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Assessment of Sustainability of Community Managed Potable Rural Water Supply Schemes/Points in Saharti-Samre Woreda

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Declaration

This thesis entitled "**Assessment of Sustainability of Community Managed Potable Rural Water Supply Schemes/Points in Saharti-Samre Woreda**" is my original work and has not been presented for a degree, diploma or fellowship to any other university and that all the sources of materials used in the thesis have been dully acknowledged.

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Certification

This is to certify that this thesis entitled "**Assessment of Sustainability of Community Managed Potable Rural Water Supply Schemes/Points in Saharti-Samre Woreda**" Submitted in partial fulfillment of the requirements for the award of the degree of MA, in Development Studies of the college of Business and Economics, Mekelle University, through the Department of Management, done by Mr. Tenaw Kassa, ID,No, CBE/PR0020/03 is carried out by him under our guidance.

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Acronyms and Abbreviations

ADF	African Development Fund
BOFED	Bureau of Finance and Economic Development
FWP	Functional Water Points
GTP	Growth and Transformation Plan
HH	Household
MDGs	Millennium Development Goal
MOFED	Ministry of Finance and Economic Development
MOWRD	Ministry of Water Resource Development
NFWP	Non Functional Water Points
O&M	Operation and Maintenance
PRWS	Potable Rural Water Supply
REST	Relief Society of Tigray
SL	Sustainability likely
SP	Sustainability possible
SU	Unlikely sustainable
SPSS	Statistical Package for Social Science
UAP	Universal Access Program
UN	United Nations

UNICEF	United Nations International Children Fund
WHO	World Health Organization
WASHCOs	Water, Sanitation and Hygiene committees

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Abstract:

The concern in the provision of water to rural areas in Ethiopia is lack of sustainability due to an emphasis on construction with inadequate post-construction support and various other related factors. The main objective of this study was thus to assess and determine the sustainability of community managed rural potable water supply systems in Seharti-Samre woreda by examining the main factors and identifying the limitation and key challenges. A total of 12 Functional and 4 Non-functional water points were identified from four Tabias in Seharti-Samre woreda, as unit of analysis for this research. A sampling procedure with both probability and non-probability sampling method was used to identify the 4 Tabias and 16 water points, and the survey was carried out with 112 HH. Cross-sectional design with descriptive analysis was applied using different data collection methods. Findings of the study demonstrated that although water management Committees were initially established, Five of the committees were no longer fulfilling their roles and responsibilities and the majority of the rest were not also effective. As a result majority of the studied Water Committees were frequently not collecting and managing sufficient funds for maintenance and operation costs. From the finding of the study the bottle necks in village level maintenance practices asides to lack of skill and poor fund raising were lack of spare parts and a set of toolkits. The institutional support after construction was also found very weak mainly due to limited capacity of the woreda office. The survey result also showed that due to semi arid nature of the woreda, poor construction designs, and lack of soil and water conservation activities almost half of the studied water points experienced seasonal fluctuation of water sources. Based on the study finding the majority of user households from the non-functional & partially functional water points were not satisfied with management of the water service by water Committees. Moreover, results of the sustainability score showed that none of studied water points are likely to be sustainable in the long term, and 62.5% are possibly sustainable, and the rest 37.5% of the water points are unlikely that the community will be able to overcome any significant challenge. Generally, the ineffectiveness and inability of the water committee to ensure regular payment for O&M of facilities, lack of spare part chain and a set of toolkits, seasonal fluctuation of many water sources, and limited external support were identified in this study as major challenges adversely affecting the sustainability of facilities.

Keywords: *Sustainability, Community Management, Functionality, Rural Potable Water Supply*

Chapter One

Introduction

1.1 Background of the Study:

The provision of clean drinking water is a fundamental requirement for human consumption to reduce waterborne diseases and promote economic and social development (Vammen, 2012). Realizing the critical importance of supplying potable water, over the last decade many rural water supply programmes were implemented throughout the developing world, (Otti, 2012). Despite this, in 2008, an estimated 141 million urbanites and 743 million rural dwellers continued to rely on unimproved sources for their daily drinking water needs, (United Nations, 2011). This indicates worldwide, 84 percent of the people who have limited access to drinking water supplies live in rural areas.

Even where rural supply systems are developed, many are in disrepair or not functioning properly (RWSN, 2012). Un-sustained water points deprive people of intended health and livelihood benefits, (Shaw, 2012). Besides, the poor management of water and sanitation resources are the impediment to achieving the Millennium Development Goals (MDGs), (Otti, 2012). Studies show that rural water supply programmes in developing countries have frequently failed to deliver benefits to society over the long term, mainly because of the approach used. For example, according to Garriga and Pérez-Foguet, (2008), the emphasis has been on the fast production of new schemes while sidestepping post-construction support.

Poor sustainability of rural water supplies has been recognized for some time, and a number of management approaches have come and gone with the aim of addressing these problems, (Lockwood and Smits, 2011). Current drinking water policies for developing countries are based on the premise that rural water supply facilities, such as improved hand-dug wells, hand pump-fitted boreholes, or spring developments are best managed by community organizations of local water users, (Yan Sun, et al., 2010).

Similar to many developing countries Ethiopia adopted a Community Ownership and Management strategy under which community water and sanitation committees handle day-to-day maintenance and repair needs of the water facility. In spite of its wide application in many developing countries, the community-based approach to rural water supply is not without

challenges, (Harvey and Reed, (2004). The research idea proposed in this paper, therefore, intends to assess the sustainability of community managed potable water supply schemes in the rural areas of S/Samre Woreda, South-Eastern Tigray.

1.2 **Statement of the Problem:**

Construction of potable water projects in rural areas is the first step to increase community access and contribute to the health of its members. However, according to Lockwood and Smits (2012) such investment often appears to be at the expense of the sustainability of services already in place. The problem is that many of rural water supply schemes in the developing world are not working to the optimum level (Montgomery et al., 2009). For instance, in a survey of 11 countries made in Sub-Saharan Africa, the percentage of functioning water systems in rural areas ranged from 35–80% (Sutton, 2004).

There are a number of research studies which show that the sustainability of rural water supply system is dependent on many factors. The widespread failures in water supplies have been attributed to a complex mix of Policy, legal and institutional factors; Social factors such as demand for water, community participation and community organization; Economic factors such as ability to meet the cost of maintenance and ability to pay for services; Technological factors such as technology choice; availability of spare parts and operation and maintenance; and finally Management factors, (Parry-Johnes, 2001, Harvey and Reed, 2004; Mukherjee and Wijk, 2002; Sugden, 2003; Harvey and Skinner 2002) cited in Musonda (2004).

The rural potable water supply conditions in Ethiopia are not different from the general situation of developing countries as a whole. As of 2010, national safe water supply and sanitation coverage have reached 68.5% (65.8% rural and 91.7% urban), (MoFED, 2010). In the study region, Tigray, overall water supply and sanitation coverage in 2010 were at 60% (Tigray BoFED, 2010). The number of rural dwellers without access is greater. However, not only has progress been slow in rural areas, yet the concern in the provision of water to rural areas in Ethiopia is lack of sustainability due to an emphasis on construction with inadequate post-construction support, (Smits et al, 2010). Similar to many other developing countries it has been estimated that 33% of rural water supply schemes in Ethiopia are non-functional at any time, (MoWR, 2007) cited in Habtamu and Israel (2008). Besides, it has been estimated that a large

numbers (22%) of the water supply schemes in Tigray region are also non-functional at any given time (BoFED, 2010).

In rural Sharti-Samre attempts has been made towards increased coverage through national and regional development framework. According to Seharti-Samre woreda water desk office recent data, the rural water supply coverage in the woreda has reached 67%, (Samre woreda water desk, 2011). The same report indicated that there are a total of 504 different types of rural water supply schemes in the woreda. Preliminary data from the woreda show that out of the total water supply facilities only 386 are functioning while the rest 119 are either non-functional or fully abandoned. In other words, 23.6% (119/504) rural water supply systems are not sustainable in Seharti- Samre.

Therefore, there is no question that sustainable use of water resources needs greater attention throughout Ethiopia. To sustain the rural water supply service targets are set to reduce non-functionality rates to 10% in Ethiopia in 2012 (Chaka et al, 2011) and to 7% in Tigray by 2015 (Tigray BoFED, 2010). Although these targets are significant for functionality, however, according to Chaka et al (2011) 'the capacity at different levels to reach these ambitious targets is still too low and it is perhaps unrealistic'.

Studies that focused on the sustainability of community managed water supply schemes in Ethiopia are very few (Admassu et al., 2003; Gebrehiwot, 2006; Smits et al., 2010' Chaka et al, 2011; Israel and Habtamu et al., 2008). Similarly, based on preliminary assessments, there has been also lack of systematic research studies in this regard in Seharti-Samre in particular and in Tigray region in general. Therefore, it is useful to conduct research studies (as proposed here) to better understand the reasons that undermine long term sustainability of rural potable water supply schemes, as managed by the community itself.

1.3 Research Questions

1. What are the main factors that affect the sustainability of community managed rural water supply systems in Seharti Samre woreda?
2. What is the extent of external support available for the rural communities to sustain their water supply scheme?

3. What are the inconveniencies faced in the rural potable water supply systems to affect proper functioning and uses of the service?
4. How much is the community satisfied with the management of water facilities?
5. What other management options are available for delivery of sustainable rural water supply schemes?

1.4 Objectives of the Study:

1.4.1 General Objective:

The main objective of the study is to assess the sustainability of community managed rural potable water supply systems in Seharti-Samre woreda of Southern Tigray.

1.4.2 Specific Objectives:

1. To determine and or predict the Sustainability of community managed rural water supply systems in Seharti-Samre, using WATERAID's sustainability snapshoot tool,
2. To examine the main factors that affect the sustainability of community managed rural water supply systems in Seharti-Samre,
3. To assess how the water user communities function together with the woreda water desk and relate with other stakeholders after water facilities are handover to users,
4. To identify the limitation and key challenges faced by water user communities, and
5. To assess the users satisfaction with facilities management

1.5 Scope and Limitation of the Study:

1.5.1 *Scope of the Study*

The focus of this study will be on rural potable water supply systems constructed in the rural part of Seharti-Samre Woreda. It has a primary focus on community managed rural water facilities, where the beneficiaries themselves are taking full responsibility for operating and maintaining systems. The water management committees which are usually established, for this purpose, when water systems are erected and handed over to the community, will deeply be studied besides to the community/households. As the focus of this study is on the sustainability issues of community managed rural water supply systems, to observe changes and to assess their sustainability achievement, emphasis has been given to include rural water supply facilities constructed within the last eight years (from 1998 to 2006 E.C). And exclusive of properly functioning new water sources constructed within the past three months ahead of the data

collection period as it would be too early for this kind of schemes to assess its sustainability achievement.

1.5.2 *Limitation of the Study:*

The researcher will focus on the sustainability of Hand dug wells, and Shallow boreholes, which are the predominant improved sources of potable water supplies in rural parts of Seharti-Samre woreda. This is a limitation because sustainability of rural water supply may lie in other types of technology, however the other type of water technologies in the woreda are located widely scattered. As time and resource for the research is limited it will focus on these two types of technologies. Moreover, though, sanitation and water supply projects are often addressed in an integrated manner for better health impacts, rural sanitation facilities has not been included in this study. This is because; referring Lockwood and Smits (2011) the sustainability mechanisms for the two are different. And secondly, if they need to be studied all together it requires huge amount of time and money, which is limited again.

1.6 Significance of the Study:

This research will contribute to the better understanding of problems and factors related to sustainable management of rural water supply system. Some problems identified in this research are systematic and common to all other woredas in Tigray. Therefore, recommendations to be made in this research study can be applicable to many other woredas in Tigray. It complements the overall management aspects of rural water supply systems and the study findings and its recommendations will serve as reference for those governmental and NGOs working in water service delivery to rural areas of Ethiopia in general and Tigray regional state in particular.

Chapter Two

Review of Related Literature

2.1 Concepts and Definitions

2.1.1 The concept of Sustainability

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, but later it has also been extended to incorporate other dimensions like economic, social and institutional

dimensions (OED, 2003) cited in Gebrehiwot (2006). It was "Our Common Future," also known as the Brundtland Report, written in 1987 that projected sustainability and sustainable development onto the global stage (Schweitzer, 2009). A number of definitions for sustainable development have been developed by different organizations. For example, the following subsequent definitions of Sustainable Development is reviewed and complied by Lockwood (2003);

Brundlant Report "Our Common Future"(1987) defines, as *"Sustainable development is development that meets the needs of the present generations without compromising the ability of future generations to meet their own needs."*
International Institute for Sustainable Development, USA; describes as *"To be sustainable, development must improve economic efficiency, protect and restore ecological systems and enhance the well-being of all peoples."*
UK Government "A better Quality of Life"(1999) defines as, *"Sustainable development is a very simple idea. It is about ensuring a better quality of life for everyone, now and for generations to come."*
World Business Council for Sustainable Development (2003), *"Sustainable development involves the simultaneous pursuit of economic prosperity, environmental quality and social equity. Companies aiming for sustainability need to perform not against a single, financial bottom line but against the triple bottom line."*

Source, (Lockwood, 2003)

2.1.2 Sustainability in Rural Water Supply

There is a broad range of definitions of sustainability in Rural Water Supply Systems (RWSS) used in different studies. The majority of these definitions are similar in nature but have slight differences in emphasis. The following three definitions emphasize on issues including; the flow of benefits, relationship between community management organization and external support institutions, efficiency, effectiveness, reliability and equity issues. And therefore all have been applied in the context of this study, and is summarized as follows;

Sustainability is best defined by (Abrams, 1998) as '*whether or not something continues to work overtime*'. More specifically, it implies the ability to recover from technical breakdown in the

scheme. On the other hand Sustainable rural water supply has been defined by Harvey and Reed (2004) as one in which: *'The water sources are not over-exploited but naturally replenished, facilities are maintained in a condition which ensures a reliable and adequate water supply, the benefits of the supply continue to be realized by all users over a prolonged period of time, and the service delivery process demonstrates a cost-effective use of resources that can be replicated'*. Similarly, Parry-Jones et al, (2001) defined rural water supply as sustainable if the systems:

- are being used efficiently, effectively and equitably by users
- can be managed and financed by users with limited external support
- will continue to deliver benefits for a long period after project inputs cease

2.1.3 The Concept of Community-based Management

Though different meanings have been given to the term community management in service delivery, the World Health Organization (WHO, 1996) explained as; "*Community Management means that the beneficiaries of water supply and sanitation services have responsibility, authority and control over the development of their services"*. Responsibility implies that the community takes ownership of the system, with all its attendant obligations and benefits/liabilities whilst authority indicates that the community has the legitimate right to make decision about the system. Control implies that the community has the power to implement the decisions regarding the system, cited in Braima and Fielmua, (2011)

According to this definition, community ownership and management however does not mean that community will not receive support from external sources, but it must be the community itself that actually owns the system, makes the decisions on when to call for this support, and exercises control over access to the system.

The following definition provided by Lockwood and Smits (20011) is particularly on Community management of rural water supply systems, '*Community-Based Management refers to a service provision option whereby communities control management of their water supplies. For practical purposes, day-to-day responsibility lies with a representative group of community people, often referred to as a water committee, elected to take up this task. Although this group may involve local caretakers or small entrepreneurs, the committee remains responsible for ensuring a sustainable service, and accountable to the community at large*.'

Definition of Other terms

Rural: It should be noted that the focus of this study is on *rural* water supply and the definition of what is rural differs from country to country, and is often based on criteria such as population size (of settlements) or density. Urban-Rural classification of population in Ethiopia is based on the availability of municipality service. Therefore, rural population in Ethiopia is those with no municipality service and their economic activity is predominantly based on agriculture. On the other hand, to estimate rural water demands in the Water Sector Development Program, Ministry of Water Resource defined Rural areas as those having a population of less than 2,500 in the base year 2001 (MoWRD, 2002).

Community: Community refers to a group of households in a particular area that share one or more rural water supply facilities.

Rural Water Supply: Rural water supply refers to the provision of clean and safe water to rural communities through construction of boreholes, protected wells and springs, (Musonda, 2004).

It is also important to define here the characteristics of **access** to the service. Accordingly, the most commonly used service attributes are the quantity of water, its quality, the reliability and accessibility of supply, which is expressed typically as the distance between the water point and the homestead, or in terms of crowding, (Lockwood and Smits, 2011). For example, the Government of Ethiopia adopted the Water Supply and Sanitation Universal Access Program (UAP) targeting to provide 15 L of safe water per person per day within a 1.5 km rural dwelling radius from the point of source by 2012 (MoWRD, 2006) cited in Hailemicheal and Moges (2012).

Water Supply Facility: Water Supply facility Refers to 1) Shallow Boreholes, 2) Hand dug wells, and in this paper water supply facility is interchangeably used with water schemes or water supply systems.

Functionality: Functionality refers to the percentage of water points working at any given time and is normally measured by a one-time check on a water facility or water point to determine whether the system is working at the time, and is normally a binary condition (yes/no), (Lockwood & Smits, 2011) .

2.2 Determinants of Sustainability of Community Managed Rural water Supply Systems: Empirical Evidences

This section of the literature will review the different critical factors that influence sustainability of rural water facilities. Accordingly, based on a review of previous studies and existing literature eight factors have been identified by (Harvey and Reed, 2004) as being critical to achieving sustainability of rural water supplies, these are: Policy context; Institutional arrangements; Financial and Economic issues; Community and Social aspects; Technology and the Natural Environment; Spare parts supply; Maintenance systems; and Monitoring.

On the other hand, based on literature review, desk review of rural water supply project documents and field work, Lockwood et al (2004) identified two broad sets of issues which can lead to problems for community-managed Rural Water Supply Systems after projects have been implemented: Those limitations within the community: community dynamics, political or social conflict, lack of cohesion, lack of capacity (technical, managerial etc), lack of financial resources; and Those constraints which are external to the community: lack of spare parts supply, lack of supportive policies and legislation or the lack of long term support to help communities through major repairs, conflicts and other problems with extension and upgrading.

For the purpose of this research work the following factors are tried to be discussed in detail in relation to the role they played in promoting the sustainability of community managed rural water facilities.

2.2.1 Institutional Support

According to Harvey and Reed (2004), there are many different institutional issues that influence rural water supply sustainability. The institutional category of sustainability relates to external support being available to communities from NGOs, national and local government institutions, as well as the private sector (Harvey and Reed, 2004). According to them traditionally the water supply sector in sub-Saharan Africa has been heavily dependent on external support from international and bilateral donors. But the authors emphasized that, national and local government institutions are generally the most important stakeholders if services are to be sustainable.

In order to guarantee the sustainability of Rural Water Supply systems and the associated benefits, it is necessary to provide support and guidance that addresses a range of issues. Support activities identified by Whittington et al (2008) included assistance with maintenance and repairs, accounting and tariffs, technical training, free repairs, manuals and other materials, as well as access to spare parts. But these authors found no evidence that free repairs or technical assistance were positively associated with sustainability; the most promising support activities identified were those relating to administrative management and system operation. Besides, as Lockwood (2004) pointed out, there are four main functions provided by such support mechanisms above and beyond technical support for the Operation & Maintenance (O&M) of physical infrastructure. These are technical assistance, coordination and facilitation, monitoring and information collection and training.

A recent study made in Ethiopia on Rural Water Supply sustainability indicates that overall the external support in post construction is very limited and ad hoc, (Chaka, et al, 2011). The finding of this study shows emphasis is nearly always on new construction and on implementation phase, rather than long-term support for capacity, preventative maintenance, etc. Involvement of local private sector for post-construction support is Limited. With regard to O&M the system does not work well and even minor repairs can be reported to the region. Spare parts distribution is problematic with very weak private sector supply chains, e.g. for hand pump spares. Monitoring is generally very poor due to low capacity and lack of allocated budget, and limited occasional post-construction training for WASHCOs on O&M, bookkeeping, etc, (Chaka, et al, 2011).

2.2.2 Policy environment

According to Harvey and Reed (2004), there is a wide range of government policies and strategies that affect rural water supplies, some directly, others indirectly. Many of these have a significant impact on the sustainability of water services, intentionally or otherwise. For Instance, the 1998 Ethiopian Water resource Management Policy recognize that water supply is an integral part of the overall water resources management and incorporate water supply planning in the domain of comprehensive water resources management undertakings. It also Promote the development of water supply on participation driven and responsive approaches without compromising social-equity norms. Besides, it declares to create and promote a sense of

awareness in communities of the ownership and their responsibilities for operation and maintenance of water supply systems and develop participatory management practices, centered on self-reliance, community participation and management (MoWR, 1998). However, the issue of policy environment is not considered to be directly relevant when assessing sustainability at village level, (Parry-Jones et al, 2001). Therefore, no further discussion is included.

2.2.3 Financial Factors

A water supply service is sustainable if, among others, its operation, maintenance, rehabilitation, replacement and administrative costs are covered at local level through user fees or through alternative sustainable financial mechanisms (Brikke, 2002). To explore the causes of non-functionality of distribution points, a purposive survey was undertaken covering 38 villages, in six different districts by Water Aid Tanzania (2009), and the finding indicated that poor financial management was the primary correlate of non-functionality. Similarly, Baumann (2006) stated the inability of communities to collect sufficient revenue for repairs could reduce the life expectancy of installed water supplies. The financial sub-category of sustainability includes issues of community financing and the cost of operation, maintenance and repairs (Harvey and Reed, 2004). According to Harvey and Reed, if systems are to remain operational indefinitely, sustainable financing mechanisms need to consider Operation & Maintenance and longer-term rehabilitation needs. In other words emphasis must be shifted from paying for maintenance of a facility to paying for the provision of safe, adequate and accessible water.

While securing finance for operation and maintenance is a major part of the maintenance task, Shaw (2012) states that community members are usually reluctant to pay when everything appears to be working. Ideally, water tariffs should cater for future system upgrade, rehabilitation and expansion costs as well as ongoing O&M costs, and currently, this occurs very rarely, (Harvey and Reed , 2004). Nedjoh et al (2003) argue that a lack of knowledge regarding maintenance costs, inadequate tariffs and high rates of defaulting combined with ineffective collections and poor financial management undermines the ability of communities to establish such financing mechanisms. According to Harvey and reed (2004), one of the main constraints to this is the need for a transparent, secure and sustainable method of storing and investing money for future use. Community managed financing mechanisms are rarely able to fulfill these requirements, (Harvey and Reed, 2004).

Besides, the success of cost recovery efforts, as a key post-project determinant of sustainability, will be influenced by the extent to which individuals and committees are supported, re-trained, and guided in relation to tariff structures and broader financial management (Gebrehiwot, 2006). If such (external) guidance is absent, then it is likely that the success of cost recovery efforts will slowly diminish over time, ibid

According to Musunda (2004), in order for the community to meet the cost of maintenance, community members must be willing to pay for the service. However, not every community members is willing to pay for services. **Willingness to pay** for the services is influenced by a number of factors. One of such factors is availability of alternative source of water in community. The other factor according to this author that influence willingness to pay is providing an opportunity for private connections or having a private hand pump at one's house, as opposed to paying for communally owned water supply facilities, ibid.

2.2.4 Technical: Technology, Availability of Spare parts and Maintenance

Under this category discussion is made on technology choice, operation and maintenance and availability of spare parts and how they determine sustainability. **Technology options** which are low-cost, easy to understand and easy to maintain and repair are likely to be more sustainable than those that require specialist skills or equipment, (Harvey and Reed, 2004). A study by Katz and Sara (1997) found that sustainability was higher in communities where informed choices about technology type and level of service were made. Katz and Sara also found that construction quality had a major impact on sustainability; poor quality lowered the chances that systems would be sustained. Ease of operation and maintenance, user acceptability and cost must be considered jointly, cited in Harvey and Reed (2004).

When breakdowns occur, access to a **supply of spare parts** is essential for repairs to be made. According to Hodking, (1994), 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, especially where the technology

provided is imported, which has often been the case with large-scale hand pump programs in Africa, ibid. However, Harvey state that there are very few examples of sustainable supply chains in Africa, and that many water supply projects continue to replicate ineffective approaches to supply chain development (Harvey, 2009). For example, a study made by Israel and Habtamu (2008) indicated that in Alaba Woreda (where the study is conducted) there is no specialized spare parts supplying shop and the WASHCOs travel a longer distance to Awassa or Shashamene.

The long term success, of any water programme, depends almost entirely on effective **Operation and Maintenance** (O&M), and yet it is as an aspect that is very often neglected, (Musunda, 2004). Carrying out an effective Operation and Maintenance system depends on Management tiers. The first tier is one that is managed by central body; the second tier has the regional responsibilities, and the third one consist of the local community (Sami & Murray, 1998) as cited by Ibid. The first two tires are not suitable for community managed water supply facilities because they are centralized system, which have lamentably failed. In order to ensure that sustainability is promoted, the third tier would be more effective. Sustainability cannot fully be realized if communities are not able to operate and maintain their own water supply facilities, because Operating and maintaining of the water supply system on the day to day basis ensures that it continues to work for long time, ibid.

However, Harvey & Reed (2004, on the other hand argued that despite its growing prevalence in recent years, community management of Operation &Maintenance has had limited success and is not the only available option. For instance, according to Chaka et al, (2011) support and funding for major repairs in Ethiopia are generally sourced from the woreda, zone, or regional level. In most cases, Water Management Committees (WASHCOs) lack the capacity to handle funds (cost recovery mostly weak), do not have the necessary O&M skills and hardly have any access to spare parts. In turn, capacity problems at the WASHCO level create WASHCO dependency on woredas, themselves having limited capacities to respond to the multiple demands of its constituents, ibid. Therefore, new and innovative maintenance systems require further investigation, especially those that encourage indigenous private sector participation, (Harvey & Reed, 2004).

2.2.5 Community and Social Factors

Braimah and Fielmua, (2011) in their study indicated that **Demand-responsiveness** (meaning that demand is expressed directly by householders, rather than through traditional leaders) at the household level is a determinant of overall sustainability primarily due to its role in increasing consumer satisfaction and willingness to sustain the system. According to them consumers are more likely to be satisfied with results such as quantity of water, color and test of water, distance and waiting time to fetch water when they initiate the project, are involved in decision-making, and are informed about their responsibilities in terms of costs and Operation & Maintenance. It is expected that under such circumstances, users express a higher sense of ownership, greater confidence in their ability to maintain the water system, a better understanding of how the tariff is used, and a willingness to pay for improvements, ibid.

Furthermore, there is ample evidence to indicate that a more **active involvement of women** can optimize the results and impacts of Rural Water Supply projects (Mukherjee et al, 2003; DFID, 1998) cited in Misgana (2006). The central role that women pay in the collection, management and use of water, as well as with the general sanitation of the household is well documented (Fong et al, 2003). Therefore, it is not surprising that the continued involvement of women, after project implementation has been completed, is identified as one important determinant of sustainability.

Similarly, an adequate degree of **social cohesion** within a community is now considered as a fundamental factor in sustainability, Braimah and Fielmua, (2011). The collective willingness to maintain a water supply system, is a reflection of social cohesion, and is dependent on the concept of community identity (Cater et al, 1999) cited in ibid.

2.2.6 Management Factors

Three main management approaches in rural water supply are identified by professionals in the water sector (Musunda, 2004) each with its pros and cons. These are; the Centralized Management approach, the Community-based Management approach, and the Partnership Approach. On the other hand, according to (Lockwood & Smits, 2011) a number of formally recognized management options were found across countries, with a clear predominance of the

Community based Management approach. Other options have also been recognized, according to the authors, including public sector management (through municipal utilities or local government providers) and the growing involvement of small private operator arrangement. Finally, there is self-supply which is understood as the investment in and management of household facilities by the same households. But, however, as the emphasis of this study is particularly on Community Managed rural water supplies, the literature review emphasizes the Community-based Management option.

Community-based Management refers to a service provision option whereby communities control management of their water supplies, (Lockwood and Smits, 2012). The community management model is the most widely adopted approach to managing rural water supplies in Africa (Harvey and Reed, 2004). However, as identified by Carter (2009), communities are not always motivated to manage water points effectively. Consequently, many communities experience a gradual decline of the service prior to a major breakdown, which is resolved only through an external rehabilitation programme, (Shaw, 2012).

In spite of its wide application in many developing countries, the community-based approach to rural water supply is not without challenges. Harvey and Reed (2004) indicated that with the coming of Community ownership and Management there is a widespread idea that ownership of facilities will lead to responsibility for their management; though in reality, just because a community owns a facility does not necessarily mean that it will acquire a sense of responsibility for its management, nor does it guarantee a willingness to manage or pay for its O&M.

Furthermore, Lockwood et al (2010) reported that in many cases this approach still leaves the community, and especially the water committee, isolated once the infrastructure is in place and the programme implementers disappear. By and large this approach has failed to achieve the ultimate goal of reliable and sustainable water supply at scale, ibid.

Similarly, Tamm (1991) argues that community management is more ideological than operational and as much guided by beliefs than by practical consideration. Due to lack of specifity, which in part is also due to lack of corresponding successful examples (Musunda, 2004).

On the other hand, however, Whittington et al (2008) argued that Community management has undoubtedly brought many benefits and it says recent studies indicate that this approach has indeed improved the performance of water supply systems. Much effort has been put into better understanding the reasons for the success and failure of communities, such as supply chains, gender, participation and financial contributions of communities and low-cost technologies. In this regard, Lockwood and Smits (2011) advise that where community-based management is the mainstay Service Delivery Model it should be strengthened through legal recognition of committees and formalizing their relationships with local government.

After the Water Resource Management Policy of the 19198 ,Community management is the main service delivery model implemented in the rural water sector in Ethiopia, and thus after construction and the handover of schemes, operation and minor repairs are handled by the WASH committees (WASHCOs) representing the community (Chaka et al, 2011). However, the absence and/or lack of legal recognition for WASHCOs also compound their problems and effective performance. In general, WASHCOs are not legally recognized and in areas where breakthroughs for WASHCO recognition have been achieved, delays in implementation pose great difficulties to effective governance. For instance, without the necessary structural recognition, WASHCOs are restricted from opening a bank account, ibid.

2.2.7 Environmental Factors

The sustainability of water supplies is intrinsically linked to the water source that they use, (Harvey and Reed, 2004). A water supply will only be sustained if the extraction rate does not exceed the replenishment rate of the resource over the lifetime of the system, ibid. Similarly, Lockwood et al, (2004) stated that deterioration of source water quantity will be of major concern in areas of low rainfall, or poor groundwater re-charge, where there is greater sensitivity to over-extraction. But even in relatively water abundant regions of the world, the source can fail to satisfy demand, either due to population expansion or abuse of the supply for non-domestic purposes. An assessment of borehole reliability by Harvey and Reed (2004) demonstrated the importance of drilling wells at specific times of the year; well depth in relation to dynamic water level; and the depth of the pump cylinder below the dynamic water level when installing reliable boreholes.

Climate change also affects water availability, especially in rural areas with dry climate conditions. Climate change impacts due to dry events such as El Nino which leads to scarcity of water resources in specific rural areas usually located in semi-arid and arid regions (Vammen, 2012). Water quality may also suffer from contamination from agricultural by-products or chemicals. In either case, care must be taken in the design of projects to determine the likely sustainability of the source over a long period of time, (Lockwood et al, 2004).

2.2.8 Interdependence of Factors:

Subdividing sustainability into different categories illustrates the broadness and complexity of the issue, but fails to demonstrate the interdependencies that may take place between them, (Shaw, 2012). In general, Harvey and Reed (2004) also indicated that Sustainability cannot be achieved by focusing on one or two of these aspects in isolation. It is essential, according to Harvey and Reed that **a holistic approaches** to be taken which addresses all sustainability factors and the relationships between them.

2.3 Conceptual Framework:

By building from the works of different authors, Lockwood et al (2004) categorized the above discussed determinant factors for the sustainability of rural water supply systems in to two main categories. These broad conclusions are pre-implementation factors and post-implementation factors. Community participation, technology selection, site selection, demand responsiveness, construction quality, population and training are some of the pre-implementation factors. And post-implementation factors are technical support, community satisfaction, institutional and financial management, training and willingness to sustain the water project.

For the purpose of this research study sustainability of rural water supply facilities is considered as the dependent variable. From the preliminary assessment and review of different researches the independent variables which directly affect sustainability of rural water schemes are; management capacity of the water committees, adequate payment of tariff, and adequate operation and maintenance of systems. Moreover, education and training, and satisfaction with the performance of the water committees on the part of the community are the dependent variables which affect the determinant variables. Furthermore, the following supporting variables

are identified by different researchers; consistent and equitable participation by both men and women of the community, the socio economic condition of communities, and post project institutional support. For the purpose of this study the following conceptual frameworks to achieve sustainability by Lookwood (2004), for community managed rural water supply is adapted to reflect the situation in Ethiopia.

Chapter Three

Research Methodology

3.1 Site Selection and Description of the study area

Seharti-Samre Woreda, the study area, is located in the southern zone of Tigray, 60 km west of Mekelle, the capital of the region. Seharti-Samre is bordered by Degua Tembien in the north, Alaje in the south, Tanqua-Abergele in the west and Hintalo-wajerat in the east. The elevation of Seharti-Samre is between 1490 and 2266 meter above sea level. Seharti-Samre is topographically relatively flat compared to neighboring woredas and dominated by lowlands. Seharti-Samre is characterized by warm temperature and lower annual rainfall. The temperature of Seharti-Samre ranges from 17-23^{0}c, the average being 20^{o}c and the annual rainfall 580-670 mm, and the average being 600 mm, (REST, 2007).

There are 20 rural Tabias and 2 small towns in the woreda. The number of population residing in the woreda according to 2010/2011 estimate of the local administration was 135,102, (Seharti-Samre Woreda Administration, 2011). Majority of the people of Tigray is basically dependent for their living on subsistence and rain fed agriculture. Similarly, most people of the Woreda are also rural dwellers, and 93% of Seharti-Samre are dependent for their livelihood on subsistence farming, (REST, 2011).

The settlement pattern of the communities in S/Samre Woreda is scattered, creating difficulties in the provision of public services such as potable water, health and educational services and the like to the desired level. The main source of potable water for the people of Seharti-Samre Woreda, according to the woreda water desk office information, include low yield spring and unprotected wells and rivers, in which this source is used in most of the localities both for human and animal. Besides, hand pump fitted (Handdug Wells, Shallow Boreholes, and Deep wells) are also the existing source of improved potable water in Seharti-Samre.

In relation to water coverage, in recent times access to clean water in rural Seharti-Samre is increasing. As of 2011, access to potable water reached 67% in the woreda. The number of people benefited so far has reached 90,615. The increase is mainly due to the government and REST's active involvement in the area. At the time of data collection period, there were 505 water points in the woreda which are scattered in different rural Tabias.

Furthermore, the reason for selecting Seharti-Samre as an ideal area for this study was primarily linked to the researcher's work experience, and close exposure in rural water supply and sustainability related projects in this woreda. He worked in Samre as a staff member of REST, coordinating a Rural Water Supply-Post Implementation follow up project which was funded by Intermon Oxfam. This Post Implementation Follow-up Project was a model project implemented in two woredas of Tigray (Seharti-Samre and Emba Alaje) with purposes to improve the sustainability of rural water supply points, and had also the intention to replicate best practices to other woredas in Tigray. Although, signs of improvement in sustainability of water points in the intervention areas were seen during the follow up time of the project, however, it was then observed that un-sustained rural water supply systems start to loom after the withdrawal of Intermon's/REST support. Since then, the researcher was curious to scientifically understand this problem and factors behind this. Informed to this situation and having the additional preliminary assessment made as part of this study, it is fair to say that sustainability of community managed rural water supply is a challenge in Seharti-Samre woreda and thus could be an ideal site to carry out this study.

3.2 Research Strategy and Design:

The research used a combination of both quantitative and qualitative research methods. Quantitative methods was used to establish the extent of sustainability achieved, and to show relationships between factors, reviewed in the literature (financial, technical, institutional, environmental, social, etc), which may account for the achievement of sustainability. Qualitative approaches were also employed to generate depth of understanding of issues. And the research used a cross sectional research design where data has been collected for multiple cases at a single point in time. The units of enquiry in this research were; Water and Sanitation Committees at Kushet level, the woreda water desk, and households. In this study, a community (a group of households in a particular area that share one or more water supply facilities) is considered as a unit of analysis, while key informants, mostly water committee members, are considered as unit of observation.

3.3 Data type and Sources:

The research used both primary and secondary data sources. To produce primary data interview using a semi-structured questionnaire, focus group discussion, key informant interview and physical observation of water facilities were used. In this regard, beneficiaries were the main

primary data sources and thus all the necessary quantitative data for assessing the sustainability of community managed rural water supply systems had been collected from selected household members. Beside to this, Focus group discussion with community management representatives (water committees) was used to gather the existing qualitative as well as quantitative data on the sustainability and management aspect of water supply systems. In addition, using a key informant interview more qualitative data had been gathered to assess the institutional support and triangulate data gathered from other sources. Moreover, secondary data was collected from documents, books, journals, other similar studies, and from woreda level documentations.

3.4 Target population and Sampling:

3.4.1 Target population

The target population for this study was the rural communities who have access to improved water sources in seharti-Samre woreda. However, besides to access to some form of rural water facilities, only systems with Community-based-Management arrangement to managing rural water supplies were included in the study. Since 'Deep wells' that use motorized water pump technologies follow a different model of Management, this study has excluded 4 (four) similar rural communities from the study. These Deep wells are meant to serve larger populations of up to 1000-1500 people. While community managed improved water sources such as Protected spring, Hand dug wells, Shallow boreholes, which are the primary focus of this study, are usually planned to serve 250 up to 500 people of rural villages that are small and more or less economically and socially homogeneous population. Specifically, the estimated number of users per type of rural water source is; hand dug well: 250 users; Shallow borehole: 500 users; and Spring Development (on spot): 300 users, (MoWRD, 2006).

On the other hand, it is clear that those rural communities in Samre without any form of improved/potable water sources were not definitely targeted under this study. Nevertheless, this does not mean that those communities who had been previously accessed but their water source has gone non-functional, during the study time, are excluded. Rather these sections of the population were among the prime targeted populations of this study. Moreover, new water sources constructed during the past three months, and in fact their source properly functioning, were excluded from the study, because it would be too early for such new water facilities to assess and determine their sustainability achievement.

3.4.2 Sampling Design

The sampling frame for the study was the list of all water points obtained from Seharti-Samre woreda water desk office. However, the limited time and resources available made it difficult to visit a sufficient number of water points throughout the woreda to make results statistically valid. Thus, the research employed a somehow mix of Sampling Designs for different reasons. For example, to identify the samples of water points to be studied first purposive sampling was used so as to choose accessible but feasible Tabias. Then random sampling was employed to incorporate functional water points, and purposive sampling was used again to sample non functional water points. The field research findings therefore should be taken as indicative of the realities, rather than strictly statistically representative. However, the focus group discussions and key informant interviews has given considerable confidence in the reliability of the study findings.

3.4.3 Sample size and its determination

According to existing data there are 505 water schemes; such as Protected spring, Hand dug wells, Shallow wells and Deep wells that are spread in twenty rural Tabias in Seharti-SamreWoreda. It is intended that 16 water points with community based management arrangement be sampled for the analysis. The rationale for choosing 16 water points out of the total 505, as desirable sample size for this study, was in part from evidence based literature. For instance, 3 similar recent research works carried out in Ethiopia at woreda level by Gebrehiwot (2006), Mekonnen (2009) and Awoke (2012) used sample sizes of (12), (20), and (12) water points for their study respectively. Therefore, more or less the average, i.e., 16 water points, is considered as appropriate and manageable sample size for the purpose of this study.

The next step here was to decide how much Functional and Non-functional water points should be incorporated for the sample. Thus, proportional to the total 386 Functional and 119 Non-Functional water points found throughout Seharti-Samre woreda, 12 Functional and 4 Non-functional water points are determined to be the sample sizes of the study. 4 Motorized Deep wells identified during the preliminary assessment (2 Functional and 2NonFunctional) were not included in the sampling as they do not require community management organization.

Since the budget set for this research was too small to locate and assess remote areas if study Tabias are to be selected randomly. Thus, instead of selecting sample water points directly from the sampling frame, first four (4) Tabias were chosen purposively based on accessibility and

feasibility factors. Some of the feasibility factors to select this Tabias are; the availability of the three different water technologies (SPD, HDW, and SBH), and also the availability of at least one Non-functional water point within the Tabia. This helped later to select a more or less representative water systems from different technologies that were geographically dispersed. This study Tabias was selected carefully in consultation with the woreda water desk.

The12 Functional and the 4 Non-functional water points were sampled independently because complete randomization is not pragmatic if we were to sample them all together. Therefore, as planned the 12 Functional water points were sampled randomly from different Kushets. For this purpose, first kushets/villages with Functional water points were listed separately and then from each Tabia three Kushets were selected randomly. This made it totally 12 villages from the four Tabias. It is important to remind here that more than one water facilities is common to find in a particular village in rural Seharti-Samre. Thus, one water point from each village was finally selected based on simple random sampling from the 12 villages. On the other hand, the rest four (4) Non functional water points was purposively selected from 4 villages of different Tabias. Finally, on aggregate, 4NF and12F functional water points had been identified as unit of analysis for this research.

Community beneficiaries were also the main primary data sources in this study. To identify the number of households interviewed, in a statistically representative way, the following formula by Kendie, (2002), cited in Braimah and Fielmua (2011), was used. According to this author three factors are considered in the sampling of the households; the desired level of confidence (92%), the error tolerance level (8%), and the proportion of the population with access to potable water in the woreda (67%). For the purpose of this research, the error tolerance level was raised from (5%) to (8%) assuming that the members of community in this study are socially and economically homogenous, and thus are likely to have similar views of current and future development in their area.

The sample size was then determined using the following formula:

$N = (z/e)^2 (p) (1-p)$, where:

N=sample size,

z = standard score at 92% Confidence Level (1.76),

e = sampling error allowed (0.08),

p= proportion of population with access to potable water in the district (67%)

Therefore $N = (1.76/0.08)^2 (0.67) (1-0.67) = 107$

(Source, Kendie, (2002), cited in Braimah and Fielmua (2011))

Hence an equal share of households (7 persons representing household heads) benefiting from each water sources was taken from the 16 sample water points, and which resulted totally about 112 persons. Subsequently, the original sample size (107) which was determined using the above formula was no more used as it was inappropriate if we were to take an equal share of HHs. During data collection it was difficult to get the Name lists of each community households surrounding the water facilities. As a result, within the water user communities households that are geographically dispersed were conveniently selected across the community for the interview. In the household survey precedence were given to interview adult women and men household members as they are the ones who have useful information with regard to the management aspects and also involved in the day-to-day operation of the water facility.

In addition, according to the plan data was also collected from Focus group interviews. Focus group discussion with community management representatives (water committees) was used to gather qualitative as well as quantitative data. The minimum members of a water committee in Ethiopia is six which was appropriate for the Focus group discussion, thus among the sampled water points as planned a total of 4 profound Focus group discussions, one in each Tabia, were conducted.

Moreover, key informants (Head of Seharti-Samre woreda Water desk and two additional experts, and REST's Field office coordinator in Seharti-Samre were interviewed to assess the institutional support and triangulate data gathered from other sources.

3.5 Data collection:

According to Mack et al, (2005) semi-structured questionnaire interviews with relevant focus groups is a recognized and valid approach for conducting research through case studies in order to explore and describe relationships, cited in Shaw (2012). Thus, the semi-structured questionnaire interview was used as the most important data collection method for this research study. Accordingly, the structured interview was made with the water users/households. Focus group interview with members of water committees, and key informant interview with technical staff members at the woreda water desk level including REST were undertaken. In addition, physical observation of water point was carried out to check the status of each water facility.

The data collection team comprised of four (4) Enumerators and a Supervisor. Priority was made to include potential data collectors who have a Diploma from Maichew Technique College in Water Resource Management. Accordingly, four diploma holder water technicians who have the local knowledge and used to be living in the woreda were identified as data collectors. A briefing to the chosen enumerators, on how to collect the data, was made by the researcher itself. During the data collection, besides to acting as a supervisor, the researcher have had lead and coordinated the whole research team in the data collection process. The four enumerators were assigned to each of the four Tabias. At most effort were made to complete the data collection within two days and the third day served for editing and taking corrections at field level for omissions, consistency, completeness, etc.

3.6 Method of data Processing and Analysis

Descriptive statistics based on percentages, frequencies and ratios was used to analyze findings. Qualitative and quantitative data collected form beneficiaries, technical staff members and water committees using structured questionnaire and discussions are organized and analyzed using SPSS to result descriptive statistics to examine the problem under study. To this end, each question in the questionnaires had been identified by a variable name and within variables there are values and value labels for identification of responses from the respondents. Accordingly, after coding the information from the questionnaires, template for entering data in the computer program was created. The coded data was then entered in the SPSS computer program whereby frequencies, multiple responses, mean, standard deviations and cross tabulations had been computed during the analysis.

Along with this, in order to get a better understanding of why the rural water supply systems are sustainable or not, and to predict future sustainability, the sustainability snapshot (developed by WaterAid, and in fact used by different researchers) was also employed separately in the data analysis. The WaterAid 'Sustainability Snapshot' provides a crude scoring system so a range of rural water facilities could be compared for sustainability, Parry-Jones et al (2001). According to the following authors the sustainability snapshot provide easily interpretable data on whether the water facilities are currently sustainable and help to summarize and analyze the field data, ((Parry-Jones et al (2001), Lockwood et al (2004); Harvey and Reed (2004); Carias (2008); Schweitzer (2009)). Specially, the analysis result of this tool has helped to highlight key issues

that may be undermining sustainability across the Woreda. The sustainability snapshot tool that was used for the analysis purpose and thereby to predicting sustainability is annexed at the end of this research paper.

Chapter Four

RESULTS AND DISCUSSIONS

In this chapter, after a brief overview of the rural water supply systems in Seharti-Samre and respondents' characteristics, detailed discussions on the main components influencing sustainability of the sampled water points is presented. Under the discussion of the later sub-section, the main important factors that affect sustainability of rural water supply are grouped in to the following general categories; such as community participation, financial factors, operation and maintenance practices, external follow up support services, and management aspect. After this, users' satisfaction with facilities management is discussed, followed by a sub-section of discussions to determine the Sustainability of water supply systems in Seharti-Samre, based on the finding of results from the sustainability snapshoot tool. Finally, discussion of the major limitation and key challenges faced by water user communities will be presented.

4.1 Overview of Rural Water Supply Systems in Seharti-Samre Woreda

A total of 505 rural water supply schemes were constructed until the data collection period and of this water points 386 were functional and the rest 119 are non functional. And more specifically, a total of 265 Hand dug wells, 195 Shallow Boreholes, 40 Spring Developments and 5 Deep Wells were found in 20 Rural Tabias of Sehati-Samre. Most of these water points were

constructed by REST and the regional government. The following Table 4.1 simply summarizes the distribution of different types of rural water supply systems in Seharti-Samre

Table 4.1: Overview of Rural Water Supply Systems in Seharti-Samre

S/No.	Type of Water Supply Systems	Total Number of Schemes	Current status	
			Functional	**Non-Functional**
1	Hand dug wells (HDW)	**265**	219	46
2	Shallow Boreholes (SBH)	**195**	142	53
3	Deep Wells (DW)	**5**	4	1
4	Spring Development(SPD)	**40**	21	19
	Total	**505**	**386**	**119**

Source: Seharti-Samre Rural Water Resource Development office, 2013

4.2 Characteristics of the Respondents

Age and Sex

Before presenting the age and sex distribution findings of the study, it needs to mention that the age and sex data distribution of the household respondents is a result of convenient random sampling technique. Based on this, as shown in the table 4.2 below, the sex distribution shows, out of 112 cases of surveyed respondents, the survey has included 38 males and 74 female members of the households for the interview. Of those, 39 are between 15-34 years. The 35-54 years age group included 52 rural water users accounting above 46% of the total respondents, while those between 55-74 years old are only 20, and no more than one respondent is aged above 74. However, this does not necessarily reflect a natural distribution or is indicative of the larger trends of the distribution of ages of the rural community water users.

Household Size of Respondents:

Under this section attempts have been made to assess the household sizes of respondents so that to determine the influence of it on daily water consumption in the study area. The study finding showed that about 37 are among the 1-4 household size groups, the 5-8 groups included 69 rural respondents accounting above 61.6% of the total respondents, and only 6 respondents are in the 9 and above HH size group. In case of the family size the minimum family size is 1 member and

the maximum is 9 members or the number of people in a household ranged from 1 to 9 with an average of 5.1, which is slightly greater than the average Ethiopian HH size of 4.7 persons (Ethiopian Central Statistical Agency 2007)

Marital Status of Respondents

The marital status of the respondents is presented in table 4.2 along with other household characteristics, as is shown in the table below; more than 80% (90) of the respondents are married. About 1.8% and 7.1% of them were separated and widowed, respectively. Only 10.7% of the respondents were single (and living with their parents). Because the majority of the respondents were married, our survey results are valid for fetching water as a household is the unit of observation in this study.

Educational Level of Respondents:

The following table 4.2 also describes the education level of respondents' in the study area. As shown in the table, the majorities of respondents' composition (73.2%) are not educated meaning they could not write or read or did not attend formal education. About 1.8% of the composition can write and read without having formal education in schools. The remaining 25% included those attending or interrupted education at primary, high school, preparatory levels.

Table 4.2: Distribution of Respondents' Demographic Characteristics

Characteristics	Category	Frequency	Percentage
Age	15-34	39	34.8
	35-54	52	46.4
	55-74	20	17.9
	75+	1	.9
Sex	Male	38	33.9
	Female	74	66.1
Marital status	Married	90	80.4
	Unmarried	12	10.7
	Separated	2	1.8

	Widowed	8	7.1
Household Size	1-4	37	33.0
	5-8	69	61.6
	9 and above	6	5.4
Educational Level	No education	82	73.2
	1-4	7	6.3
	5-8	15	13.4
	9-12	6	5.4
	Write and read	2	1.8

4.3 Analysis of factors affecting the Sustainability of Rural Water Supply Systems in the Study area

4.3.1 Community Participation

For the purpose of this study the following types and forms of participation were identified and used to assess the situation of community participation during the development of the water point schemes. These are, initiation or who takes the initiative to construct the water point, identifying possible sites for the facility, choice of technology, deciding on capital or cost contribution for construction of facility e.g. in kind/labour or cash, election of Water Committees, determining hours of operation of facility, and women's engagement were the main ones and the data was collected from FGD participants. Under the literature review section of this paper, we have seen that Demand-responsiveness at the household level is a determinant of overall sustainability primarily due to its role in increasing consumer satisfaction and willingness to sustain the system. Hence, one of the questions on issues of community participation was who initiated to build the Water point? As a result, almost all the participants of the FGDs indicated that it is the community's initiative to construct the water points.

Similarly, in responding to questions of whose idea was it to choose the source area of the project, all participants in the focus group discussion explained the process as follows. After being nominated to get new water facility by the woreda administration, site identification and feasibility study was done by experts of the contracting agency's water development experts

together with concerned government partners in consultation of the community at large, and then agreement was signed.

On the other hand, the FGD participants reported that the community had participated in all stages of the construction phase. Because according to them in the agreement it was clearly stated that the provision of available local construction materials, feeder road clearing from the existing road to the site and mobilization of industrial materials and equipment necessary for constructing the water schemes was the sole responsibility of the beneficiary communities. Accordingly, participants during the discussion reported that the community has contributed in cash and in kind or both to the construction of the water supply facility. According to them, each community was expected and was obliged to contribute 3% of the construction cost. This amounted from 10 Br to 20 Br with an average of 14 Br. The payment varied among villages because the cost of construction differed. In addition, participants reported that the community has also contributed local construction materials such as stone, sand, gravel, trees and other required in kind contributions consisted of fencing the water point, removing excavated material, and inserting pre casted concrete rings in to the well shaft and installing pump. Generally, all FGD participants in the study area stated that the community is the owner of the scheme or water points.

All FGD respondents believed that representation of more women in the water committee is good for the society. Committee comprising up to 6 members was to be elected by the beneficiary community regardless of who he/she represents for. But at least half of the community members should be women. Although the guideline for establishing water committees recommends equal number of women to be represented in the committee we have found that out of the studied 16 water user communities only 11 water schemes had an equal representation of women in the water committee while the rest communities had less number of women in their water management committees.

4.3.2 Financial Factors: (Financial Management, cost sharing, cost recovery and willingness to pay of the communities)

The 1998 Ethiopian water policy clearly established that all rural water supply user communities should adequately address costs associated with Operation and Maintenance and be based on “cost-recovery" principles. This implies ability to recover from technical breakdown of facilities

with the communities' own resources. The assessment of community financing systems of the targeted water points has been made by asking respondents a series of 9 different but interrelated questions on financial issues and the results of the study are presented hereafter.

As shown in the Table 4.3 below out of the total 112 respondents, 84 (75%) of the respondents from 12 different water points contributed water fees, while the remaining 28 (25%) respondents from the rest of the four water points do not pay and or have suspended water fees due to lack of service. Within this, it is found that, only 8.3% of the communities from the non functional water points who contribute water fees and the same amount of communities (8.3%) from the partially functional water points also contribute water fees although they are not getting optimum service from the water facilities.

Table 4.3: Distribution in Percentage of Households that Contribute Water Fees

Functionality Status	**Do your household contribute water fee?**				**Total**	
	No		**Yes**		**Freq.**	**%**
	Freq.	**Percentage within**	**Freq.**	**Percentage within**		
Functional	0	0.0%	70	83.3%	**70**	**62.5%**
Non Functional	21	75.0%	7	8.3%	**28**	**25.0%**
Partially Functional	7	25.0%	7	8.3%	**14**	**12.5%**
Total	**28**	**100.0%**	**84**	**100.0%**	**112**	**100.0%**

The study has showed that the rural communities who are contributing water fees in the study area were not found collecting the money based on operation, maintenance and improving system costs. According to a working manual developed by Samre woreda rural water desk office, each rural community water users should have a minimum tariff of 36 birr per year or a monthly payment of 3 birr/household. In order to see the prevailing water tariffs of the studied communities computed against the minimum tariff set at the woreda level, after the data collection respondent's data was analyzed by categorizing in to the following four separate tariff level groups as can be seen in Table 4.4 below. Accordingly, the result indicated that only 12.5% of the respondents said they contribute water tariff ranging from 25-34 birr year, and a significant number of the respondents 62.5% said they contribute water fee less than 25 birr per

annum, and the rest 25.0% of respondents did not start or have suspended water fees payments at all. Contributions are made annually in most cases and still most of the people would like to contribute in kind (in grain) than in cash. Similarity was also observed between Non Functional Water Points and Partially Functional water Points regarding the water tariff setting and fee collection problems. According to the evidence from Focus group discussions made with water management committees, determination of tariffs was made based on what users are willing to pay instead of requirements for cost recovery. The reason for disparity between rules and practices arises as the common practice in most of the water facilities while setting tariffs was that they agreed to pay annual/monthly in kind or cash contributions which are meant to cover only salary costs of the guard who watches over to the water facilities, but they only contribute additional money when repairs were needed. And due to this inadequate tariff has been set compared to the woreda level standard in most of the schemes.

Table 4.4: Distribution of Annual Water fee Payment of Respondents (categorized in to three tariff levels)

Functionality Status	**How much money do you contribute per year?**								**Total**	
	0		**1-12 birr**		**13-24 birr**		**25-34 birr**		**Freq.**	**%**
	No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**		
Functional	0	0%	36	51.4%	20	28.6%	14	20	**70**	**100%**
Non Functional	21	75.0%	6	21.4%	1	3.6%	0	0.0%	**28**	**100%**
Partially Functional	7	50.0%	7	50.0%	0	0.0%	0	0.0%	**14**	**100%**
Total	**28**	**25.0%**	**49**	**43.75%**	**21**	**18.8%**	**14**	**12.5%**	**112**	**100.0%**

Based on the preceding discussion we can see that the existing water tariff in almost all of the communities were found inadequate and not based on operation and maintenance requirements. It is far below the minimum tariff recommended at the woreda level. Respondents were asked to indicate which costs were covered through the money contributed, i.e., for Operation, maintenance, recovery of the water point. And the finding showed that a significant number of respondents 60.7% (Table 4.5) believe that the tariff would cover at least maintenance costs.

This means that nearly half of the individuals who believe their tariff will cover the cost of repair are misinformed, and may not be prepared to cover the cost of a system failure.

Table 4.5: Distribution of Respondent's Opinion on the System Costs Covered from Contributed Fees

Valid Response	Frequency	Percent	Valid Percent	Cumulative Percent
No tariff at all	28	25.0	25.0	**25.0**
Only for operation	1	.9	.9	**25.9**
Only for Maintenance	68	60.7	60.7	**86.6**
Both for operation and maintenance	7	6.3	6.3	**92.9**
For operation, maintenance and recovery	8	7.1	7.1	**100.0**
Total	**112**	**100.0**	**100.0**	

The balance between the paying ability of users and water charges has to be considered, as it could cause dissatisfaction for people and affect the service. As can be seen in the tabulated Table below 19.6% of the people consider the tariff expensive, 52.7% as fair & 0.9% inexpensive and the rest do not have collection and do not responded at all as illustrated in table 4.6 below.

Table 4.6: Perception of Tariff Level

	Perception of tariff level		Do you have problem in paying user fee	
	Freq.	**%**	**Freq.**	**%**
Expensive	**22**	**19.6**	**15**	**13.4**
Fair	**59**	**52.7**	**15**	**13.4**
Inexpensive	**1**	**.9**	**70**	**62.5**
I don't know	**2**	**1.8**	**5**	**4.5**
Not contributing	**28**	**25.0**	**7**	**6.3**
Total	**112**	**100.0**	**112**	**100.0**

The following Table 4.7 presents the distribution of respondent's knowledge on where the collected money is saved and cross tabulating it with functionality status of the studied water points. From the Table 4.7 below we can observe that within the functional water points more

than 97% the respondents know where the contributed money is saved, where as it is only 79% of the respondents within the non functional and 50 % of respondents within the partially water supply schemes respectively did not know where the community money is saved.

Table 4.7: Knowledge of Respondents on the Management of the Money Collected Money in relation to Functional Status of Water Points

Do you know where the money is saved?	**Functionality Status**						**Total**	
	Functional		**Non Functional**		**Partially Fu.**			
	Freq.	**Percentage**	**Freq.**	**Percentage**	**Freq.**	**Percentage**	**Freq.**	**Percentage**
No	2	66.7%	1	33.3%	0	0.0%	**3**	**100.0%**
Yes	68	84.0%	6	7.4%	7	8.6%	**81**	**100.0%**
No saving	0	0.0%	21	75.0%	7	25.0%	**28**	**100.0%**
Total	**70**	**62.5%**	**28**	**25.0%**	**14**	**12.5%**	**112**	**100.0%**

It is already indicated that all the studied rural water supply facilities follow the community management system, and thus these water facilities were required to have a community bank account where funds raised for Operation & Maintenance and recovery are kept. However, findings of the study from discussions with the water committees showed that only some communities' money was saved in the bank after acquiring the facilities. As can be observed in Table 4.8 below, only 42% of the respondents collected money is deposited on community bank account, while 31% of respondents said that payments are deposited on the hands of members/treasurer. On the other hand the rest of the households, 27%, do not know at all and or did not give response on how the money was saved and spent as they did not have fee collection program. This was not only because communities did not regularly contribute towards operation and maintenance but only contributed as and when repairs were needed. And after repairs the remaining money was saved with the hands of committee members. The study showed that water point communities who have saved money with bank accounts, the amount of money saved ranges with a minimum 300 and maximum of 3,500 birr which is meant for future maintenance and replacement reserves.

Besides, the cross tabulation analysis of responses by Tabias indicated that Tabia Amdewoyane has the lowest percentage of response (21.4%) in terms of depositing the collected money in to community bank accounts. And as a result a large amount of money was still kept on members' hands. And the situation of it in the rest of the three Tabias were not that much different, because as illustrated on Table 4.8 it was only as many as 50% of the respondents each from the three Tabias reported collected money are saved in local community bank accounts. And the remaining respondents from these Tabias reported that the contributed fees are kept on the hands of the treasurers or they did not have saving at all.

Table 4.8: Response on where the Contributed Money is saved in relation with Targeted Tabias

Where is the contributed money saved?	**Targeted Tabias**				**Total**
	Mai-Tekli	**Amdeweyane**	**Dekera**	**Addisalem**	
Community bank account	46.4%	21.4%	50.0%	50.0%	42.0%
On treasurers hand	0.0%	71.4%	25.0%	25.0%	30.4%
No Saving at all	53.6%	7.1%	25.0%	25.0%	27.6%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

The water management committees are responsible to mobilize users and to generate and manage adequate financial resources so as to cover relevant costs and keep replacement reserves. In this regard, attempts have been made to assess respondent's satisfaction on how water management committees are performing on generating and managing the water fees and respondent's views is summarized in Table 4.9 below. The result showed that about 40% of respondents from the four Tabias do not believe that their respective committee members are effectively managing the water fee program. And the same number of respondent said that they don't know if the committee meets occasionally. And about 37% of respondents also indicated that the committees in their respective community did not give financial reports.

To make comparisons among water management committees and to draw experiences on relatively better managed water points, respondent's opinion on some of the indicators of financial management by their respective committees were also cross tabulated by Tabias. Accordingly, as shown on Table 4.9, a significant percentage of respondents (71.4%) found in Tabia Mai Tkli reported that the committee did not usually hold periodic committee meetings to discuss and take measures on issues that affect the water services including financial issues. However, compared to Mai-Tekli Tabia, it was only 25% to 35.7% of respondents located from

the rest of the three Tabias who reported No periodic meetings by respective committees. On the other hand, in regards to delivery of financial reports to user communities, again it was from Tabia Mai-Tkli that a large percentage of respondents (67.9%) who reported the lack of periodic financial reports to user communities, and still less percentage of respondents (21% to 35%) from the rest of the studied Tabias reported lack of financial reports by their committees. From this we can see that most committees in Tabia Mai-tekli have less performance towards financial management of contributed fees which is reflected by lack of reporting on income and expenditures of the funds and also lack of holding committee meetings. And This Tabaia can learn a lot from committees of neighboring Tabias who are relatively with better financial management performances.

Furthermore, as can be observed on the third column of Table 4.9 below it was only 32% respondents from Tabia Amdeweyane who have reported miss-financial utilizations of the operation & maintenance funds by some Committee members, while almost all of the committees from the rest of the three Targeted Tabias has not been involved in utilizing community funds other than to what is intended as reported by almost all of household respondents contacted during the field survey.

From the analysis made above, we can learn the importance of experience sharing among weak and strong committees of the studied communities so as to practical share among other things on how the operation & maintenance funds were better managed. But, generally, additional to poor collection of fees, proper financial recording, monitoring and control systems were not established in almost half of the visited sites. Therefore, this finding shows that poor performance and lack of shouldering responsibilities by the water management committee for collecting and managing the water fee, is one of the major reasons for the prevalence of significantly large number of weak and financially unsustainable water user communities in the study area. In view of the above, most of the community water management institutions are not at required level to generate and manage adequate financial resources for sustainability of rural water facilities, and this shows that among others committee members need further training in financial management.

Table 4.9: Distribution of Percentages on Financial Management of the Collected Money by Committees

Targeted Tabias	Do you know if the committee meets?			Do they give financial reports?			Do committees ever use funds other than to what is intended?			Does Committee effectively manage the money?	
	No	Yes	No response	No	Yes	No response	No	Yes	No response	No	Yes
Mai-Tekli	71.4%	25.0%	3.6%	67.9%	32.1%		92.9%		7.1%	78.6%	21.4%
Amdeweyane	28.6%	71.4%		21.4%	71.4%	7.1%	60.7%	32.1%	7.1%	25.0%	75.0%
Dekera	35.7%	64.3%		35.7%	64.3%		100.0%			28.6%	71.4%
Addisalem	25.0%	75.0%		25.0%	75.0%		100.0%			28.6%	71.4%
Total	**40.2%**	**58.9%**	**0.9%**	**37.5%**	**60.7%**	**1.8%**	**88.4%**	**8.0%**	**3.6%**	40.2%	59.8%
G. Total	**100.0%**			**100.0%**			**100.0%**			**100.0%**	

The majority of respondents (95) contacted for the study have said that they are willing to pay tariff set at the community level. In view of the preceding discussions, we can see that poor financial capacities in most of the schemes, among other reasons, is the result of poor performance of the water committees arising from lack of shouldering responsibilities than low willingness to pay by communities that resulted to inadequate financial resources in most of the water schemes of the studied rural water user communities. Yet out of the total 112 respondents about 17 of them said that they were not willing to pay water fees and 13 of those not willing were from the non functional water facilities, which is rational to say that they were found not willing to pay because of failure of services than refusal of the idea that community should finance to sustainably use water facilities.

Table 4.10 Response on Community Willingness to Pay

Functionality Status	would the community be willing to pay tariff				Total	
	No		Yes			
	Freq.	Percentage	Freq.	Percentage	Freq.	Percentage
Functional	4	5.7%	66	94.3%	**70**	**100.0%**
Non Functional	13	46.4%	15	53.6%	**28**	**100.0%**
Partially Functional	0	0.0%	14	100.0%	**14**	**100.0%**
Total	**17**	**15.2%**	**95**	**84.8%**	**112**	**100.0%**

4.3.3 Operation and Maintenance:

4.3.3.1 Assessed Status of Water Points, Technology type and Machine brand:

Data collected from Samre woreda water desk during the survey time indicated that out of the total 505 rural water supply facilities only 386 were functioning while the rest 119 are either non-functional or fully abandoned during the data collection period. The following table then presents the functionality status of the surveyed water points together with the type of technology and the hand pump machine brand fitted for the studied water supply schemes.

Again based on the data collected from the woreda water desk office, two different water technology types; Hand dug wells and Shallow boreholes were found widely available in the Woreda. In addition, we found that where conditions permitted Spring Development structures are also used as alternative potable rural water supply technologies in Seharti Samre woreda, but Spring Developments were found fewer in quantity than the preceding two types of technologies. According to key informant from the woreda water desk office, in response to working in less favorable hydro geological locations of Samre woreda, shallow wells and hand dug wells with hand pumps became the woreda's and other nongovernmental organizations, like REST, preferred option for delivery of potable rural water supply in Seharti Samre woreda. And priority was given to schemes with lower unit costs to implement, such as hand-dug wells, shallow wells, and spring developments. Even within these three technologies, the woreda water desk officials indicated that hand dug wells were better as they cost less, and shallow boreholes were better as water quantity and quality was higher and better to reach to relatively large populations.

Each type of facility is used by a certain number of users. Data obtained from the water desk office indicated that the Shallow drilled wells throughout the woreda are not more than 60 m deep and are operated with hand pumps, and the Hand dug wells are also with hand pumps and are up to 10 to 20 m deep and covered with concrete lids. Whereas, all the Spring developments were developed at source or with on spot distribution points. In the studied communities, beneficiary's opinion was not usually considered regarding preferences for technologies. As can be seen in the Table 4.11 Afrideve hand pumps were the preferred water lifting machine brand in the study area. Key informant from the woreda water desk indicated that Afridev hand pumps are the most widely available, cheapest and easy to handle for periodic maintenances at the community level. For the purpose of this study attempts have been made to include and study all

the three major varieties of water supply technologies available in the Woreda. Accordingly, 10 HDWs, 3 SBHs, and 3 SPDs were represented for the purpose of this study.

Table 4.11: Functionality status of water points and Technology type and Machine brand

Tabia		**Water Point Name**	**Type of Water Point**	**Machine brand**	**Functionality Status**	**Year of construction Et. Calendar**
Mai-Tekli	1	Mai-egam	Hand Dug Well	Afridev	Functional	May 02
	2	Gerebrab	Shallow Borehole	Afridev	Functional	Jan 98
	3	Mai-hatsena	Spring Development	Spring	Partially Functional	Jan 01
	4	Sewhi	Hand Dug Well	Afridev	Non Functional	Feb 98
Amde-weyane	1	Lemlem sewhi	Shallow Borehole	Afridev	Functional	Jan 03
	2	Mai-tebaq	Hand Dug Well	Afridev	Functional	Nov 99
	3	Ziban aheser	Hand Dug Well	Afridev	Non Functional	Feb 00
	4	Mai-mecheal	Spring Development	Spring	Functional	Jan 03
Dekera	1	Mai-fhero	Hand Dug Well	Afridev	Functional	Dec 04
	2	Mirgatse	Hand Dug Well	Afridev	Non Functional	Dec 00

	3	Gerabatela	Shallow Borehole	Afridev	Functional	May 03
	4	Sewhi2	Spring Development	Spring	Partially Functional	Jan 00
Addisalem	1	Mai-aini	Hand Dug Well	Afridev	Functional	Dec 99
	2	Hashewa	Hand Dug Well	Afridev	Non Functional	April 00
	3	Mai-shahera	Hand Dug Well	Afridev	Functional	Jan 02
	4	Hamed-quaeraye	Hand Dug Well	Afridev	Functional	Sep 01

4.3.3.2 Maintenance practices by Water Management Committees:

Communities are normally expected to manage the operation and maintenance of their water supply system. This requires establishing and capacity building of water management committees in undertaking basic maintenance tasks, in money management and for the overall management of the water supply facility. Besides, among the committee members at least one caretaker is needed for each water point and when a part wears out, they will have to buy a new part. When the facility breaks down, they will have to fix it themselves or report for major maintenance to woreda water desk.

However, as per the result of the focus group discussion, it is difficult to say that all the committees in general or the assigned caretakers have understood that maintenance is their job. The following table then depicts who does if any repair was made to the broken water facility. Hence, 28 respondents (25%) within the four functional water points reported that their water facility had experienced breakage and their respective water management committees done the repair work. And another 28 (25%) of respondents both from functional and partially functional water points said that the required maintenance work were done by external experts from Tabia/and woreda water desk office. However, 56 (50%) respondents from four non functional and two partiall functional water points said that given the existence of major scheme failure and simple maintenance needs, repairs had not been yet undertaken by either the water management committee or other external bodies due to insufficient funds being available to pay for spare parts, lack of skill and commitment from the committee side, and poor external support from the woreda water desk.

To put it in a different way, from the total established 16 water management committees for all studied water points, four 25% of them were found managing financing but not maintenance, and another four committees (25%) manages both maintenance and financing, besides six committees were found totally inactive in terms of shouldering their role and responsibilities and they are not functioning at all. The remaining 2 committees are managing financing but have not yet undertaken any maintenance tasks as their water facility was functioning to design and has not yet broken down.

Table 4.12: Percentage Distribution of respondents on who Repairs to the water facility

Functionality Status	**Who does the repairs to the water facility?**						**Total**	
	Water management committee		**Tabia/woreda**		**None of the above**			
	Count	**% within**	**Count**	**% within**	**Count**	**% within**	**Count**	**% within**
Functional	28	100.0%	14	48.1%	28	51.7%	**70**	**100.0%**
Non Functional	0	0.0%	0	0.0%	28	48.3%	**28**	**100.0%**
Partially Functional	0	0.0%	14	51.9%	0	0.0%	**14**	**100.0%**
Total	**28**	**100.0%**	**28**	**100.0%**	**56**	**100.0%**	**112**	**100.0%**

4.3.3.3 Status of frequency of scheme failures/ breakdown for targeted water points

Respondents were also asked whether there was occurrence of frequent breakdown in their water supply facility, and the study was cross tabulated by the type of water points. As depicted in Table 4.14 more than 53% of the total respondents said their water supply points have faced frequent failures. And within this water facilities with Hand dug well technology have experienced frequent failures compared to the other two type of technologies where more than 64% of respondents using this technology reporting frequent failures. On the other hand the rest 47 % from the total respondents said that their water supply facility did not experienced frequent failures. And among this large number/percentage (95.2%) of respondents using Shallow wells type of water technologies reported less frequency of scheme failures.

Table 4.14: Response on frequency of failures of the water facility in relation to the type of technology

Does the water facility break very often?	Type of Water Point						Total	
	Hand Dug Well		Shallow Borehole		Spring Development			
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
No	25	35.7%	20	95.2%	7	33.3%	**52**	**46.4%**
Yes	45	64.3%	1	4.8%	14	66.7%	**60**	**53.6%**
Total	**70**	**100.0%**	**21**	**100.0%**	**21**	**100.0%**	**112**	**100.0%**

Furthermore, as can be observed in table 4.15 below, on the other hand, 40.1%, 17%, 20.5% and 13.3% of the respondents confirmed that there was system failure once a year, twice a year, three times a year and more than three times a year, respectively. Besides, attempts were made to see which type of water technologies had the lowest frequency of breakage (once in a year) and the highest frequency (more than three times in a year.) As illustrated on table 4.15 below the statistics showed that Spring Developments has the highest percentage of occurrences of scheme failure of more than three times in a year, where 33% of respondents reporting encounters of breakage, followed by Hand dug wells (11.4%) and Shallow wells (0%). Whereas when it comes to breakage reports of only once in a year the reverse comes true. As can be observed on table 4.15 below 90.5% of respondents who use Shallow wells type of technologies have reported occurrence of failures only once in a year, followed by users of Hand dug wells where 31.4% respondents reporting the same situation. Generally, the above findings are also found matching with other similar research works. But, we shouldn't also forget that Shallow wells are costly during installation as compared to the other two types of rural water supply technologies.

Table 4.15: Responses on how many times breaks occur in a year cross in relation to the type of water facility

How many times breaks occur in a year?	Type of Water Point	Total

	Hand Dug Well		Shallow Borehole		Spring Development			
	Freq.	**%**	**Freq.**	**%**	**Freq.**	**%**	**Freq.**	**%**
No breakdown	7	10.0%	0	0.0%	0	0.0%	**7**	**6.2%**
Once in a Year	22	31.4%	19	90.5%	4	19.0%	**45**	**40.2%**
twice in a year	13	18.6%	2	9.5%	4	19.0%	**19**	**17.0%**
three times in a year	20	28.6%	0	0.0%	3	14.3%	**23**	**20.5%**
more than three times in a year	8	11.4%	0	0.0%	7	33.3%	**15**	**13.4%**
No Response	0	0.0%	0	0.0%	3	14.3%	**3**	**2.7%**
Total	**70**	**100.0%**	**21**	**100.0%**	**21**	**100.0%**	**112**	**100.0%**

On the other hand, days between breakdown & repair largely depends on the time when water committees or beneficiaries have to report whenever they face any failures of services and on actions taken by trained Committee members within the community or other external technicians from the Tabia/woreda would be able to repair as much faster as possible depending on the severity of the failure. The following table then depicts the prevailing situation of the repair time which actually depends as mentioned before on the time interval of failures and report of beneficiaries for measures to be taken. As can be observed from the table below, 40 Communities from six of the Functional water points reported that their water point facilities had been repaired in less than 30 days, while 7 respondents from 1 water point said that after reporting of breakdown they had waited greater than 3 months to get their water point repaired.

To give a brief overview of the common type of failures specially faced on the non functional and partially functional water points, we found that all in all eight hand pumps experienced drying of wells. Additional to this, the four non functional water points have system failures on hand pump structure and on submersible pipes. On the other hand the partially functional water sources were found with simple fitting problem on distribution points which would have been fixed by the community itself.

Table 4.16: Response on Days between breakdown & repair in relation to Functionality Status of water points

Days between breakdown & repair?	Functionality Status						Total	
	Functional		Non Functional		Partially Functional			
	Count	% within	Count	% within	Count	% within	Count	% within
Less than two weeks	20	100.0%	0	0.0%	0	0.0%	**20**	**100.0%**
Greater than 2 weeks and less than 1 months	20	100.0%	0	0.0%	0	0.0%	**20**	**100.0%**
Greater than 1 months and less than two months	0	0.0%	0	0.0%	7	100.0%	**7**	**100.0%**
Greater than 2 months and less than 3 months	0	0.0%	7	100.0%	0	0.0%	**7**	**100.0%**
Greater than 3 months	0	0.0%	14	66.7%	7	33.3%	**21**	**100.0%**
No Response	30	81.1%	7	18.9%	0	0.0%	**37**	**100.0%**
Total	**70**	**62.5%**	**28**	**25.0%**	**14**	**12.5%**	**112**	**100.0%**

4.3.3.4 Availability of spare part and maintenance tools

Maintenance tools:

It is obvious that committees managing rural water facilities, apart from provision of basic trainings, need to be provided with essential tools such as Pipe ranch, trawl, and chisel to carry out minor repairs and periodic maintenance tasks. According to the result from the table 4.17 below; 77 respondents from 8 functional and 3 non functional water points have stated that the committees are equipped with simple tools (mainly pipe ranch), while 4 water communities (2 from the partially functional water points, and one water points each from the functional and non functional water points) were found lacking with simple maintenance tools because there was nothing for them or are missing. And the remaining respondents did not know anything about the issue.

Table 4.17: Responses on availability of simple tools and equipment to undertake simple maintenance by communities in relation to Functionality Status of water points

Functionality Status	Do you have simple tools?						Total	
	No		Yes		No response			
	Count	% within	Count	% within	Count	% within	Count	% within
Functional	9	31.0%	58	75.3%	3	60.0%	**70**	**100.0%**
Non Functional	6	20.7%	19	24.7%	3	40.0%	**28**	**100.0%**
Partially Functional	14	48.3%	0	0.0%	0	0.0%	**14**	**100.0%**
Total	**29**	**100.0%**	**77**	**100.0%**	**6**	**100.0%**	**112**	**100.0%**

Spare Parts:

During the focus group discussion made with the water management committees it became obvious that one of the bottle necks in village level maintenance practices was lack of spare parts especially at nearer local markets. Besides, the cost of various spare-parts and the lifetime of different hand pump and spring components are not known by most members of the committees and communities. This inhibits the ability of water mgt committees to plan effectively. However, a key informant interview response from a woreda official says that spare parts are available to the communities according to him the woreda water desk office has stocks of different spare parts at the woreda level,

In this regard, the Relief Society of Tigray (REST) has been supporting the supply chain of Spare parts. REST has been providing spare parts with a systematic intervention of revolving funds to ensure the availability of Spare parts and to reduce the cost of parts. This stocked spare part was to be distributed by the woreda water desk, and according to a key informant discussion with the woreda official, it was then stated that user communities are expected to pay money from their community account and were also previously forced to save an equivalent cost of money of the spare part if they want to get spare-parts from the woreda water dresk. However, the problem with rural communities according to him was lack of financing. We have seen that in most of the studied water points committees were not collecting and saving money in advance - so that they have money in hand when they have to buy new parts, pay for a repair, or pay other expenses.

Table 4.18: Responses on Access to Spare parts to maintain the Water Facility in relation with Functionality Status of Water Points

Functionality Status	Where do you access spare parts if you need to maintain the water facility?						Total	
	Woreda water desk		Local shop		I don't know			
	Count	% within	Count	% within	Count	% within	Count	% within
Functional	49	68.1%	5	100.0%	16	45.7%	**70**	**100.0%**
Non Functional	14	19.4%	0	0.0%	14	40.0%	**28**	**100.0%**
Partially Functional	9	12.5%	0	0.0%	5	14.3%	**14**	**100.0%**
Total	**72**	**100.0%**	**5**	**100.0%**	**35**	**100.0%**	**112**	**100.0%**

4.3.4 Training to water committees and Households

Among other things training is one factor for rural water supply sustainability. It includes not only trainings of the management bodies at community level but also that of the household level. This study reveals that despite all the efforts to establish new water management committees by the organizations which constructed the studied water points, very little has been done to capacitate respective beneficiary communities to the level that is possible to sustainably and effectively manage and maintain the constructed schemes. Operation and maintenance training was given initially to some members of the committees in all the studied water points. However, it was found that 96 respondents which amounts 85% of the total respondents said they did not get trainings and thus could not believe the operation and maintenance trainees had the capacity to maintain the scheme. Besides, from focus group discussion made with committee members we found out that the local communities have weak training exposure with regard to potable water use, personal hygiene and environmental sanitation practices. According to them training programs were not effective as they were not supported with easily understandable and self explanatory training manual prepared in local languages.

Table 4.19: Response on Access to Trainings to Household members in relation to Functionality Status

Functionality Status	Have you (family members) ever received trainings on water and sanitation utilization?				Total	
	No		Yes			
	Count	% within	Count	% within	Count	% within
Functional	58	60.4%	12	75.0%	**70**	**100.0%**
Non Functional	25	26.0%	3	18.8%	**28**	**100.0%**
Partially Functional	13	13.5%	1	6.2%	**14**	**100.0%**
Total	96	**100.0%**	16	**100.0%**	**112**	**100.0%**

Specific to the problematic sampled water points causes for failures, types of breakdown and possible reasons for not taking care of simple and major requirements is presented here as follows as a summary to the discussion of Operation and Maintenance and Training subsections. The problem with the two of the partially functioning water points was that it remained without repair for long period of time, even though the sources were still being used. For example, one of these semi-functional water points was a Spring developed at spot and due to continual and improper usage all the tapes of the distribution point are damaged and get valves of the distribution point and the cattle trough are also all damaged. Consequently, users were forced to get water that comes out only from the perforated pipe originally stretched to fill the cattle trough and no water was saved on the reservoir as the water was flowing out during the night time. Contacted respondents who were taking water for drinking from this source were found less impressed with the quality of service. On the other hand, the problem with the second partially functional water point was that the hand pump has broken and water leakage was observed. Besides, the problem of the four Non functional water points was due to complete drying of wells, pipe failures, and system failure on the hand pumps. Respondents of the non functional water points were also asked to explain the causes for failure and greatest challenge to the proper functioning of the water point. And almost all respondents witnessed that lack of proper utilization and over usage of schemes had affected to an early non functionality of their water facilities.

The main reasons for why these water points remained non functional or partially functional for long period of time, from the finding of the FGD Participants. was that committees together with communities and external stakeholders failed to undertake the required simple and major

maintenance needs of the water points. Information presented in the discussion of financial factor demonstrated the importance of having sufficient money to pay for repairs; however almost all of these communities were not able to raise adequate finance for the purchase of replacements. Therefore, the inability of communities to raise sufficient money to pay for repairs was found to significantly affect water point to be no longer operating. In turn, one of the major reasons for lack of funds in some of the non functional water points, asides to weakness of committees overall management, was the availability of alternative water sources in their neighboring localities which made communities to be reluctant to pay for repairs. As for major maintenance needs, it is important for ongoing support to be available for water committees and or communities to maintain their motivation and skills, however we have seen that the capacity of the woreda water desk to address both major maintenance and ongoing support needs were very limitted. Therefore, options has to be sought that improve the capacity of both the woreda water desk office itself as well as the performances of Water management committees so as to better manage rural water facilities, and possible recommendations are also included as part of this study.

4.3.5 Environmental Issues:

Different studies have showed that deterioration of source water quantity will be of major concern in areas of low rainfall, or poor ground waters re-charge areas where there is greater sensitivity to over extraction. Correspondingly, Seharti-Samre woreda is not different from this in that it is characterized by warm temperature and lower annual rainfall. The temperature of Seharti-Samre ranges from 17-23^{0}c, the average being 20^{o}c and the annual rainfall 580-670 mm, and the average being 600 mm, (REST, 2007).

In view of this, we have seen that one of the causes for failures of water supply schemes in the targeted area was that a significant number of water points included in the study, 8, had experienced seasonal fluctuation of source water quantity with low water table in the wells during the dry seasons. Moreover, the study has showed that among this two wells were found totally dried up. Off course, experts in the field report that it is common during the first few years following the construction of the well that it might dry up during the dry season. However, early dry up most of the time experience due to inappropriate well depth. In relation to this we found out that some respondents who have been taken part in the construction of their water facility reported to this study that their wells were not constructed with appropriate depth, thus care must

be taken in the design of projects to determine the likely sustainability of the source over a long period of time.

However, the other important Environmental consideration is that climate change impacts due to dry events leads to scarcity of water resources in specific rural areas usually located in semi-arid and arid areas akin to Seharti Samre. In either case, attempts to integrate water supply intervention with natural resource, soil and water conservation activities by different stakeholders deserves due attention throughout the woreda.

The following table then simply summarizes whether or not that the targeted communities had undertaken any water and soil conservation activities around the water point facility. However, given the relatively long experience of the Tigray region in general, including Samre woreda in soil and water conservation activities, and it was then difficult for the study to assess and measure as regards if any conservation measures were integrated to the water supply interventions in particular. The study indicated that 9 water user communities out of the total 16 communities said that they had undertaken water and soil conservation activities around the water point facilities. However, from the table we can observe that the remaining 7 rural communities have not yet taken any measure to conserve surface water around the water point. This analysis result strengthen the assumption that the prevailing seasonal fluctuation of source water quantity as observed in the studied could have resulted due to the arid nature of the area and consequently due to lack of water resource conservation activities and poor construction design exacerbating the situation. Besides, lack of awareness among the latter communities on the linkage between the water supply and conservation of the environment has negatively contributed to sustainably use the limited ground and surface water sources available in the woreda

Table 4.20: Distribution in Percentage of Respondents on Measures taken to Conserve Surface Water around the water point

Functionality Status	**Were any measures taken to conserve surface water around the water point?**				**Total**	
	Yes		**No**			
	Freq.	% within	Freq.	% within	Freq.	% within
Functional	6	66.7%	3	42.9%	**9**	**56.2%**
Non Functional	2	22.2%	2	28.6%	**4**	**25.0%**

Partially Functional	1	11.1%	2	28.6%	**3**	**18.8%**
Total	**9**	**100.0%**	**7**	**100.0%**	**16**	**100.0%**

Almost all of the respondents, from the nine communities who carried out soil conservation works, as depicted on Table 4.21, have reported that at least two of the following soil water conservation activities to conserve the surface water around the water facilities. These included forestation of catchment areas, Surface water recharge structures (such as check dams), Diversion upstream, Participatory watershed management like control of open grazing.

Table 4.21: Response on the Type of Measures taken to Conserve Surface Water and Cross tabulated with functionality of water points

Functionality Status	**If yes, what measures were taken?**				**Total**	
	At least two of the above		None of the above			
	Freq.	% within	Freq.	% within	Freq.	% within
Functional	6	66.7%	3	42.9%	**9**	**56.2%**
Non Functional	2	22.2%	2	28.6%	**4**	**25.0%**
Partially Functional	1	11.1%	2	28.6%	**3**	**18.8%**
Total	**9**	**100.0%**	**7**	**100.0%**	**16**	**100.0%**

4.3.6 External Support for Rural community Water users (Post-Construction support)

Enhancing technical and managerial capacity of the community has a major role in ensuring sustainability of the water supply. In turn the capacity of the rural water users is also strengthened through continuous follow up support by different stakeholders. It is obvious that defects beyond control of local communities need external technical supports. But apart from this, external support directed towards improving arrangements for maintaining water points as well as mechanisms to more effectively manage household contributions could be useful initiatives to improve the sustainability of community managed rural water supply systems.

To find out the existing situations of external support services in the study area we have first contacted user communities and obtained their response if they would have received from different stakeholders. Then, we have also included the reaction of service providers (particularly Seharti-Samre woreda water desk office and Relief society of Tigray) on their involvement in the

delivery of follow support services to community managed rural water users in the woreda. The finding of the analysis is presented as follows.

Almost all of the household respondents (100%) included in this study, have indicated that the water supply agency that facilitated the construction of their water supply scheme had been involved in the establishment and training of water management committees at the outset or when water supply projects were under construction, completed and or handed over for communities. It is obvious that external follow up and support services in the rural water sector area have different forms. Repair and maintenance, capacity building programs like onsite training and refresher training to strengthen their financial management system and technical practices, and follow up of water management committees, and periodic technical supervisions are among them. The existing situation on most of the sampled water points show that communities did not have well trained technicians to repair serious failures, and it was rather rarely the technicians from the woreda water desk take the responsibilities for such activities.

For instance out of the 6 water facilities that require major maintenance tasks, it was only 2 of the water points that have received the woreda water desk official's support to get their water supply facilities repaired. The rest of the 4 communities have not yet received any external support. The feedback we got from focus group discussions participants also indicated that apart from the provision of maintenance tasks, the woreda water desk has not been actively engaged to build the capacity of the rural community and to enable them to maintain and sustain the water supply facility by the community itself. As a result part of the participants thought that it is not realistic to think that rural communities should manage water supply facility on their own without outside help.

Although there are many stakeholders who are concerned in the rural water supply deliver sector in Seharti-Samre woreda, we found out that only the Woreda water desk office and the Relief Society of Tigray (REST) that were assuming responsibilities both in the delivery of water supplies and in the fulfillment of post construction follow support services to rural water supply users. Yet again, the focus and forms of post construction follow up support services provided by these two organizations varies to a great extent and limited in its scope.

Sehaeti-Samre woreda water desk office, which is based at Samre town, is the major responsible body for water development and provision of post construction follow up support services to all

rural communities in the area. Based on a key informant data collected from officials of Seharti Samre woreda water desk office the capacity of the Woreda water resource office in terms of skilled manpower, logistics and equipment is generally poor to provide the required support to the more than 500 rural water supply scemes in the woreda. The following are major capacity limitation of the office to conduct follow up on each water points more closely, as outlined by the office's head Ato G/selassie:

- Lack of skilled manpower; Geologist and Hydrogelolgist (which need to be filled by the regional government)
- Lack of logistics; budget for perdium, motor bike and field equipment (Need to be provided by government and non governmental organizations)
- Lack of equipment and tools; tripod (chain block) pipe ranch and different types of spare parts (Need to be provided by non governmental and governmental organizations)

As a result, based on the responses both from the community and woreda water desk office sides, we were able to understand that with limited staffs and logistics the office was constrained to provide follow up support and thus its focus was to severely affected water points in the woreda, Hence, the woreda water office identified that the staffs were not enough to provide the necessary follow up service as the demand for such services is huge in the woreda. And based on the discussion made with the office head the number of staffs and their education and qualification is presented as can be seen in the Table 4.22 below. But generally, only 2 BSc degree professional staffs and 4 Diploma experts are there in the woreda.

Table 4.22: Seharti Samre Woreda water Desk Office Staff based on their Education and Qualification

No	**Responsibility**	**`Education level**		**Field of Study**
		BSc	**Diploma**	
1	Water quality expert	1		
2	Rural supply water expert		**1**	Rural water supply and sanitation

3	Pump Attendant		**1**	General Mechanics
4	Maintenance and operation expert		**2**	Mechanical Engineering
5	Planning and documentation expert		**1**	Management
6	Office head	1		Agricultural Economics 1

Until fairly recently, as described above the water technicians who were assigned to give follow up support services, in most woredas of the Tigray regional state, were very few in quantity and they were all centered at the woreda office level. Subsequently, coupled with the long prevailed logistical and capacity limitations, this few technicians alone were not able to manage and address the required huge follow up service demanded by a large number of rural water communities, particularly referring the situation in the study area.

However, one of the recent step forward measures taken by the regional government as part of the decentralization process of the rural water supply sector was the introduction of water supply Technicians at a Tabia/kebelle level. These water supply experts are generally Diploma graduates from Technical Colleges and specialized in the water supply fields. All of the rural Tabias in Seharti Samre have now got these water experts. Since, previously the woreda level water office didn't have clear system for supervision and monitoring works, water committees or beneficiaries used to have to report to the woreda whenever they face any failures of services so that technicians from the woreda office would be able to come and repair which was most of the time in effective. But now there is no question that this new Tabia level water staffs assigned by the government are based and working under these lowest administrative units are able to give day to day follow up support services to rural communities more closely and this can be taken as a great breakthrough in terms of reaching rural communities and definitely help to fill the long existed shortcomings and gaps to closely provide follow up support services to community managed rural water users.

However, we have found that the water supply technicians assigned in the studied Tabias were not fully and effectively functioning. For instance, in the studied four Tabias, the performance of each of the water technicians as evaluated by water management committee members were not

satisfactory in regards to delivery of follow up service. Some of the group discussion participants reported that the technicians didn't even takes care of small defects. On the other side, discussion was also made with the four Technicians (Ato Birhanu Niguse from Tabia May-Tekli, W/t Ahza /Amde-Woyane/, Ato Kiros /Adikala/, and Ato Redaee /Adisalem/), all of them said that the complain by committee members were true, and all of them reported that there was a great burden on them due to extra job assignments, because they were not only responsible to the water supply sector but also have additional duties and responsibilities both for the irrigations and other rural development sectors. And they added that local administrators most of the time give priorities to the irrigation and other rural development activities than to the follow up services of water supply sector. And this, according to them, is causing problem to give the required follow up services at the optimum level, and one of the technicians added that it is true that if the water management committees would have complained on their performance.

From this survey, what we have found out was that in order to give follow up service and to build the capacity of the rural community, it is of paramount importance to build up at first instance the capacity of both the Wereda water resource development office and the Tabia level Technicians both in terms of personnel, material, and technical capacities and clear role responsibilities has to be established.

On the other hand, due to its proximity to the regional capital, the city of Mekelle, many other local and international NGOs have been attracted to Seharti Samre woreda to be engaged in the water supply sector through the channel of the woreda water desk office. However, among these NGOs, Relief Society of Tigray (REST) was the only NGO that have been providing post construction follow up support services to rural community water users in Seharti-Samre woreda. REST has been involved in providing these support services for long time through internal and donor funded projects. And more particularly, REST in collaboration with Intermon Oxfam had executed a Post Implementations Follow-up Project for selected rural water supply systems in Seharti Samre woredas for three years (from 2007 to 2009).

Although all the studied water communities were not targeted through the above cited post implementation follow up project, we found that the project was new in its approach and

comprehensive in terms of addressing the diversified external support needs of rural water user communities which needs a few mention here. According to a key informants from REST (Ato Teklehaimanot) REST had established spare-parts revolving fund by providing initial spare parts which was to be administered by the woreda water office and tools and equipments were also provided to the targeted rural water supply schemes. Besides, the project had facilitated natural resource conservation works around some most vulnerable water schemes and water tariff assessment was also conducted. The key informant then added that water management committees' training manual in Tigrigna language was prepared and intensive refresher training delivered for water management Committee members particularly for old schemes of the project to strengthen their financial management system and follow up capabilities on routine O&M works. And under the project short term trainings were provided to 2 experts from Samre Wereda water office in collaboration with Arbamnchi water Technical Colleges. However, the key informant indicated that after the phase out of the above stated project, except undertaking of rehabilitation works to dry and non functional water schemes, REST was not able to sustain other similar post construction support activities in Seharti-Samre woreda. And it was then also difficult for this study to see the contribution and impact of this project towards the sustainability of the water point schemes targeted through the project and its replycability to other similar areas in the woreda.

4.3.7 Management system (Performance of Water Management Committees)

Nowadays community water management is seen as the best way to guarantee the sustainability of rural water services after the construction of the water system and after the implementing agency has left the community. Likewise Ethiopia has made community water management a key concept in its national water policies. Proclamation 122/1999 is one of its kinds that clearly set different categories of water supply services and gave rise to establishment of rural Water supply and management committees with clear mission. Water supply, sanitation and hygiene committee should be established based on the articles of proclamation for establishment of rural and urban water supply and sewerage services (No 122/1999). Part 4 article 36 of the proclamation states that there are two committees, one at Tabia level to guide, monitor and support the sub-Kushet (water point level Water and Sanitation management committee) supposed to mange, operate and maintain the water scheme. These committees are required to be established under close guidance and endorsement of woreda water office and woreda

administration executive committee respectively. Sub-Kushet level water management committee, which is elected by the beneficiary community, is expected to manage water supply and sanitation facility found within the sub-Kushet and it is accountable to the Tabia level water and sanitation committee.

However, to achieve the proper management of constructed water facilities and to plan for new ones, clear roles and responsibilities of major stakeholders and water committee members should be in place. Explanation on these roles and responsibilities and other preliminary facility and financial management concepts should be given through training to all concerned, and especially to Water committee, who are involved in the day to day management of such Water and Sanitation facilities.

The following table simply summarizes the assessed results of the performances of the Sub-Kushet level water management committees in the studied area as evaluated by the beneficiary communities. Six communities 1 from a Functional and 4 from the non functional and one from the partially water points continued without a water management committee despite them being established and trained when the water facilities were handed over to the community as part of the community management approach. Ex-Committee members from the non functional water points stated the reason they were not operating was because there was nothing for them to do. However, these water points was not maintained and remained non functional. The remaining 10 water points had a Water mgt Committee established and they were active but functioning with varied level of performances.

Table 4.23: Response on Type of Management Systems Put in Place to Manage Water Supply Facility in relation with functional status of water points

Functionality Status	**What management systems have you put in place to manage your water supply facility?**						**Total**	
	Establishing Water Management Committees		**Both Establishing Water Management Committees & employing guards**		**None of the two**			
	Freq.	% within	Freq.	% within	Freq.	%	Freq.	%

Functional	3	75.0%	6	100.0%	1	16.6%	**10**	**62.5%**
Non Functional	0	0.0%	0	0.0%	4	66.8%	**4**	**25.0%**
Partially Functional	1	25.0%	0	0.0%	1	16.6%	**2**	**12.5%**
Total	**4**	**100.0%**	**6**	**100.0%**	**6**	**100.0%**	**16**	**100.0%**

As can be observed on table 4.24 below, 11 communities have rules and regulation in the use of the water supply facilities including limiting the time given for the service to be used for collecting water, keep the service from damage including animal and children not to get closer to the water point, suspending services to households who do not pay water fees etc. The rest five water user communities on the other hand were found with no community rules and regulations at all mainly due to poor community and committee member interrelationships.

Table 4.24: Response on Availability of Community Rules and Regulations in the use of the water supply services

Functionality Status	**Does the community have rules and regulations in the use of the water supply services?**				**Total**	
	Yes		No			
	Freq.	% within	Freq.	% within	Freq.	% within
Functional	7	63.6%	3	60.0%	**10**	**56.2%**
Non Functional	2	18.2%	2	40.0%	**4**	**25.0%**
Partially Functional	2	18.2%	0	0.0%	**2**	**18.8%**
Total	**11**	**100.0%**	**5**	**100.0%**	**16**	**100.0%**

4.3.8 Users Satisfaction with the Management of the service:

Literatures in the rural water supply sector indicate that the sustainability of water facilities is a function of consumer satisfaction with the management of the facilities by the committees. Besides, the level of user's satisfaction as an indicator of sustainability of water supply schemes is also reflected by the continuous support and participation of the community in water supply related issues.

For the purpose of this study, water quantity, water pressure of the sources, number of hours avail, waiting time, and perception of taste were taken as the prime indicators for consumer's satisfaction on the service. As can be observed in the table 4.25 below, 39% to 46 % of the households were very satisfied with the pressure, amount of water , number of hours water is available, and waiting time to fetch water, and about 74 % of the households are also very satisfied with the water test of the sources. However, 12.5% to 32 % of the households said that they were not satisfied with the pressure, amount of water, test, number of hours water is available, and on the waiting time they spent to fetch water.

Table 4.25: Distribution of Users Satisfaction on Quantity, Pressure, Perception of taste and Waiting time

Response	**Are you satisfied with the water pressure of the source?**		**Are you satisfied with the quantity available? (↓Good, It depends on season, No)**		**Are you satisfied with number of hours avail?**		**Do you mostly stand in line a long time?**		**What is your perception of taste? (↓Good, Fair and Poor)**	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Very	49	43.8	52	46.4	54	48.2	38	33.9	83	74.1
Some how	28	25.0	28	25.0	32	28.6	60	53.6	15	13.4
No	35	31.3	32	28.6	26	23.2	14	12.5	14	12.5
Total	**112**	**100.0**	**112**	**100.0**	**112**	**100.0**	**112**	**100.0**	**112**	**100.0**

Moreover, in the study area user's satisfaction with the management of the service is also assessed and the result is depicted on the table 4.26 below. Users were asked to respond on their overall satisfaction on the management of the service taking in to consideration of trustworthiness of the water committees and financial reports, prompt repairs of facilities as and

when required, and cleanliness of facility. And the study on table 4.26 indicated that 59% of the households from the Functional water points were well satisfied with the management of the facilities, and again 41% of respondents still from the functional water points are fairly satisfied with the management of the facilities. However, 28 respondents or almost 100% of households from the non functional water points and 8 respondents or 57% of the households from the partially water points respectively were not satisfied with management. The main reasons for the dissatisfaction of users both for the semi and non functional water points was lack of water from the source and or quality of service had deteriorated. Consequently, most of the users in these localities were dissatisfied with management by their respective committees because the measures taken to set the water facilities operational were ineffective or the committees were totally inactive to interface with communities to for betterment of their water sources. Although the Committees are responsible for daily operation of the schemes, they are not the only organs that have to be blamed for the low service level. Because, first committees were not capacitated to the required level, and second we have seen also that there is less follow up support services by external stakeholders to capacitate community institutions after construction of water facilities were completed and handed over to communities for day to day management.

Table 4.26: Distribution of Overall Satisfaction with the Service

Functionality Status	**Q37 What is your overall satisfaction with the service?**						**Total**	
	Good		**Fair**		**Poor**			
	Freq.	% within	Freq.	% within	Freq.	% within	Freq.	% within
Functional	41	100.0%	29	82.8%	0	0.0%	**70**	**62.5%**
Non Functional	0	0.0%	0	0.0%	28	77.8%	**28**	**25.0%**
Partially Functional	0	0.0%	6	17.2%	8	22.2%	**14**	**12.5%**
Total	**41**	**100.0%**	**35**	**100.0%**	**36**	**100.0%**	**112**	**100.0%**

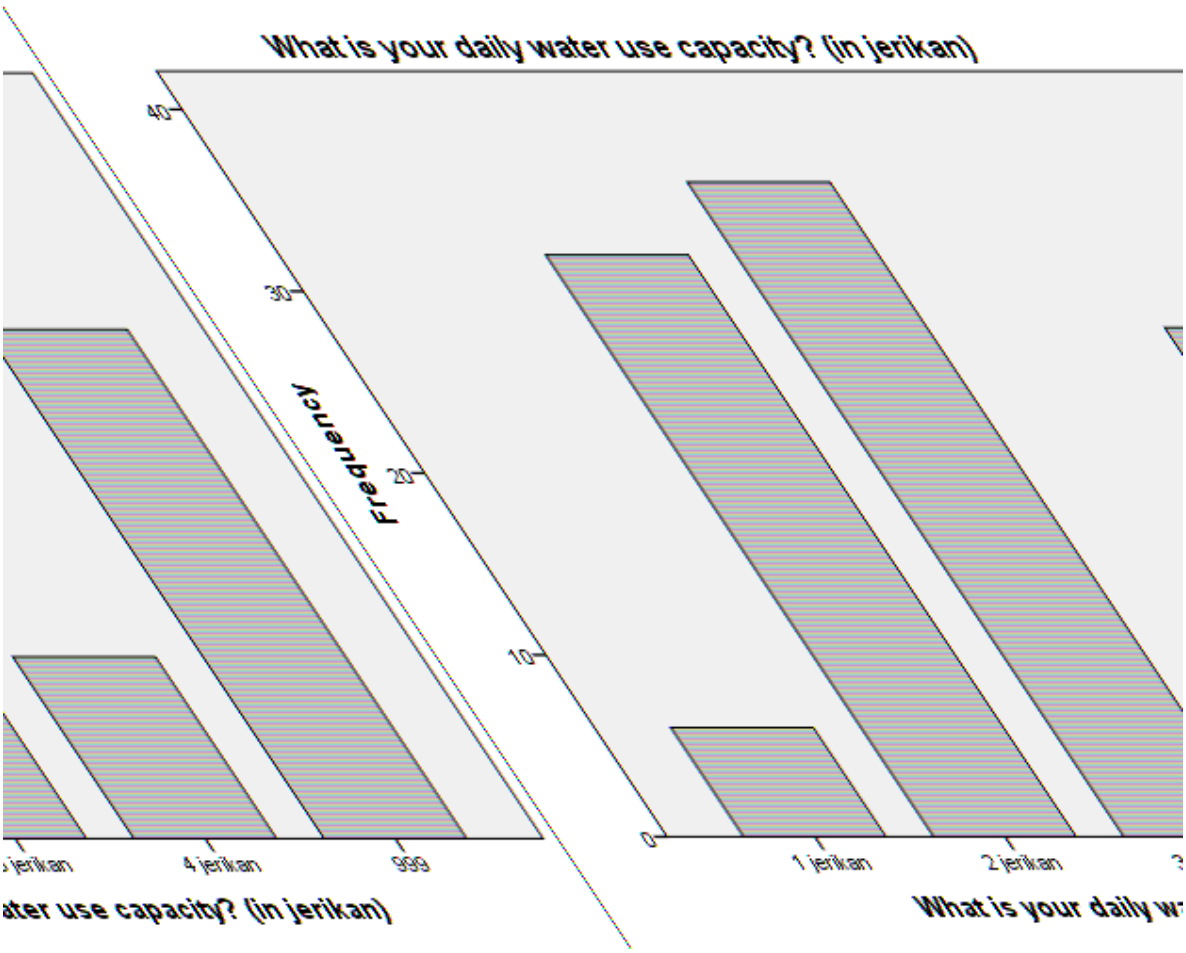

Figure 1: Respondents Daily Water Use Capacity

The above Fiure4.1 shows respondents daily water consumption capacity from the source. The average water consumption ability of households from the developed potable water sources was calculated to be 3 jerikan per day with a minimum of 1 jerikan and maximum of 4 jerikans per day. However, still significant numbers of respondents from the non functional water source were found using unsafe water sources, while still others were also forced to share potable water from the neighboring water points.

When we observe the general opinion of respondents on the need of new water points, all respondents, 28 from the non functional water points, as can be illustrated in Table 4.27, said they need new water facilities, and all the 14 respondents from the partially water facilities also said new water facilities to be constructed. And about 20% of respondents from the functional water points responded the same. Looking in general terms, therefore, and almost half of the

studied communities' water sources are found unsustainable because they are not giving the required service to their respective communities.

Table 4.27: Distribution in Percentage of Respondents on the Need of New Water Points in relation with Functional Status of Water Points

Functionality Status	Q39. Do you need new water points?				Total	
	No		Yes			
	Freq.	% within	Freq.	% within	Freq.	% within
Functional	59	100.0%	11	20.8%	**70**	**62.5%**
Non Functional	0	0.0%	28	52.8%	**28**	**25.0%**
Partially Functional	0	0.0%	14	26.4%	**14**	**12.5%**
Total	**59**	**100.0%**	**53**	**100.0%**	**112**	**100.0%**

4.4 Determining the overall Sustainability of the Sample Rural Water Points

As we indicated in the methodology section of this paper, in order to get a better understanding of why the rural water supply systems are sustainable or not, and to predict future sustainability, the sustainability snapshot tool (first developed by WaterAid, and in fact then used by different researchers later) was employed in the data analysis. The WaterAid 'Sustainability Snapshot' provides a crude scoring system so a range of rural water facilities could be compared for sustainability, Parry-Jones et al (2001). 10 sustainability issues were arranged around seven of the eight key sustainability factors that were identified by the literature review associated with this study. For each issue identified, three statements have been developed which represent a continuum from least sustainable (score of 1) to most sustainable (score of 3). Thus, a three tiered ranking system was incorporated into the sustainability analysis tool of this research, these are; "sustainability likely", "sustainability possible", and "unlikely sustainable" (referred to SL, SP, and SU, respectively, from here on).

During the data collection discussion have been made on each issue with the community to decide which of the three statements most closely relates to the current status in the specific water user communities. This was done through a focus group discussion and meeting with the water committee members. Once agreement has been reached on the issues, a corresponding 1, 2

or 3 is then inserted into Sustainability grid. This was then repeated for all the 10 issues in the sustainability snapshot. The completed sustainability snapshot checklist that was used to determine the sustainability of the studied water points in Seharti-Samre Woreda is attached as Appendix - 4 on this research paper.

Finally, the average scores then was used as a crude means of comparison between water user communities and also served to highlight which key areas are weakest in relation to sustainability. The total sustainability score as well as the SU, SP, and SL rankings for each of the 10 issues of the seven indicator categories for each of the 16 communities can be found in Table 4.28 below.

First it should be reminded that about 25% of sampled water points were not being used and 18.7% were also partially functioning. In other words, close to half of water points sampled in this research do not provide reliable access to water and or were not maintained during the data collection time. And only 53% of water points were assessed to be functioning to design and providing services.

Finding of the study resulted from the Sustainability Snapshoot tool employed in this research has also determined that more than 37% of the Rural Water Supply schemes of the studied communities have scored sustainability unlikely results (scoring an average points ranging from 1.3 to 1.8) and this was due to conditions whereby the financial resources and the community institutions (water management committees) are not totally available when needed or are insufficient, and the technical skills of the committees were found weak for the maintenance demanded. The remaining 62.5% of the studied water schemes were determined to be possibly sustainable (with an average score of 2.0 to 2.10 points). These possibly sustainable water points were found providing services and with some kind of community participation, however these water points have institutional, financial, and technical capacities falling somewhere between sufficient and insufficient. On the other hand, based on the finding of the analysis from the tool none of the sampled water points were found with committees or communities effectively administrating the water services and technical capacities that are significant and with financial resources that are available when needed and sufficient for the most expensive maintenance processes.

However, it is important to note that an overall assessment of sustainability unlikely mean that it is impossible. Using the definition of sustainability used for the purpose of this study, the

concern for the systems that are deemed “sustainability unlikely” is that service levels will not be maintained and the benefits will not be sufficient and equitable amongst the populations served. The indicators must, therefore, be taken at face value as indicators, or predictions of sustainability, not as observable measures of long-term sustainability. This tool functions as a community diagnostic tool, focusing on the capacity of the community and assuming that the external factors are indirectly accounted for. In order to simplify data analysis, whenever possible, responses were represented numerically.

Factor / issue	Specific Water Point Name & type of water point																Average Score
	Mai-egam HDW	Mirgatse HDW	Gerabatela SBH	Sewhi2 SPD	Mai-aini HDW	Hashewa HDW	Mai-shahera HDW	Hamed-quaeraye HDW	Gerebrab SBH	Mai-hatsena SPD	Sewhi HDW	Lemlem sewhi SBH	Mai-tebaq HDW	Ziban aheser HDW	Mai-mecheal SPD	Mai-fhero HDW	
Management systems	2	1	2	2	2	1	2	2	2	2	1	2	2	1	2	2	**1.75**
Major breakdowns	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	**2.00**
Technical skills	2	1	2	2	2	1	2	2	2	1	1	2	2	1	2	2	**1.69**
Equipment and spares	2	1	2	1	2	2	2	2	2	2	1	2	2	1	1	2	**1.69**
Financing/cost recovery	2	1	2	2	2	1	2	2	2	1	1	2	2	1	2	2	**1.69**
Training	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	**2.00**
Source reliability	2	1	2	2	2	1	2	2	2	2	1	2	2	1	2	2	**1.75**
Quality	3	1	3	2	3	3	3	3	3	2	1	3	3	1	3	3	**2.50**
Capital contribution	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	**2.00**
User satisfaction	2	1	2	1	2	1	1	2	2	1	1	2	2	1	2	2	**1.56**
Average Sustainability Score	**2.10**	**1.30**	**2.10**	**1.80**	**2.10**	**1.60**	**2.00**	**2.10**	**2.10**	**1.70**	**1.30**	**2.10**	**2.10**	**1.30**	**2.00**	**2.10**	**1.86**

Table 4.28: Sustainability Score of the Studied Water Points

4.5 Capacity Limitation and Key Challenges Faced by Water user Communities

This study have tried to identify the capacity limitations and key challenges that were restricting water user communities from getting regular safe and potable water from their scheme on a sustainable basis. The finding of the study indicates the following key challenges with regard to community management and sustainability of water facilities in the study area. From the focus group discussion with water management committees and based on the discussions made so far, the first identified challenge is the ability of the Water committee to ensure regular payment for Operation & Maintenance of facilities. Most of the communities have problems in raising funds for Operation & Maintenance which adversely affects the sustainability of facilities. Another related challenge observed through this study is the ineffectiveness of the Water Committee due to a number of reasons, such as lack of interest (four committees were found completely inactive which was due to unwillingness and change of committee members), and due to failure of the committees to account to the community members. This challenge affected the willingness to pay for sustainable services delivery.

Another key challenge is that almost half of the schemes lack a set of toolkit for undertaking minor maintenance of the schemes. FGD participants have outlined that refresher training on basic operation; maintenance and overall management of the scheme to water and sanitation committee on the spot were identified to be limited.

Furthermore, institutional support and follow up from woreda level stakeholders was also found limited. The other major challenge that was observed during the survey is the seasonal fluctuation of many water sources especially during the dry seasons. And this was resulted due to arid nature of the area, lack of awareness on the importance of different type of soil and water conservation techniques so that they will understand the linkage between the water supply and conservation of the environment, and poor construction design exacerbating the situation.

Chapter Five

Summary, Conclusion and Recommendations:

5.1 Conclusion

This case study has tried to assess the sustainability of community managed rural potable water supply systems in Seharti-Samre woreda by examining the main factors and identifying the limitation and key challenges, and on how the water user communities function together with other stakeholders. As identified in the methodology section a total of 16 rural water points were identified from four Tabias in Seharti-Samre woreda as unit of analysis for this research. A sampling procedure with both probability and non-probability sampling method was used to identify the 4 Tabias and 16 water points, and the survey was carried out with 112 HH, besides 4 different FGD with Water management Committees and some key informant interviews was also employed to generate the required information.

Findings from the study demonstrated that water management Committees were established during or immediately after construction in all sampled communities to manage installed water points, however six (6) were no longer fulfilling all their roles and responsibilities and the rest majorities were not also functioning with full capacities. Findings from the study also showed that majority of the Committees were frequently not collecting or managing sufficient funds to pay for repairs and maintenance. Furthermore, without sufficient funds and without an effective spare parts supply chain, parts could not be easily located. Moreover, due to negligent external support their interests in managing the water point were found weak. This study has indicated that due to semi arid nature of the woreda and poor construction designs most of the water points experience seasonal fluctuation of water source and some were completely dried. Communities of the four non functional water points were left without reliable access to an improved water source and thus these communities were forced again to use unimproved sources and some were forced to fetch water from neighboring communities which in turn created pressure for host communities and the water facility.

Similarly, the result of the sustainability snapshoot tool indicates that none of studied water points are likely to be sustainable in the long term, and 62.5% are possibly sustainable, and the rest 37.5% of the water points are unlikely that the community will be able to overcome any significant challenge.

Communities that were scored as unlikely sustainable perform poorly in financial management, and or the committees were not totally unavailable and consequently no technical skills for repair service.

5.2 Recommendations

As this study is based on case study of sampled rural water supply systems in one woreda of the Tigray regional state, the following recommendations presented have specific relevance for the targeted rural area in particular. However, it must also be viewed that some of the problems identified in this research are systematic and common to all other woredas in Tigray, therefore, part of the findings and recommendations presented in this research study may substantiate or can be applicable to many other similar woredas in Tigray.

According to the findings of this study the capacity of almost all community based water management committees of the studied water points calls for additional efforts to make them able to effectively operate the systems and administer services. To this end, committee members need refresher and further training including on topics of financial management and operation and maintenance of water point schemes. Committees should also be Institutionalized and strengthened through legal recognition and formalizing their relationships with local government. And the practice of keeping cash contributions in the treasurer's home which was observed on some of the schemes should be avoided and as soon as possible be kept in to a community bank account.

Options and incentives to encourage more proactive maintenance of facilities by Water management committees should also be explored. To have timely repair of water facilities by the community itself equipment like pipe-ranch and other necessary tools has to be available at village level. Therefore, the woreda water resource office together with other stakeholders should plan and work to its achievement (this scarcity is observed on almost halve of the schemes). To provide spare parts on a fee paying basis strong linkage has to be created between the community and the Woreda water office. NGOs like REST should support the supply chain by sharing estimated lifecycle cost. The woreda water desk office or other concerned bodies should, as soon as possible, give maintenance to those four non functional water points that were found not functioning because of major technical problems.

Woreda water resource development office and other relevant stakeholders (including the local government and NGOs) should develop long-term plans to work with water mgt Committees

following installation of water points and specific ongoing support in the area of financial regulation and contribution management appear particularly essential.

In relation with ensuring the environmental sustainability of water supply schemes community should be given adequate training on different type of soil and water conservation techniques so that they will understand the linkage between the water supply and conservation of the environment.

The existing database on the different rural water supply sources found in the woreda was not complete and some important information concerning HDW and SBH depth and year of establishment was not totally available. Thus a properly controlled and permanent record of the water sources should be held.

Replicating similar research works on sustainability of rural water supply systems in other woredas of Tigray could build a more comprehensive understanding of how to support sustainable rural water services.

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Annexes:

Annexe 1: Questionnaire for rural community water users/ Households/:

Dear sir/madam:

Tenaw is currently studding at Mekelle University. He is undertaking a research on the **Sustainability of Community Managed Rural Water Supplies**, as part of his Masters degree in Development Studies at Mekelle University. The main objective of this questionnaire is to collect information about the Sustainability of rural water supply points in Seharti Samre Woreda of South-Eastern Tigray. Specifically, this survey aims to gather information about the factors affecting the non-functionality of Rural Water Supply facilities (Institutional factors, Technical factors, Financial factors, Environmental factors, etc). Besides, it is also intended to better understand the extent of external support and the challenges facing rural water user communities. Therefore, your information helps me to find the causes for the non functionality of rural water supply points. And, I will use this information in academic report and all your answers will be confidential.

Thank You!!

General Details	
Tabia	
Kushet	
Site/water point name	

Scheme type/ Technology	
No. of people using the water point	
Year the water facility constructed	
Constructed by	
Name of Data collector	
Date of Data collection	

Instructions:

For each of the following questions, please check the box that best describes the situation of the water point (when necessary you may check more than one options) and please also fill in the information in the blank space where required.

I. Socio-Economic Characteristics of Households:

Name of the respondent	Age	Sex	Marital status	HH size	Educational level
		1. Male□ 2. Female□	1. Single□ 2. Married□ 3. Divorced□ 4. Widowed□		

II. Identification of non-Functionality and Sustainability factors (Research Objective 1)

Operation and Maintenance

1. What is the condition of your water supply facility now?
    a) Functioning□
    b) Non-functional□ (it is possible to find respondents in the
    c) Semi-functional□
2. If your answer to question 1 is non functional, when did it stopped functioning?
    ____/____/____Date/month/year
3. If your answer to question 1 is non functional, how long did it serve the community before it stopped functioning? _____

4. If your answer to question 1 is non functional, what has made it not to be functional?

   _____, _____, _____, _____

5. Does the water facility break very often?

   a) Yes□ b) No□

6. If it breaks, how many times breaks occur in a year?

   a) Once in a year□ b) Twice a year□ c) Three times a year□ d) More than three times a year□

7. Have you (family members) ever received trainings on water and sanitation utilization?

   a) Yes□ b) No□

8. Is the water point repaired over past 12 months? A) Yes□ b) No□

9. If yes, days between breakdown & repair?

   a) Less than 2 weeks, b) less than one month c) less than 3 months d) greater than 3 months

10. Who does the repairs to the water facility?

    a) The water management committee b) The Tabia/Woreda c) The Community d) An NGO

Financial Management

11. How do you think funds should be obtained for water system to be repaired?

    a) Tariff □ b) Additional contribution by users□ b) Tabia/Woreda□ c) NGOs□ d) If other please specify _____

12. Would the community be willing to pay for Operation and Maintenance of the water supply?

    a) Yes□ b) No□

13. Does your household contribute money for operation and maintenance cost of the scheme?

    a) Yes□ b) No□

14. If your response for question 16 is yes, how much do you contribute?

    _____in birr/month/year _____in kind/year/month

15. Who sets the user fee?

    a) The community itself b) The water committee c) Tabia and or Woreda d) If other please specify _____

16. What is your perception on tariff level?

    a) Expensive□ b) Fair□ c) Inexpensive□

17. Do you have problems in paying user fee?

    a) Yes□ b) No□ c) Sometimes□

18. Do you believe that the Committee is effectively managing the money collected in the community?

    a) Yes□ b) No□ c) Don't know □

19. If your response for questions 16 is yes, is the amount contributed enough for Operation, maintenance, recovery of the water point?

    a) Only for operation□ b) Only for maintenance□ c) Both for operation and maintenance□ d) For all operation, maintenance and recovery□

20. Do you have any idea where the contributed money is saved?

    a) Yes□ b) No□

21. If yes where is the money saved?

    a) At the treasurer's hand□ b) Community account□ c) If other specify_____

22. If your response for question 16 is no, what are your reasons for not contributing?

    _____, _____, _____

23. If you are not using the water supply service, what other alternative water source are using currently?

    a) Open river□ b) Unprotected springs□ c) If other please specify _____

24. How do you evaluate the performances of Water and Sanitation Committee?

    a) Very good□ b) Good□ c) Fair□ d) Poor□ e) Very poor□

25. Do you know if the committee meets?

    a) Yes□ b) No□

26. Do they give financial reports?

    a) Yes□ b) No□

27. Has the committee ever used funds other than to what is intended?

    a) Yes□ b) No□

28. If you are not satisfied with the current water management, what other management systems do you recommend to have a sustainable water supply?

    _____ _____ _____

Environmental Factors

29. Were any measures taken to conserve surface water around the water point?

    a) Yes□ b) No□

30. If yes, what measures were taken?
    a) Afforestation of catchment area□
    b) Surface water recharge structures (such as check dams) □
    c) Diversion upstream□
    d) Participatory watershed management (control of open grazing) □
    e) Any other? Specify_____

III. Users Satisfaction (Resarch Objective 4)

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

IV. External Support (Research Objective 2)

40. How did the water supply agency that facilitated the construction of your water supply prepare you to maintain and sustain the water supply facility?

    _____, _____

41. What type of external support service do you receive to enable you effectively manage your water supply facility? _____, _____, _____
42. When the water point got major breakdown, do you know who to contact with the relevant tools and technical training to carry out the repair? Please explain

    _____
43. Do you think it is realistic that communities should manage water supply facility on their own without outside help?
    a) Yes□ b) No□

V. Identifying the Capacity limitation and key Challenges (Objective 3)

44. What is the greatest challenge to the proper functioning of the water point?

    _____, _____, _____
45. What have been the greatest difficulties that the community has encountered in the Operation and Maintenance of the system?

    _____, _____, _____
46. How have you responded to the challenges?

    _____, _____, _____
47. What do you think are the most critical factors that are important in ensuring the water supply facility to be sustainable? _____, _____,

Annex 2: Focus Group Checklist for Water & Sanitation Management Committee (WASHCOs)

BACKGROUND INFORMATION

Woreda _____, Tabia _____, Kushet_____, Specific Water Point Name _____

1. Is there Water and sanitation committee?
2. When was the committee established?
   (Month/year): _____

3. If the committee is functioning, how many Committee members are actively working?

Active/inactive	Title	Gender (Male/Female)	Education level	Number of years in the committee passed	Occupation

4. Meeting frequency; Water Committee: _____ With Community: _____
5. Dates of the last meeting? _____
6. Who established the committee? Number of elections executed? _____
7. Date of the last election? ____ Month _____year

Community Participation

8. Whose idea was it to build the Water point?

a) The community□ b) Local leaders□ c) NGOs□ d) Governmental offices□ e) others specify___

9. Whose idea was it to choose the source area of the project?
   a) The community□ b) Local leaders□ c) NGOs and Governmental offices□
10. Whose idea was it to choose the type of technology of the project?
    a) The community□ b) Local leaders□ c) NGOs and Governmental offices□ d) Others specify _____
11. What was the community contribution towards the construction of the water supply facility?
    a) Labor□ b) local construction material□ c) Cash _____ birr d) None□ e) If other please specify _____
12. Who is the owner of the scheme?
    a) Community□ b) local government□ c) don't know□ d) If other please specify _____
13. Do you think representation of more women in the water committee is good for the society?

Financial Management

14. Do you have a water fee collection program?
15. If yes what is the amount of tariff _____birr/kind per household/year or month
16. How was the tariff chosen/ criterion for tariff setting? _____ _____
17. Do you have differential tariff structure?
18. What are the costs covered by tariff?
    a) Operation & Maintenance + replace □
    b) Operation & Maintenance + repair □
    c) Operation & Maintenance + no saving □
    d) Operations only □
    e) No tariff, & does not cover operations □
19. How does water committee enforce payment?_____
20. How do you rate the willingness to pay of community?
    a) Good□ b) Fair□ c) Bad□

21. Who collects the tariff? _____

22. Do you use an accounting book?

23. Have you suspended service of a user for not paying the user fee?

If yes, to how many users? _____ how many times? _____ Reasons: _____

24. Do you have community bank account?

If Yes: Current Balance _____ Birr

25. Motives, dates, and amounts of the last withdrawal, if any? _____

26. How do you evaluate the overall financial management of the system?

a) Good□ b) fair□ c) bad□

27. What is the educational capacity of the treasurer? _____

28. Percentage of current in payment

a) More than 90%□ b) 50-90% □ c) Less than 50% □

29. What are the major costs of your system? _____

30. If you don't have a water fee collection program what are the reasons? _____, _____, _____

TRAINING AND EDUCATION

31. Do you get trainings and educations?

32. How many times did you get trainings? _____

33. How many members of Water Committee get training? _____

34. When did you get the training? _____

35. For how much days was the training given? _____

36. Do you think that you know all the parts of the water supply scheme that need frequent maintenance? _____, _____, _____

37. Do you think that the training was adequate enough so that you can maintain the scheme by yourself without assistance at any time?

OPERATION AND MAINTENANCE

38. Did the water point ever got minor or major dysfunction?

#Minor failure/s_____# Major breakdown_____#

39. How many times the system was maintained and made it function? _____
40. Has the scheme maintained up to now by those other than the committee, because you were unable to maintain the system?
41. If your answer for question 40 is yes, who is (are) these persons(s)?
42. Who covered the maintenance cost? _____
43. Where do you access spare parts if you need to maintain the water facility?
    a) Woreda water desk□ b) Local shops□ c) I don't know□ d) If Other, please specify
44. Do you have simple tools like Pipe-ranch (Jira tobo) to undertake simple maintenance by yourselves? Please explain
45. What problems do you face in maintenance of your water supply facility? _____, _____, _____, _____
46. Does the community have rules and regulations in the use of the water supply services?
47. What management systems have you put in place to manage your water supply facility?
    □Establishing Water and Sanitation Management Committees□
    b) Employing guard to protect the water point□
    c) If other please specify _____

OTHER SUSTAINABLITY ISSUES

48. How do you rate the Service Level of the water point :
    a) Very good□ c) good□ b) fair□ d) bad□ e) very bad□
49. In last month how many days was any part of the community without water? _____ days
50. How many often is there water in the system? (on average) _____days/week for an average of _____hrs/day
51. Is there a guard for the water point?
    a)Yes□, Payment? _____ b) No□ why?_____
52. Is the surrounding of the water point fenced?
53. How is the water point functioning?
    a) Very well□ b) Well□ c) Regularly□ d) Poorly□ e) Very Poorly□ f) if other specify_____

EXTERNAL SUPPORT

54. Since completion of the water facility how many times have you requested for external help? _____ from whom? _____

55. Do the Woreda water staff and other organization give you follow up supports?

_____

56. If Yes, what was the form of the help?_____

_____

57. Do you have a chlorination treatment system?

_____

58. If so, how often is it disinfected?

a) Frequently□ b) sometimes□ c) rarely□ d) never □

CHALLENGES AND DIFFICULTIES

59. Problem areas in the water service? _____

60. What has been the largest obstacle to the proper functioning of the water system?

_____

61. What have been the greatest difficulties that the Water Committee has had in the Operation & Maintenance of the system?

a) Collecting the tariff□ b) Accounting□ c) Organizing meetings□ d) Physical repairs□ e) Technical knowledge/capacity□ f) Other:_____

62. What major problems do you have with regard to water service management?

_____,_____-

63. What do you recommend for sustainable use of the water supply scheme?

Annex 3: Check list to be used for service providers

Name of the organization _____

Position of the respondent_____

1 How many rural water supply facilities are constructed to date in this woreda? Please list them by type of water facility and give information on their functionality status,

S/No.	Type of Water Supply Systems	Total Number of Water facilities	Current status	
			Functional	**Non-**

				Functional
1	Hand dug wells (HDW)			
2	Shallow Boreholes (SBH)			
3	Deep Wells (DW)			
4	Spring Development(SPD)			
5	Other			
	Total			

2 Give information on the following:

a) Number of households served so far in the woreda:_____

b) Total population served in the woreda_____

3 What is the composition of the professionals in your organization?

- Number of technicians (involved with the hard ware part of the project)_____
- Number of social workers (involved with the software part of the project _____
- Others _____

4 What are the services that your organization provides to the rural water communities once constructed? List with respect to the following indexes:

i. Effective financing and financial management of the communities that you were working with□

ii. Operation and maintenance practices□

iii. Health impacts, Effective hygiene and environmental use□

iv. Quantity and quality of water supplied□

v. Effective functioning□

vi. Quality of construction□

vii. If there are other approaches than mentioned that your organization follows explain it the back of this page. □

5 What are the major factors for the non functionality of rural water supplies in Saharti Samre woreda? _____

6 Do you regularly follow up rural water supplies?

_____

7 If yes, what are the mechanisms by which the office gives follow up support to rural water users?

_____

8 If No to question number 7, what are the major constraints that your office faces to give follow support? _____, _____, _____

9 How sustainable are the water supply facilities you are supporting?

a) good□ b) somehow□ c) poor□

10 How are you ensuring that communities you are working with are prepared to manage their water supply facility?

11 What impact does this preparation have on the ability of communities to sustain the schemes?

12 Do you provide both major and minor maintenance services?

13 If No, what kind of maintenance service do you provide to water users?

14 Who covers the maintenance costs?

a) The community□ b) Woreda water desk□ c) If other, please specify_____

15 How do you see the relationship you have with water sanitation management committee members (WASHCOs? A) Good□ B)Fair□ C) Bad□

16 Did your office provide refresher training to WASHCOs?

17 How does your office monitor the performance of WASHCOs?

18 Do you control the financial Management of WASHCOs?

19 If Yes to Q18, how do you control it?

20 Do your organization perform water quality test for each of the water points constructed?

A) Yes□ B) No□

21 If your answer for question 20 is no, why water quality testes have not been done?

22 How do you know the yield of the well or the spring that your organization constructing is enough for the community consumption? _____

23 If your answer for Q20 is by measuring, what is the standard?

24 If your answer for Q20 is by guess, how?

25 Did the communities participate in the construction of the water facility?

26 If your answer for question 25 is yes, at which stage of the projects community participated?

a) Planning□ b) choosing place of construction□ c) Construction Phase□ c) Post construction□

27 If your answer for question 25 is No, why so?_____

28 If your answer for question 25 is yes, how the community participated?
a) Labor□ b) local construction material□ c) Cash□ _____ birr d) Other _____

29 If your answer for question 25 is in kind, on what types of works do the community specifically participated?

30 Had your organization helped the community in establishing Water and Sanitation Committee in the water user communities?

31 What was the contribution of your organization in Establishing WASHCOs?

32 Have your organization followed demand driven approach?

33 Did your organization give chance to the community in choosing the type of technology of the water points constructed? A)Yes□ B)No□

34 If Yes to Q33, how?_____

35 Did women participate in the processes involved?

36 If your answer to question 35 is yes, how do they involve?

37 Do you have quality controlling Mechanism of construction?

38 If yes, how do you control the quality of construction of water points?

39 What are the key Challenges that your office face to give follow support to rural water users?

Annex 4:

Sustainability snapshot checklist used to determine the sustainability of the studied water points in Seharti-Samre Woreda

No.	Factor	Issue	Statements	Score of each water point																Average Score
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1	Policy environment	None at village level	None																	
2	Institutional arrangements	(a) Management systems	1.No village organization has responsibility for water point																	
			2.Village has organisation but is not managing point satisfactorily																	
			3.Village organization actively managing system to everyone's satisfaction																	
		(b) Major breakdowns	1. Community would not know what to do in event of major breakdown																	
			2. No clear procedure, responsibility unclear in case of major breakdown																	
			3. Confident that pump would be quickly repaired in case of major breakdown																	
3	Technology	(a) Technical skills	1. Technical skills not available to community for maintenance when needed																	
			2. Some technical skills available for maintenance, but not all																	
			3. Technical skills for all maintenance processes available																	
		(b) Equipment and spares	1. Maintenance equipment and spare parts not available																	
			2. Some availability but not for all repairs																	
			3. Available for all repairs																	
4	Community and social aspects	(a) Use	1. Handpump source never used for drinking water																	
			2. Handpump source sometimes/normally used for drinking water																	
			3. Handpump source always used for drinking water																	

		(b) Access/exclusion	1. Some people never get access to the pump even when they want to use it																			
			2. Some people sometimes do not get access to the pump																			
			3. All the people who want to use the pump gain access all the time																			
		(b) Preventive maintenance	1. No preventive maintenance being carried out on pump																			
			2. Some preventive maintenance being carried out, but not regularly																			
			3. Regular programme of preventive maintenance carried out																			
		(c) User satisfaction	1. Don't like the handpump and would prefer other water sources																			
			2. Like the handpump but are concerned about sustainability																			
			3. Happy with the pump and believe they will be able to sustain it																			
5	Financing/cost recovery	(a) Maintenance funds	1.No funds available for maintenance when needed																			
			2.Some funds available but not sufficient for most expensive jobs																			
			3.Funds available and sufficient to cover most expensive jobs																			
		(b) Capital contribution	1. Community did not make any financial or in-kind contribution towards pump																			
			2. Community made significant in-kind contribution (set by project)																			
			3. Community made financial contribution (set by project)																			
6	Natural environment	(a) Quality	1. None of the people who use the pump perceive it to be good for drinking																			
			2. Some of the people who use the pump perceive it to be good for drinking																			
			3. Everyone who uses the pump perceives it to be good for drinking																			
		(b) Source reliability	1. The pump yield is poor – people																			

			have to use other sources all the time																		
			2. Sometimes (dry season) the pump yield is inadequate to meet needs																		
			3. The pump always meets everyone's needs																		
7	Project process	(a) Participation	1.The pump was "given", community not offered choice if they wanted to participate																		
			2.Community was asked if they wanted to participate																		
			3.The community initiated the project themselves																		
8	Linkages	(a) Training	1.No-one in village received any structured training from project or government staff																		
			2.Some people trained but cannot remember or apply what was learned																		
			3.Useful training was provided which still benefits trainees now																		
Average Score																					

The Sustainability Snapshot developed by WaterAid rates is a participatory process by which a composite score (1-unlikely to last beyond first breakdown, 2-unlikely to last beyond first major breakdown, and 3-likely to be sustained) for service in a community or area is derived by selecting one statement (1, 2, or 3) for each category: financial, technical skills, and equipment and spare parts. This tool is adapted from - guidelines for field Evaluation of Handpump Projects by Parry-Jones et al, (2001)