000\text{l/m}^3}{\text{rural} * 365}$$

Where; l = liters of water

D= daily use

C = consumption of water

3.2.5 Sampling procedure and sample size

3.2.5.1 Sampling procedure

Multistage sampling technique was used for this particular study. In the first stage, Boloso Sore Woreda was selected purposively on the water supply problems because, the study area water supply schemes figure shows that the number of non-functional water supply schemes, inadequate community mobilization and commitment and high population density. In the second stage, the woreda have 29 kebeles from 29 kebeles four(4) kebeles was selected randomly by lottery method and three water points from each kebeles selected and four kebeles was chosen.

This is mainly because; it is believed that those kebeles located in the Woreda have number of non-functional water supply schemes and the selected kebeles can represent the water supply schemes situation of the area.

In the third stage, sample HHs were as taken proportionally from each Kebele from the total households. It is to mean that a sample size (n) in each Kebele was picked on the basis of its proportion to a sampling frame (N). In the fourth stage, sample HHs were as selected from each Kebeles. To select sample HHs simple random sampling method was applied.

To facilitate this final stage, lists of names of households in each selected kebeles were obtained from the Kebeles offices in the study areas. In general low sample sizes are taken for populations which are very similar in terms of content and subject matter while high sample sizes are needed for more diverse population. Having this in mind, from all existing 315 water schemes in the Woreda, three water points each from the above selected four kebele will chosen. Factors used for selection of the water points were technology type (shallow well and hand dug well) and status of schemes (functional and non functional). The sampling method used to analysis simple random sampling method (lottery Method). On aggregate, 12 water points of different technology incorporating functional (those delivering service) and not-functional (those not delivering service) was identified as unit of analysis for this research.

3.2.5.2 Sample size determination for questionnaire survey

To determine sample size the mathematical formula used. Taro Yamane, 1967 has suggested the following mathematical formula for determining sample size.

$$n = \frac{N}{1+N(e)^2}$$

Where;

n is sample size

N is the total households of selected kebele

e is precision level or sampling of error 9%(0.09)

$$n = \frac{5587}{1 + 5587(.09)^2} = 120$$

Based on the above sample size determination calculation, 120 sample households will be obtained.

Table 3.1: Distribution of Sample HHs in the Selected Kebeles

Kebeles	Total HHs	Sample HHs
Dache gofara	1402	30
Adimancho arifata	1407	30
Worumuma	1530	33
Gara godo	1248	27
Total	5587	120

Source: Kebeles offices of the respective Kebeles(2016)

The sample size selected of household lowest due to their non respondents and budget limit. The place and time of interview or questions was convenient to the respondents. Only one house hold member were as involved in giving the response since the household uses the same source of water. Prior to implementing the survey, the enumerators were as trained and the questionnaire was tested for its clarity.

3.3 Method of Data Analysis

Data about the water supply sustainability of schemes was collected using different methods of data collection; these include: questionnaire and discussions with beneficiaries, members of different water committees, technical staff members, and personal observations were as used to produce primary data.

As to the analysis and interpretation of the empirical quantitative and qualitative data collected on user households, technical staff members and water committees using structured questionnaire(quantitative), and discussions (qualitative): various methods of statistical analysis and interpretation are applied. The collected data through the questionnaire survey was analyzed using the Statistical Package for Social Science (SPSS) version 16 for Windows. The questionnaires are given numbers for identification purposes. Each question will identified by a variable name and within variables there will values and value labels for identification the respondents. After coding the information from the questionnaires, template for entering data in the computer program are created. The data was entered in the SPSS computer program where frequencies, multiple responses, and chart will computed during the analysis.

CHAPTER FOUR

4. RESULT AND DISCUSSION

4.1 Characteristics of respondents

A total 120 questionnaires were distributed to be responded by the house hold water users during the questionnaires survey in our kebeles. The number of respondent water users were may Dache Gogare 30 HH, Admancheo Arifiata 30HH, Worumuma 33HH and Gara Godo 27HH.

Out of total respondent 71(59.2%) of respondents male and 49(40.2%) were female (see table 4.1, below). The higher number of female respondents is attributed by culture and traditions of Ethiopia and almost half of respondents are female in study area, especially in study areas where women and girls are responsible for collecting and managing of water in the household. Hence, water supply scheme failures largely affect women. So, it is the women who know much about the problems they are facing concerning water accessibility and sustainability use. (See below table 4.1a)

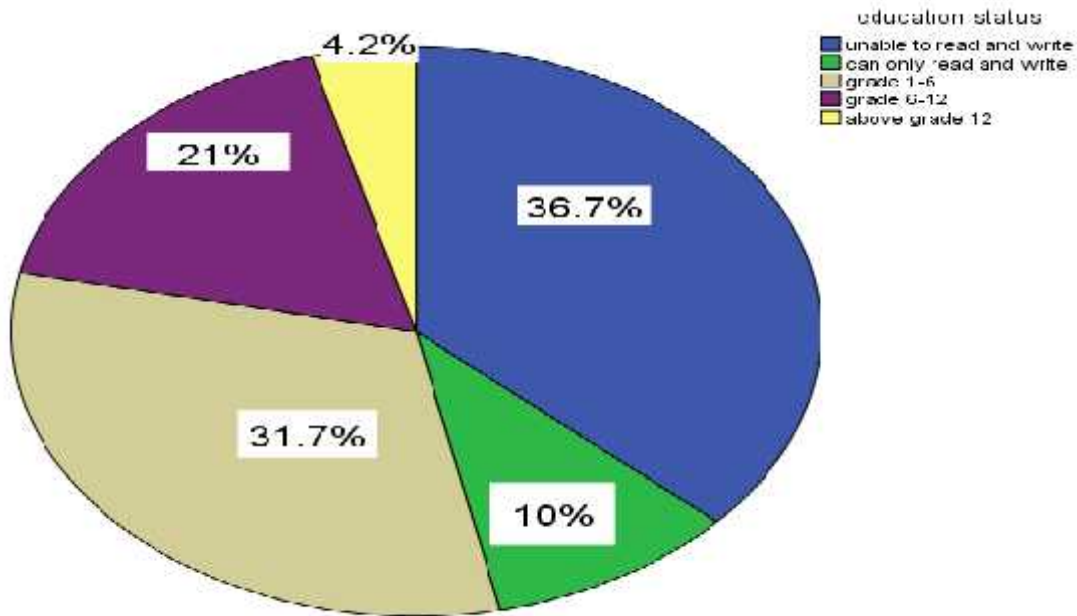
Table (4.1a): Sex and marital status of the respondents

Sex	Frequency	Percent	Marital	Frequency	Percent
Male	71	59.2	Single	20	16.7
Female	49	40.8	Married	68	56.7
			Divorced	2	1.7
			Widowed	30	25.0
Total	120	100.0	Total	120	100.0

In addition to show the marital status of the household survey there were respondents who married, single and widowed. Out of the respondents of the survey 14(16.7%) were single, 68(56.7%) were married, 2(1.7%) were divorced and only 30(25%) were widowed.

This implies that majority of the respondents are a couple or living married life. Married respondents had good participation up on community like participation in water supply development and management. This is because their water consumption and need is very high due to family size and ordered life but the unmarried respondents do not care about the water supply schemes since their need is very low as well as consumption. In other words the married need additional schemes construction but those who didn't need not.

Figure (4.1) Educational level



The education level of out of the surveyed household respondent 44(36.7%) were respondents who can unable to read and write, 12(10%) were respondents who can only read and write, 38(31.7%) were respondents who can grade 1-6 , 21(17.5%) were respondents who can grade 6-12 and 5(4.2%) were respondent who above grade 12.

Education plays a significant role for water resource management and governance. Therefore of those who learned more had good approach in management of water supply schemes since they are more near to new technologies and practices from information gathered. (See above figure 4.1)

Table (4.1b): current occupation and family size of the respondents

Family size	Frequency	Percent	current occupation	Frequency	Percent
8-10	62	51.7	civil servant	1	.8
12-15	11	9.2	Merchant	11	9.2
Below 8	47	39.2	Farmer	75	62.5
			House hold	4	3.3
			Daily lobar	29	24.2
Total	120	100.0	Total	120	100.0

The Family size is directly proportional and appropriate management and governance is very crucial for those who had great number of family size. The survey result shows that 62(51.7%) of the respondent said that 8-10 family size, 11(9.2%) of the respondent said that 12-15 family size and 47(39.1%) of the respondent other specified (the family size below 8). the survey result show almost higher number of respondent family size is very high they have affect their daily income and they daily water consumption are high in addition to this the higher family size had contribution for water related diseases transmission. Regard with, this the sample households have different occupations. These include civil servant, Merchant, daily laborers, farmers and others (pensioners and households that depend on other people for their survival). The survey result show that 75(62.5%) of the respondent were farmer, 29(24.2%) of the respondent were daily labor, 11(9.2%) of the respondent were merchant, 4(3.3%) of the respondent were other and 1(0.8) of the respondent were civil servant. Therefore, these result shows higher numbers of respondent are farmer, they have low daily income and they contribute less amount of money to water supply schemes operation and maintenance.(See above table 4.1b)

4.2 water use and accessibility

4.2.1 Water supply source and consumption

Existing water supply source situation is very important to understand or know the major problems of rural water supply schemes in the study area. The survey result in the study area shows that majority of the respondents are using hand dug well (HDW) shallow (SW) deep well(DW), river, unprotected spring and protected spring for the drinking and domestic purpose.

The survey of the respondent shows that 31(25.8%) of the respondents use shallow well fitted with hand pump, 26(21.7%) of the respondent using hand dug well, 25(20.8%) of the respondents deep well, 29(24.2%) of the respondents using bore well with rope pump, 6(5%) of the respondents using river and 3(2.5%) of the respondents using protected springs.

(See below table 4.2.1)

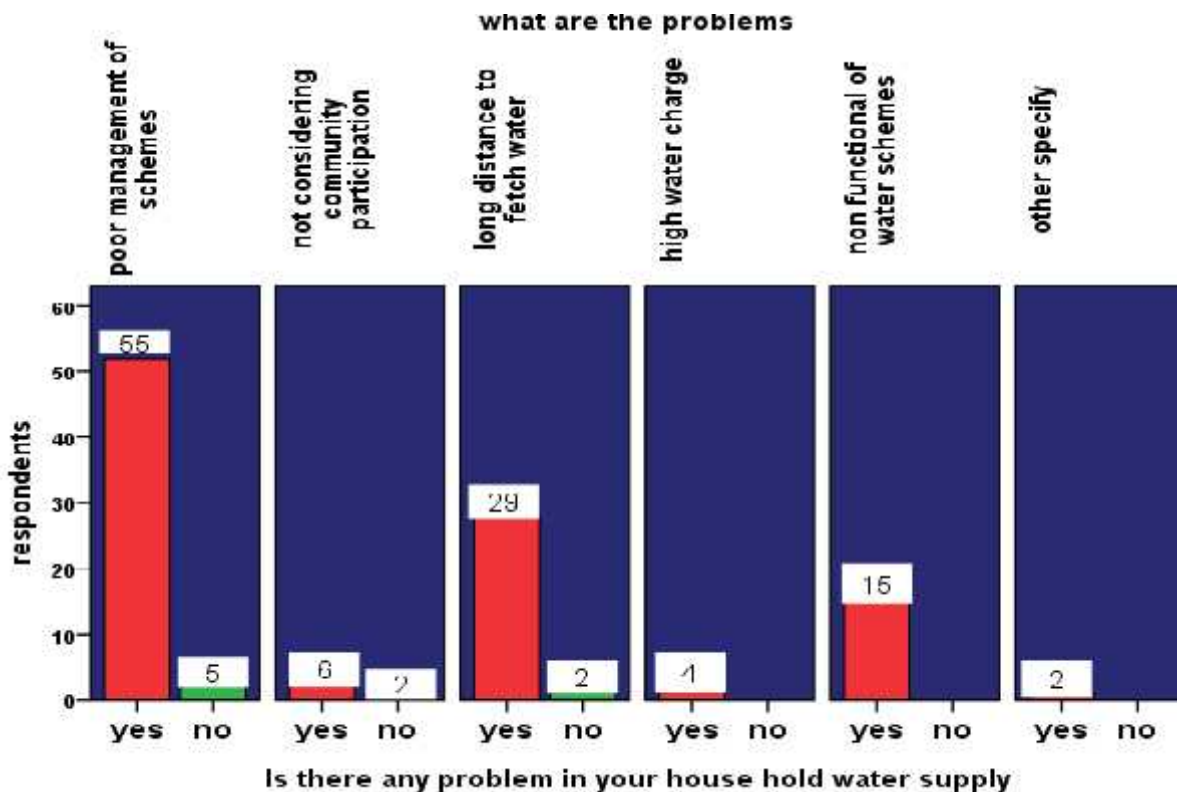
Table (4.2): water s supply source and consumption of the respondent source

Water source	Frequency	Percent
River	6	5.0
hand dug well	26	21.7
shallow well	31	25.8
deep well	25	20.8
unprotected spring	29	24.2
protected spring	3	2.5
Total	120	100.0

Therefore, the households beneficiaries or communities did not have any other alternative rather than fetching water from distance river. And, they also reported that if the schemes fail, all of the activities will be done by river water since no other options.

In general, except the shortage of water supply schemes, most of the household's respondents of the survey were using developed water sources. And, these made them happy and healthy. This further adds the productivity of the respondents in different activities like agricultural activities.

In addition to, this the shortage of water supply schemes have effect on their household consumption and domestic water supply is highly affected by seasonal variation most especially during the dry seasons. In study area the majority of hand dug well, shallow well and spring either decrease their yield to the minimum, or some dry up and beneficiaries divert to traditional source of use. The survey result shows that 111(92.5%) of the respondent said that problem on their household water consumption and 9(7.5%) of the respondent said that they haven't problem on their household water consumption. (See below figure 4.2.1)



Cornering, to the problems of the water supply schemes the respondent result shows that 55 of the respondent said that yes we have problem that related to poor management schemes and only 5 respondent have said no problem that related with poor management schemes , 6 of the respondent said that yes we have problem that related to not considering community participation and only 2 respondent have said no problem that related with not considering

community participation, 29 of the respondent said that yes we have problem that related to long distance to fetch water and only 2 respondent have said no problem that related with long distance to fetch water, 4 of the respondent said that yes we have problem that related to high water charge and no or zero respondent said that no problem that related with high water charge, 15 of the respondent said that yes we have problem that related to non-functional water schemes and non of respondent said that no problem that related with non-functional water schemes and 2 of the respondent said that yes we have problem that related to other specify (personal problems) and non respondent said that no problem that related with other specific(personal problems).

According to FGD made with water committee in study kebles area reported that their schemes are becoming non- functional many time(non- functional) house hold, are manly and long distance of the water schemes, and awareness and economy or financial problems with some of the households that result in water related diseases are the main problems encountered with in households water supply systems.

Moreover, FGD with women in the study area said that their water supply schemes problems are following these are, not considering community participation especially, women participation from planning phase to implementation phase, absence of local water technicians in nearly to the water supply schemes fail, there is no check up before failure of the schemes unless the schemes fail; absence of sense of ownership in most of the communities to take care as their own property or asset as generator which is consuming much amount to fuel other than electricity which is near by their water supply source.

4.2.2 Time and distance required for fetching water

The study area were using unprotected of water such as pond, rivers, spring and hand dug well before water supply services were given. The respondents were asked to give information on the time it took them to fetch water from these source and the new schemes constructed.

Although the value obtained were not based on accurate measurement they can be used to roughly estimate the improvement in time that the community gained from rural water supply services. The survey result shows that 17(14.2%) of the respondents said that 15-20 minutes to Fetch water,16(13.3%) of the respondents said that 20-30 minutes to Fetch water,50(41.7%) of

the respondents said that 30-40 minutes to Fetch water and 37(30.8%) of the respondents said that above 40 minutes to Fetch water. (See below table 4.2.2)

Table (4.3): Total time taken to fetch water with respondents

Time to Fetch	Frequency	Percent
15-20 minutes	17	14.2
20-30 minutes	16	13.3
30-40 minutes	50	41.7
Above 40 minutes	37	30.8
Total	120	100

More time to fetch is great impact on sustainability of water supply schemes, if it is far to Fetch they don't care for water supply schemes this is cause to scheme breakdown and sustainability need continuity of services or benefit of the schemes for long time. For women or girls who make frequent trips (2 to 3 trips most of the time) to total fetch water about 30 minutes improvement in time by using the schemes in to collect water for household use lies in place of killing most of their time in fetching water from distance sources. The saved time from nearby schemes can be commenced to do other household work or especially for girls to go to school.

4.2.3 Amount of water fetched per day

Almost more than half of the populations obtain their drinking water from protected source which are unimproved sources. But they should also walk for more than half an hour to collect water from these unprotected and protected sources. Being unfamiliar with the world liter most of the respondents were unable to tell the amount of water that their family uses per day in liters. The respondents were asked therefore to tell the average number of a twenty liters "jerican" (the container they usually used to fetch water) that their family used per day.

Most of time the study area have lack of consumption water and they get less amount of water per day to their consumption.

The survey result show that 44(36.7%) of the respondents using 11-15 liters per day consumption, 43(35.8%) of the respondents using 16-20 liters per daily consumption, 25(20.8%)

of the respondents using below 10 liters per daily consumption and 8(6.7%) of the respondents using 20-40 liters per daily consumption. (See below table 4.2.3

Table (4.4): amount of water in liter’s with respondents

Amount of water in liter’s	Frequency	Percent
below 10	25	20.8
11-15	44	36.7
16-20	43	35.8
20-40	8	6.7
Total	120	100.0

The reasons behind of the shortage of water is amount is the distance to fetch water taken to much and they using small “jerrican”(less than 20 litter)

4.3 sustainability factor of water supply schemes

4.3.1 Technical factors

4.3.1.1 Availability of spare parts

The availability of spare parts is a critical factor to keep the system infrastructure working properly. An adequate supply of spare parts and maintenance tools is obviously of primary importance to long-term sustainability in study area and it need to consider availability of spare because it requires transportation cost and time by required to buy spare parts is causing difficulty to do immediate maintenance when schemes fail. Most of the respondent result shows that 55(45.8%) of the respondent said that purchased from market,36(30%) of the respondents said that taken from woreda water office,18(15%) of the respondents said that non-governmental organization (NGO) and 9(7.5%) of the respondent said they buy them self. (see below table 4.3.1.1)

Table (4.5): Availability of spare parts with respondents

Spare part	Frequency	Percent
Purchase on market	55	45.8
Give by regional zonal office	36	30.0
Ngo	18	15.0
They buy them self	11	9.2
Total	120	100.0

The respond result shows that collect to buy the spare part by their water community and problems happen because of the money that collected from community is not enough to buy spare parts. The water committee indicated that maintenance activities were done by using their own local and worda technician's procurement of spare part and other necessary materials was the responsibility of water committee using money accrued from water fees.

According to FGD, woreda office did not give attention for operation and maintenance which are the basic for sustainability of rural water supply schemes. The shortage of budget and not getting position by the higher level organization are the bottle necks of spare parts availability and provision for operation and maintenance. These in turn resulted in the less ownership of the community to take care the water supply schemes at the rural areas if there is unavailability and affordability their life stops or they are going to use rivers for different activities which might result in water related diseases. This in turn resulted in non – productivity of the household in the study area. This finding is related with the suggestion of Musonda (2004) who stated that appropriate tools for carrying out repairs should be made available to achieve sustainability. Similarly, according to WSP (2006), at a given moment, averages of 30% of all potentially functional schemes in Africa are not working .In some areas, 50% or more are non-functional due to difficulties in obtaining spare parts. Furthermore, lack of spare parts has been a major constraint in the sustainability of water supplies. In some cases it has led to a complete abandonment of schemes

4.3.1.2 Technology selection

The main reason for schemes failure are long distance to fetch ,poor management of schemes construction in addition to this the technology not appropriate for the area and not have sustainability and selected technologies should not fit locally available skill for maintenance because community will be fully responsible for properly running the facilities. Additionally, as per whitting ton et al (2008) there is no evidence that free repairs or technical were positively associated with sustainability. Construction qualities play a great role in water supply schemes functionality or sustainability. If this is not practical i.e. the absence of necessary materials, construction and design problems, in adequate follow up during construction, poor quality of head work and the like may affect the construction quality of schemes.

Technology selection is one of the very important elements in the sustainability of rural water supply schemes. There are so many types of technologies practicing in different areas in the world in different purposes and for different activities .With regard to rural water supply schemes, in the study area, there were almost similar technologies selected by different organizations including governmental, Non- governmental, community based organizations, and communities depending on different factors such as financial (economic), environmental (geological and geophysical) and etc. The technologies are not easily operatable within the user communities; the schemes could not be functional for longer time. This is because; their acceptance has great effect on the sustainability of rural water supply schemes.

These technologies were selected by different stakeholders those have responsibility at the time of planning or during construction. The survey result shows that 29(24.2%) of the household respondents responded that, the technology were selected by woreda water, mine and energy office, 27(22.5%) responded that the technology were selected by NGOs, 9(7.5%) were community selected the technology, 7(5.8%) were responded that the water committee and 48(40%) respondent that the technology were all in collaboration. This implies that most of the technologies selection does not include the beneficiaries in the study area which affect the interest of them in using the technology by other selector and it make closer to break down water schemes(see below table 4.3.1.2).

Table (4.6) below shows the issues related to technology selection.

Technology selection	Frequency	Percent
Woreda water office	29	24.2
Ngo	27	22.5
water committee	7	5.8
Community	9	7.5
all in collaboration	48	40.0
Total	120	100.0

When at the schemes construction time not include the community to follow up and the woreda water supply schemes continuous follow the schemes this cause not well constructed schemes and it haven't resist up to the failure. The woreda water and mine office data shows that most of water supply schemes are get failure this happen when un sustainability of schemes. During observation made on some of developed water points, there construction quality was poor. It may be dangerous for people when a facility break down and cannot be repaired because of a facility in the design and construction.

4.1.1 Functionality and service time until it fail

Functionality refers to a condition where by the system provides water to the users. Therefore, the scheme is said to be fully functional when the quantity and quality of the water point is sufficient that the people can fetch water from it. Though it is controversial, shortage of water or less discharge of the well can't fully satisfy the criteria of a functional and non-functional water scheme.

Functionality is one of the important contributors to sustainability of water supply schemes in study areas. In other words, non-functionality has negative impact on sustainability of the schemes and it can't be immediately maintained because of this the community used unprotected water source for consumption. The respondent result shows that 94(78.3%) of the respondent said that existing water supply schemes are functional and 26(21.7%) of the respondent said that existing water supply schemes not functional.

In addition to this service time to non- functional water supply schemes are one problem and the community in study needs immediate maintenance. The respondent result shows that 18(15%) of the respondent said water supply scheme takes about one week to be it maintained, 14(11.7%) of the respondent water supply scheme takes about two week to be it maintained, 20(16.7%) of the respondent said water supply scheme takes about one month to be it maintained and 68(56.6%) of the respondent said water supply scheme takes more than one month to be it maintained.

Table (4.7), below shows the service time of water supply scheme.

Service time until it fail	Frequency	Percent
One week	18	15
two week	14	11.7
One month	20	16.7
Above one month	68	56.6
Total	120	100.0

4.3.2. Financial factor

4.3.2.1 Community's attitude towards cost recovery for Operation and maintenance

The concepts of cost sharing and cost recovery are key aspects of sustainability of water supply systems. One factor for the sustainability of rural water supply systems is community contribution in cash or labor for operation and maintenance per month or per year. Communities are expected to cover the operation and maintenance cost as well as guards' monthly salary and needs capacity building in money collecting, management and operation and maintenance. Rural communities have lack of awareness about the collected monthly water fee, if there are contributions of money per month for the purpose of operation, maintenance and guards' salary for the functional water supply systems. The non-functional water supply systems have no contribution of money per month; of course there was some contribution of water fee for some of the nonfunctional water supplies when it was functional. (See below table 4.3.2.1)

Table (4.8) cost recovery with respondents

Issues	Frequency	Percent	Payment	Frequency	percent
Yes	81	67.5	5-10 birr	30	25.0
No	39	32.5	10 and above birr	29	24.2
			1-5 birr	61	50.8
Total	120	100.0	Total	120	100.0

The amount of money need to meet costs of operation and maintenance depends on whether the beneficiaries pay or not and their ability to pay regularly unless costs of operation and maintenance are covered by beneficiaries, the probability of water supply schemes to be sustainable is very low as failure of water supply schemes or break down at any time is one of its features.

However community pay for developed water supply schemes in the study area, the survey result shows that 81(67.5%) of the respondents responded they were paying for the service and 39(32.5%) responded they did not pay with some factors up on their own. Those respondents who did not pay were unable to pay for the service because developed water supply schemes so far them and the nearest water supply schemes are not functional. With regard to the monthly payment for water services per household differ from one up to 5 birr. This is mainly due to absence of common responsible organ setting users water fee. Water fees are set by the water committees of each scheme through meeting with water users. the survey result shows that 61(50.8%) of the respondent pay 1-5 birr for water use,30(25%) of the respondents pay 5-10 birr for water use and 29(24.2%) of the respondent pay 10 and above birr for the water use.The evaluation of water fee the respond result shows that 20(16.7%) of the respondent said expensive payment,54(45%) of the respondent fair payment,34(28.3%) of the respondent cheap payment and 12(10%) of the respondent no fee so this result shows that the community contribute to operation and management.

4.3.2.2 Financial management system

The financial management is one of the most important and critical points of achieving sustainable water scheme. People have different views and attitudes towards paying water services as every one of us believes that he/she have a right to get water. May be a view of us also believe that it is right to pay to our water services in order to keep it sustainable for the next generation.

Though there is inadequate financial flow due to poor tariff payment and collection mechanism, all respondents replied that there is transparent use of contributed upfront cash and collected money for maintenance.

The survey result shows that 62(51.7%) of the respondents said water committee collect water fee, 33(27.5%) of the respondent elders collect water fee,13(10.8%) of the respondent said anyone that selected from the community and 12(10%) of the respondent said that employee collected the water pay. This result shows that the water committee more responsibility in most part of my study area. From this result we can see that majority of water service fee collection had been done/ doing by water committee who are management body of rural water supply schemes in the study area. This is appropriate if the water committees in the study area were capacitated in skills of financial management system. (See below table 4.3.2.2)

Table (4.9) financial management with respondents

Issues	Frequency	Percent
water committee	62	51.7
Employee	12	10.0
Elders	33	27.5
other specify	13	10.8
Total	120	100.0

Finally water fee collection good for the operation and maintenance of the water supply schemes

4.4 social factors

4.4.1 Community participation in rural water supply

In rural water supply projects, a key issue of sustainability is community ownership and management. Meaning that, the communities take the final decision on important aspects of the planning and implementation of water supply schemes in sustainable rural water supply systems. Currently involvement of community in different phases of the project is widely accepted by NGOs, governments and other stakeholders. Communities' participation in which the community takes the responsibility of managing the water supply systems by themselves is one of the indicators for sustainable community management in rural water supply schemes. Community participation in project activities is considered as very important because it builds a sense of ownership and community among the local people.

In the study area community participate in different forms and in different phase of the water supply schemes and the community participation from the beginning up to the end of project.

The survey result shows that out of total sample households respondent who made participation,63(52.5%) of the respondent participated during and post planning of water supply schemes,7(5.8%) of the respondent participated on post construction phase, 14(11.7%) of the respondent participated during planning phase and 19(15.7%) of the respondent participated all phase of construction.(see below table 4.4.1)With regard a few number of respondent not participated in any of phase of the construction survey result shows that 5(4.2%) of the respondent not participated because not asked, 9(7.6%) of the respondents not participated because of everything is done by the implementing agency,3(2.5%) of the respondent not participated because of lack of awareness.

With regard to this highly recommends the need of participated the community adequately in the planning, construction. Operation and maintenance and evaluation phases of rural water supply projects to sustain water supply schemes by providing labor during procurement of construction materials like stone, sands, aggregates, and other construction materials in addition to money construction. This construction forms a part of the good participation to project implementation. Water provides reveled that they emphasized more on community participation during the implementation of project activities compared to the planning process(see table below 4.3.2.2)

Table (4.10) construction phase with respondents

Issues	Frequency	Percent
During and post construction phase	63	52.5
Post construction phase	7	5.8
During planning phase	14	11.7
In all phase	19	15.7
Respondent that are not participated		
Not asked	5	4.2
Everything is done implementing agency	9	7.6
Lack of awareness	3	2.5
Total	120	100.0

The sectors in which the community was participation include the following

i. **Pre- construction** (i.e during preliminary study like site selection comparison of alternative).

ii. **during construction**

iii. **During management of the schemes after construction phase** has ceased out In study the majority of community participation focuses during construction period. Though this is one sort of participation it should not be considered as the end game because this in a parcel of community participation for sustainable water supply systems to exist. Therefore keeping in mind that the project is self owned, protecting the water systems in every aspects in an important element of community participation.

i. **pre- construction** (i.e. during preliminary study like site selection, comparison of alternatives)

This stage of participation is the key for gathering information necessary for planning and implementation of potable water supply. Since the public has full understanding of his surrounding (environment) and is able to provide reliable information it plays major roles and helps the real implementation of the project. In this sector of participation the following activities are include

- Giving social and economic information about the area
- To show that the proposed project is based on the public interest
- To help the site selecting professionals by providing genuine information about the area
- To fence the selected site whenever necessary
- To make aware the e professionals the type of participation they can make
- To make aware the construction crew the convenient time possible for the implementation and construction of the project.

II. during construction

The participation during construction was need the joint effectiveness of the public and the constructing agency. It include the following aspects

- Labour provision
 - To do works which require no special skill
 - Access road construction
 - To dig water line trench
 - Site clearance
 - Property guarding etc
- To coordinate the project work in collaboration with professionals
 - Provision of easily available construction materials like stone, sand, aggregate etc
 - To provide lodging for construction crew whenever necessary
 - To collect money for the construction work whenever the condition permits

III) During operation and maintenance and management

In most cases sine community participation ceases out after construction phase the project implemented with great expenditure are seen to be non-functional. So the active community participation in this sector is an important factor to be taken in to account. This could be achieved through thorough participation of the community in the water supply and sanitation committees

The tasks performed by these committees are

- It will directly deal with issues related with water with the concerned officials by representing the public
- It help to enhance public participation during planning, construction operation and maintenance
- To teach the public to keep their environment healthy according to the lesson they get from trainings they are provided with.
- To collect water tariff payments
- To report to the concerned body whenever there is failure of the schemes
- To coordinate the public participation in the different ways.

During focus group discussion community participation necessary to sustainability of water supply schemes. they discussion in FGD about water community responsibility they said participation women are crucial for sustainability women know the problems of water supply better than men, fetching water from water points and they are also water vendors.

Regarding the need of community to participate in site selection of water supply schemes, dauis et al (1993) stated if improved water supplies are conventionally positioned with the participation of the intended users, it will be more used by communities and will have a better sustainability than water supplies that are not conventionally positioned with participation of communities.

4.4.2 Water Committees and Community water supply Management and governance

Community participation in project activities is considered as very important because it builds a sense of ownership and commitment among the local people for rural water supply schemes to be functional for long period of time and the benefits from the scheme to continue, those communities who manage the scheme have to have technical, financial, managerial and governance capacities. Water committees are organization of community who are managing and governing water supply schemes in rural areas. The water committees and community are responsible for operation and maintenance, protecting the schemes from children and domestic animals through fencing the schemes, fixing time of fetching, keeping its sanitation, sustaining the benefits of the water supply schemes after project completion and report to the woreda water office if there is any problems beyond their capacities or ability.

Therefore, they should have the capability to organize, manage and govern the schemes properly for sustainability of the schemes for long period of time. The survey result shows that 94(78.3%) of the respondent said that water committee the best way to organize the community management, 26(21.7%) of the respondent said that water committee not well organized to manage. From this result I can understand that majority of the users communities accepted the way managing and governing by water committees. (see below table 4.4.2)

Table (4.11)water committee organized

Issues	Frequency	Percent
Yes	94	78.3
No	26	21.7
Total	120	100.0

4.4.3 Management problems of water schemes

The role of local community in the management of water supply project is crucial for sustainability of water schemes for rural water supply schemes to be functional for long period of time and the benefit from the schemes to continue, those communities who manage the scheme have to technical, financial and managerial and governance capacities. The water committees are responsible for mobilizing community for cash and labor contributes, over all financial and technical management and governance of the schemes.(see below table 4.3.1.3)

Table (4.12)Management problems of water schemes with respondents

Issues	Frequency	Percent
before scheme construction	53	44.2
during scheme construction	38	31.7
after scheme construction	29	24.2
Total	120	100.0

Therefore the community should have the capability to organize, manage and govern the schemes properly for sustainability of the schemes for long period of time.

The water committees is critical for managing and governing the water schemes properly, if the establishment is at the beginning or before any activities done, there will have time to arrange, organize and manage the schemes without any challenge. The survey result shows that 53(44.2%) of the respondent are said committee established before scheme construction, 38(31.7%) of the respondent said that committee established and 29(24.2%) of the respondent said that committee established after scheme construction.

The result shows majority of respondent indicated committee established before scheme construction good establishment to manage and governing the water supply schemes.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusions

The functionality status of the scheme directly affects domestic consumption of the community. It was observed that in the villages where schemes were not functional people exposed to use unprotected sources of water such as river. For most of the schemes in the Boloso sore Woreda that have failed owing to abandonment, this is caused by long years of service without rehabilitation. On the other hand, inefficient water committees, operators and caretaker performance in scheme management, lack of community awareness on proper use of schemes, overpressure on schemes, and low backstopping support from the Water Resource, Mine and Energy Office are identified as the main factors accelerating the failure of schemes and stagnating maintenance.

The monthly payment for water service per household differs from kebele to kebele and from one scheme to another scheme which ranges from Birr one up to three. This is mainly due because of lack of legally viable rules for water fees limitation Boloso sore woreda water, mine and energy office. Water fees are set by the water committees of each scheme through meeting with the water users. The major factors for setting water fee are the cost for operation and maintenance including guard salary levels.

Recurrent scheme breakdowns have also contributed greatly to increasing the amount of walking distance the communities have to do in search of water, thereby aggravate the missing of school to students. In addition to frequent breakdowns, slow maintenance speed, limited number of stand posts, failure of reservoirs, poor water committee management and low discharge of hand pumps all contribute to reducing the quantity of water and quality of service delivery to the user communities.

Community participation in project planning was low. This is mainly due to lack of eagerness to share information, lack of awareness and the approaches used by the water providers when implementing water projects. Low level of participation in planning has adverse impact in

conserving the water schemes and people lack of sense ownership as a result sustainable use of water schemes would not be achieved.

User communities had made participation at least one of the periods except the planning period because communities were not participated during planning period due to most of projects done by implementing agencies and over all planning is covered by organization and they had participated especially, during construction and post construction. Therefore, their participation in implementation of water supply systems is not fully addressed from the beginning where the intended beneficiaries were absent during planning including site and schemes type selections which might resulted in low sense of ownership and ignorance by the higher level officials in planning phase.

In addition, communities had made significant contributions through provision of free labor, local construction materials and money contribution especially, during construction and post-construction period. Surprisingly, inadequate was participated during planning phase in the study area.

In general, the approaches in water supply in the study area were supply oriented approach in which provision of new water supply schemes or running for coverage without giving attention for sustaining the existing water supply schemes. This was evidenced by none of the implementing agencies had made spare parts available for communities, allocated budget, not including communities representatives during site selection and technology or scheme type selection, not observed local technicians who are responsible for maintenance and the like in the study area. The absence of equal participation of women in the water committees and their positions indicate that they are still not invited to be fully encouraged in the decision making process. Culture contributes to the low participation and involvement of women in water related meetings, water committee membership selection and committee representation

5.2 Recommendations

The main problems in the sustainability of rural water supply schemes in study area were related with non- functionality of schemes. To addressing the problem, it is recommended Replacement of schemes that are beyond their design period and are not currently providing a service; construction of new schemes in areas where there is high demand for improved water and increasing the number of water points in schemes where there is high water demand but limited numbers of water points. Hence, the government and donors with incorporation the community should construct water points at a reasonable distance (Less than 500m from residence houses) to serve the majority of the users to save the time they spent travelling and energy they produce.

Moreover, integration between beneficiaries and project suppliers in the phases of planning, implementation and evaluation through meeting need to be addressed to come up with sustainable utilization of the resource.

In addition, site selection and technology or schemes type selection should involve community properly which is crucial for sustainability of the schemes. This is the planning phase of the schemes as the result shown, financial management is one of the important factors in sustaining water supply schemes in the study area. As the study, there is a gap in the management of income from sale of water. For addressing the problem, it is recommended that management of the finance aspect should be done on legal basis or formal manner. Developing a transparent and trusted system for collection, management and governance of users' contributions is very important in alleviating the mismanagement and governance of finance.

To sustain water supply schemes in the woreda, it is vital to have the involvement of all segments of the community in the form of full participation and control over the scheme's operation and maintenance, overall management, strategic decision making, ownership and cost sharing for operation and management and construction activities.

Boloso sore 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. Hence, more works from the rural water, mining and energy office is also expected to persuade cabinets of Boloso sore Woreda government to have budget support.

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Appendix 1

General Instructions

- 1 .Please circle your answer that appropriately represents your response in the multiple choice questions.
2. To the questions with alternatives that do not match to your response, please write your appropriate response on the space provided.

Part 1: Demographic characteristics

1. Name of respondents _____
2. Date of questioner _____
3. Household headage A) 18 - 25 B) 25 - 35 C) 35- 55 D) other specify
4. Indicate your sex. a.Male b. Female
5. Marital status:
A. Single B. Married C. Divorced D. Widowed
6. Kebele _____ Got _____ Woreda _____ Zone-----
7. Family size A) 8-10 B) 12-15 C) other specify
8. Ethnic group:
A. Woliata B. If other specify -----
9. Religion:
A. Protestant (Christian) C. Muslims
B. Orthodox (Christian) D. If other specify _____
10. Educational status:
A. Unable to read and write B. Can only read and write
C. Grade 1-6 D. Grade 6-12 E. Above grade 12

11. Current occupation

- A. Civil servant E. Daily laborer C. Farmer
B. Merchant D. If other specify _____

Part Two

A. Questionnaires related water sources, water consumption and quality of construction.

11. From where you get your water supply:

- A. River B. Hand dug wells (HDW) C. Shallow wells (SW)
D. Deep well (DW) E. Unprotected spring F. Protected spring
H. If other specify _____

12. Do you dig private hand dug well ? YES/NO if your answer Yes

- A. rope Pumping b bucket pumping c. If other specify, _____

14. For what purpose do you use the water from the main source?

- A. Drinking E. livestock
B. Cooking F. All purposes
C. Washing H. If other specify _____

15. Do you think the way you prepare your food will have impact on your water use? (Yes /No), if your answer is yes so how will it affect-----?

16. Which one is your main income to sustain life?

- A. Agriculture B. Trading
B. Livestock rearing D. If other specify _____

17. Are the main water supply scheme working now?

- A. Yes B. No

➤ If your response to Q 15 is “No” where do you get you water source?-----

-

18. Is there any problem in your household water supply system?

A. Yes

B. No

➤ If your response to Q 16 is “Yes” v problem?

A. Long guena to fetch water

B. High water charge/tariff

C. Poor management of water schemes by users

E. Not considering community participation in the management

F. Non-functionality of water schemes

H. If other, specify_____

19. Do you fetch water every day?

A. Yes

B. No

➤ If your response to Q 17 is “Yes”, how many times do you go the water

source?

A. Only once

C. Three times

B. Two times

D. If other, specify_____

20. How many liters do you carry each time when you go to the source?

A. Below 10

D. 20-40

B. 11-15

E. Above 40

C. 16-20

21. How long do you go to fetch water? Kms _____ hrs _____

22. Who brings water to your house?

A. Men

C. Children

B. Women

E. Women & children

B. Questionnaires related to Technical factors

23. Who were selected the technology in service?

A. Woreda water office

E. Community

B. NGO’s

F. All in collaboration

C. Water committee

H. If other, specify _____

24. Are the community technicians equipped with necessary tools to carry out repairs when needed?

A. Yes

B. No

25. Do you think local technicians have adequate technical skills to carry out all types of repairs/maintenance?

A. Yes

B. No

26. From where does the community get spare parts to carry out maintenance?

A. Purchase on market

B. Given by regional zonal woreda water offices

C. Donated by NGO's

E. If other, specify _____

27. Are the existing water supply schemes functional?

A. Yes

B. No

28. How frequent does the scheme get failure?

A. Once in three months

E. No failure so far

B. Once in six months

F. If other, specify _____

C. Once in one year

29. How long does it stay once the schemes fail?

A. One week

C. One month

B. Two weeks

E. More than one month

30. What do you think the main reasons for the water supply scheme failure?

A. Poor quality of scheme construction B. Poor management of water point

C. Lack of spare parts provision

E. Lack of qualified technicians

D. Lack of finance for operation and maintenance service

E. If other, specify _____

31. Who undertake operation and maintenance activities when the schemes get failure?

A. Woreda water office

D. Both of them

B. Water committee

E. If other, specify _____

C. Questionnaires related to Financial factc

32. Who financed the developed water supply

- A. Community
- B. Government
- C. NGO's
- E. All in collaboration
- F. If other, specify_____

33. How much do you pay for water per Jerrican/month?

- A) 1-5 birr
- B) 5-10 birr
- C) other specify

34. How do you evaluate the existing water fees?

- A. Expensive
- B. Fair
- C. Cheap
- D. No fee

➤ If expensive or “cheap” what is the reasonable price you purpose per Jerrican/month?

35. Who collect water tariff/fees?

- A. Water committee
- C. Elders
- B. Hited employee
- D. If other, specify_____

36. Do you think beneficiaries should pay water fee?

- A. Yes
- C. No

➤ If your response to Q 32 is “yes”, why?

A. It could enable them to build new water schemes

B. It will cover O&M cost

C. If other, specify_____

➤ If your response to Q 32 is “No” why?

A. Water is considered as a gift of nature it should be hence be provided for free

B. The villagers are poor and they can not afford

C. The use of traditional source of water has no problem

D. If other, specify_____

37. When do you pay water fee?

A. Energy time water is drawn

B. Every month

C. On or two times a year

D. If other, specify_____

38. If you are unable to pay the water fees, what are the reasons for failing to do so?

- A. Poverty
- B. No land for farming
- B. Less harvest
- D. Dis-satisfaction with the services

D. Questionnaires related to social factors

39.. Have you participated from planning to construction period of existing water supply schemes?

- A. Yes
- B. No

➤ If you YES participate at which phase?

- A. During planning
- C. During and post construction
- B. Post construction
- D. In all phases
- C. During construction

➤ If the response to Q 23 is “No” what is the problem behind?

- A. Not asked
- B. Everything is done by the implementing agency
- C. Lack of awareness
- D. If other, specify _____

40. Who select the sites for construction?

- A. Community
- D. Both 1, 2 and 3
- B. Government agent
- C. Nongovernmental organization
- E. If other specify _____

41. Are you currently using the developed water points

- A. Yes
- B. No

➤ If the response to Q 26 is “No” what are the rational to abandon non-functional them?

- A. Distance
- B. Improper functionality
- C. Bad taste
- D. Low level of capacity to pay service fee
- E. Lack of enough labor to fetch water
- F. If other, specify _____

➤ If your response to Q 26 is “Yes”, what is the reasons?

- A. It is closer to home
- B. No other alternative to get water

- C. It has fair service fee tariff E. It has good taste and smell
F. If other specify_____

E. Questionnaires related to water supply management and governance

42. Are water committees the best way to organize the community management of water supplies?

- A. Yes B. No

➤ If you response to Q 28 “No”, who are best in managing water resources?

43. Who select the water committee members?

- A. Community B. NGO's C) government official
D. All in collaboration E. If other, specify_____

44. When did the committee get established?

- A. Before scheme construction B. During scheme construction
C. After scheme construction

45. How the water committee selected?

- A) 81-15 B) 15-17 C) other specify

46. Does it have formal recognition? (Yes/No)

47. How many members exist in the water committee?

- A) 8-15 B) 15-17 C) other specify

48. How frequent the committee is selected?

- A. Once a year C. Once selected still no selection
B. In three moth E. If other, specify_____

C. In six month

49. Is the water committee equipped with necessary materials, manuals and working guidelines?

- A. Yes B. No

50. What kind of support provided by the bureau to committee members?

- A. Technical C. No support
B. Monthly salary E. If other, specify_____

51. Does the committee have a bank account? (Yes/No)

52. Is there auditing of the finance? A. Yes B. No

53. Who audit the finance?

A. Woreda water office

C. Community

B. NGO's

E. If other, specify _____

54. What are the common practice of protection made to sustain the rural water supply schemes benefit?

A. Paid guard/care takers

B. Fence

C. Greening the source point/surrounding

D. Users continuously protect and control

E. No protection

F. If other, specify _____

55. Did water committee adequately discharge their responsibilities?

A. Yes

B. No

56. Do you have a good awareness on water resources management and governance?

A. Yes

B. No

Appendix 2

Focus Group Discussions

Questionnaires used to condition assessment of water supply situations in the area to be filled by in focus group discussion (FGD) .

Community level focus group discussion

Date of discussion _____

Kebele _____ village (got) _____

1. How many household are using from one schemes?
2. When was the scheme constructed?
3. Who select the water committee members?
4. When did the committee get established (Before scheme construction?
during or after scheme cons.)
7. How many members exist in the committee?
Male _____ Female _____ total _____
8. Is the water committee equipped with necessary materials, manuals and working guidelines?
9. What kind of support provided by the bureau to committee members?
(Technical, monthly salary, no support, etc)
10. Who designs the water tariff rate?
(Community, water committee alone, implementing agency, woreda water
Office, if other, _____)
11. How far is the main source from your residence? (In time and distance)
12. How much is the volume of water a household is allowed to take daily?
13. Do you access an alternative source? Why do access the alternative source?
14. For what purposes do you use the water? (From the main source, alternative source)
15. What can you say concerning water charges you are paying?
16. What problems are you facing regarding water for home use?

Annex 3 Table 1 boloso sore woreda rural water supply data

No	Kebele	population	Total schemes no except faucets			Number of users			Water access coverage (%)		
			F	NF	Total	F	NF	Total	F	NF	Total
1	Achura	10083	14	1	15	5800	500	6300	57.5	5	62.5
2	Wromum	9578	19	5	24	7900	1900	9800	82.5	20	102
3	T/ godo	5619	3	0	3	1100	0	1100	19.6	0	19.6
4	B/gofara	10083	21	1	22	7700	300	8000	76.4	3	79.4
5	D/gofara	9538	4	3	7	1350	400	1750	14.2	4.2	18.3
6	A/arifita	10090	11	2	13	6200	350	6550	61.4	3.5	64.9
7	Dubo	7178	11	3	14	4450	600	5050	62	8.4	70.4
8	Tadise	5900	8	2	10	3400	1000	4400	57.6	17	74.6
9	Dola	6710	7	7	14	3500	5500	9000	52.2	82	134
10	Legama	7178	4	2	6	1800	1000	2800	25.1	14	39.6
11	D/salta	5750	6	0	6	5000	0	5000	87	0	87
12	Yukara	5900	10	1	11	7000	300	7300	119	5.1	124
13	D/woyibo	7828	7	0	7	3300	0	3300	42.2	0	42.2
14	K/doge	7628	6	1	7	2600	300	2900	34.1	3.9	38
15	A/adila	4835	8	2	10	3100	800	3900	64.1	17	74.5
16	A/banicha	8221	8	3	11	3300	1300	4600	40.1	16	56
17	A/mino	9209	11	0	11	4300	0	4300	46.7	0	46.7
18	T/hebecho	5714	8	2	10	3500	1000	4500	61.3	18	78.8
19	M/hebecho	5000	11	0	11	7000	0	7000	140	0	140
20	CH/hebecho	8802	8	0	8	3600	0	3600	40.9	0	40.9
21	SH/honiba	5672	7	1	8	3100	500	3600	54.7	8.8	63.5
22	G/honiba	5672	8	2	10	3400	1000	4400	59.9	18	77.6
23	S/ honiba	6547	9	5	14	5800	1450	7250	88.6	20	109
24	A/garo	7091	5	1	6	2500	500	3000	35.3	9.2	44.4
25	Hajo salta	5449	3	0	3	1500	0	1500	25.7	0	27.5
26	D/madalich	6165	6	0	6	4000	0	4000	64.9	0	64.9
27	G/Godo	7605	15	0	15	8900	0	8900	117	0	117
28	G/Koyisha	6710	13	0	13	8000	0	8000	119	0	119
29	W/Woga	4071	10	1	11	7000	300	7300	138	7.4	145
30	Hebecho	4535	8	1	9	5600	300	5900	123	6.6	130
	Total	210361	269	46	315	135700	19300	155000	64.5	9.2	73.7

Annex 4 Table 2:- selected sample Water Points Study area.

No	Kebele Name	Specific Area	Year of Construction (E.C)	Scheme Type	Technology Type	Status of service
1	Garagodo	Chala	1992	HD	Afrdev	Not Functional
2	Garagodo	Safara	2000	BH	Afrdev	Functional
3	Garagodo	Hugo	1994	SW	Indian II	Functional
4	Adimancho arifta	Gote 2	1990	BHW	Afrdev	Functional
5	Adimancho arifta	Gote 1	1995	HDW	Afrdev	Not Functional
6	Adimancho arifta	Gote 2	2002	SW	Afrdev	Functional
7	Dach gofara	Ankalusa	1996	BHW	Distribution network	Not Functional
8	Dach gofara	Mehal dache	1990	HDW	Afrdev	Functional
9	Dach gofara	Elibo luga	1999	BHW	Afrdev	Not Functional
10	Wormuma	Betale	1989	BW	Afrdev	Functional
11	Wormuma	Gote 1	1992	SW	Indian II	Functional
12	Wormuma	Kule	1993	HDW	Afrdev	Not Functional

Source: Boloso sore Water, Mine and Energy Office (2006)

