ADDIS ABABA UNIVERSITY

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COLLEGE OF DEVELOPMENT STUDIES

Assessment of Problems to Sustainability of Rural Water Supply Schemes with Particular Attention to Handpumps: The Case of Aleta Wondo Woreda, Sidama Zone, SNNPR.

BY: MEKONNEN GUJO

JULY, 2009

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Assessment of Problems to Sustainability of Rural Water Supply Schemes with Particular Attention to Handpumps: The Case of Aleta Wondo Woreda, Sidama Zone, SNNPR.

A thesis Submitted to the School of Graduate Studies of AAU in Partial Fulfillment of the Requirements for the Degree of Masters of Art(MA Degree) in Development Studies, Environment and Development.

BY: Mekonnen Gujo

Advisor: Getnet Alemu(Ph.D)

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DEVELOPMENT STUDIES

APPROVED BY THE BOARD OF EXAMINERS: SIGNATURE

Dr. Mulugeta Feseha _____
FACULTY CHAIRMAN

Dr. Getnet Alemu _____
ADVISOR

Dr. Tesfaye Tafesse _____
INTERNAL EXAMINER

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Definition of Terms

Community: refers to a group of people in one village using/used water from the same developed water supply source (Brikke F. 2000:163).

Community managed water supply: refers to community takes a full responsibility of the management of its water supply schemes (Davis et al 1993:147).

Functional: HPs those were giving water supply service for a community during HHs survey.

Handpump: water supply scheme that is operated by hand through protruded handle for pumping purpose.

Maintenance: refers to the activities required to sustain the water supply in a proper working condition (Davis&Brikke 1995:5).

Non-functional: HPs those were not giving water supply service for a community during HHs survey.

Operation: refers to actual running of a service i.e. staring or handling of pumps (Brikke F. 2000:42).

Safe water: refer to drinking water that meets the requirement of MoWR's drinking water quality standard.

Sustainability: refers to water supply schemes being maintained in a condition that ensures a reliable and adequate potable water supply over a prolonged period of time (Davis&Brikke 1995:6).

Water Committee: refers to a group of people (5-7 individuals), elected by users and those serve for overall management of water supply schemes at community level.

Water supply schemes: refers to safe water points from where beneficiaries of given community collect water.

Water Decade: the period of 1981-1990 that was designated as The International Drinking Water Supply and Sanitation Decade or "the Water Decade" in Short by The General Assembly of United Nations (Reynolds 1992:1).

Acronyms

BGRs	Benishangul Gumuz Regional State
DDA	Demand-Driven Approach
EWRMP	Ethiopian Water Resource Management Policy
FGD	Focus Group Discussion
GPS	Global Positioning System
HDW	Hand Dug Well
HHs	Households
HPs	Handpumps
IRC	International water supply & sanitation Reference Center
JICA	Japan International Cooperation Agency
KII	Key Informant Interview
MoFED	Ministry of Finance and Economic Development
MoWR	Ministry of Water Resource
O&M	Operation & Maintenance
RSPF	Revolving Spare Parts Fund
RWSS	Rural Water Supply Scheme
PA	Peasant Association
SNNPR	South Nations, Nationalities and People Region
SDA	Supply-Driven Approach
SPSS	Statistical Package for Social Scientist
SZDoFED	Sidama Zone Department of Finance and Economic Development
SZWRDO	Sidama Zone Water Resources Development Office
UAP	Universal Access Plan
VLOM	Village Level Operated and Maintained
WASH	Water Supply, Sanitation and Hygiene.
WCs	Water Committees
WRDB	Water Resource Development Bureau
WWRDO	Wereda Water Resources Development Office

Abstract

Safe, adequate and sustainable supply of water is basic needs, and essential components of socioeconomic development of a given society. However, a great section of society still remained without access to safe, adequate and sustainable supplies of water. The problem is severe within rural communities than urban. Some of the major causes of the problem are; limitations in development of new water supply schemes and non sustainability of already developed water schemes are major ones. To tackle the problem of sustainability, development agents are using village level operated and maintained technologies such as handpumps. However, empirical evidence shows that huge numbers of community managed water supply handpumps are not operational. As result, numbers of people with safe water supply are decreasing and wasted investment capital is increasing. Having these issues in mind, the researcher assessed factors affecting sustainability of rural water supply handpumps, in Aleta Wendo Wereda.

The research was initiated by conducting scheme inventory to know current status of handpumps. Then after, probability and non probability sampling techniques were employed to select sample handpumps, respondents for households survey, focus group discussion participants and key interview informants. Specifically, 7 handpumps (5 functional & 2 non functional) were selected by applying proportionate stratified random sampling; 128 households were selected through simple random sampling for households survey; 5 focus group discussions were held with selected water committees, women groups and wereda water office staff members; Key informant interviews were conducted with 9 individuals selected from community, government offices and NGOs. Furthermore, quantitative data were analyzed using descriptive statistics, frequency table& cross tabulation using SPPS version 15 software. Also, handpumps inventory data were mapped by using Arc View 3.2a software and qualitative data were analyzed through narration.

The study has revealed that 47.5% of handpumps are not operational during scheme inventory exercise. Furthermore, performance of water committee were found to be weak since scheme management training were not provided in most cases, lacks working manuals& by-laws ,and legal recognition as well. Women do not made real participation during handpumps development; also, number of women in water committees varies between 20-40% and their responsibility limited to mere membership of the committee in most cases; community technicians, toolkits and spare parts supply chain were almost non existent in the study area. Majority of users do not contribute for O&M regularly; some handpumps are abandoned because of water quality problem and low yield as result of inappropriate site selection and lack of construction supervision; institutional capacity problems of wereda water office in terms of human, material and financial resources were also identified.

Hence the study calls for: adequate scheme management trainings along with necessary working manuals and directives to be provided for WCs; legal status of WCs should be ensured; women's decision making roles should be strengthened; local community technicians should be trained and necessary toolkits to be provided before scheme hand over to community. Simultaneously, to address problem of spare parts, RSPF should be established in wereda center; integrated feasibility study and construction/drilling supervision should be conducted by appropriate professionals; institutional capacity of WWRDO should be strengthened in terms of human, material and financial resources.

CHAPTER -ONE

1. Introduction

1.1. Background

Water is a common property resource and is a critical factor for sustainable livelihoods. All households need water for domestic use i.e. for drinking, food preparation, washing, cleaning, etc. Access to adequate, clean water greatly contributes to improved health and productivity (Desalegn 1991:1).

On other hand, insufficient access to water is not only bad for heath, but also contributes to food insecurity and lagging social development. Globally, there are about 1.1 billion people those do not have an access to safe drinking water. Many of these people live in rural areas and the poorest and vulnerable (Kiongo2005, as cited in Bezabih 2008:1). In this regard, according to Harvey (2005: i), the proportion of people without access to safe drinking water is significantly higher in rural areas than urban areas throughout the less developed world. For example, 56% of people living in rural areas of sub-Saharan Africa and 34% of those living in Latin America lack access to safe water, as compared to only 17% and 6% of their respective urban population.

In order to meet the Millennium Development Goals (MDG) for water and to halve by the year 2015 the proportion of people without sustainable access to safe drinking water, huge international investment and effort is still required. This task is made even harder by the low levels of sustainability prevalent in low-income countries. It is estimated that 35% of improved rural water supplies in Sub-Saharan Africa are out of service at any given time(Harvey 2005:i).

In this regard, water supply situation in Ethiopia is not different from Sub-Saharan countries. According to MoWR(2006:34) Annual Report, overall national water supply coverage is 47.3%. Service coverage is considerably higher in urban areas than rural, where the coverage is 78.8% and 41.2% respectively in the same year. Furthermore, 25% of developed water supply schemes found to be non-functional at national level (MoWR 2006:30).

In order to improve water supply and sanitation situation, the Ethiopian government has planned and currently on implementation of the Universal Access Plan (UAP) for the period 2006-2012. UAP targets to extend overall water supply coverage of the country to 98% within 1.5km radius and 15 liters/person/day in rural areas and within 0.5km radius and 20litres/person/day in urban areas by 2012(MoWR 2006:4,19). As technology related strategy for implementation, UAP advocates the use of VLOM handpumps those could be operated and maintained by local technicians (MOWR 2006:7). However, unless sustainability levels of water supply schemes in general and water supply handpumps in particular are improved, the MDG targets as well as those of UAP will hardly be achieved in real terms.

1.2. Statement of the problem

Safe, adequate and accessible supplies of water combined with proper sanitation are basic needs and essential components of primary health care (Hofkes.E.H 1986:9). However, most of developing countries in general and sub-Saharan countries in particular are suffering from negative social and economical out comes as result of lack of safe and adequate water supply at reasonable distance. Ethiopia is also one of the sub-Saharan country facing similar problems.

As mentioned earlier, the national water supply coverage for Ethiopia is considerably low (47.3%) with significant variation across rural and urban settings. In addition to low water supply coverage, non-sustainability of already developed water supply schemes is another factor which exacerbates the already existing problem within the country. According to MoWR annual report (2006:33), national water schemes non-functionality rate is 25%. However, the report by MoFED (2006) indicated that about 30% of the schemes were mal-functioning at national level for the same year.

Similarly, a report by SNNPR Water Resource Development Bureau (2006) indicated that overall water supply coverage of the Southern Region stands at 48%, of which rural

coverage is 45% and urban is 60%. Furthermore, scheme non-functionality rate in the region was about 28% in the year 2006. However, according to Israel& Habtamu (2008:5), the schemes non functionality rate in the region varies between 22% to 24 % for the same year. These inconsistent figures of scheme non-functionality status at national and regional level show that the exact number of malfunctioning schemes is not known yet. The controversy is a reflection of lack of timely scheme inventory practice in the country and region as well.

In this regard, water supply coverage of Sidama Zone is about 23%, with scheme non-functionality rate of 21%. The situation is relatively bad in the case of the wereda under consideration in this research i.e. Aleta Wendo wereda. Among many development challenges in the wereda, low water supply coverage and schemes non-sustainability are major problems for water sector. Drinking water coverage of the wereda is 21.5 % (SZWRDO 2008:12, 49). Aleta Wendo is a typical wereda with high non-functionality of water supply handpumps and low water supply coverage. A recent scheme inventory result (2009) has shown that water supply scheme non-functionality rate of the woreda is 31 %.

Furthermore, schemes non-functionality rate varies among scheme types and kebeles in the wereda. Table 1.1 shows the status of water supply schemes with their type and functionality rate.

Table 1.1 Summary of rural water supply schemes in type and functionality rate in A/Wendo Wereda.

S.No	Type of scheme	Status		Total	% non-functionality
		functional	Non-functional		
1	Protected spring	103	22	125	17.60
2	Handpump	53	48	101	47.5
	Total	156	70	226	31

Source: Wereda scheme inventory result, March 2009

As one can easily understand from above table, non-functionality rate of handpumps, those are supposed to be simple for operation and maintenance and seen as appropriate technology options for community management is as high as 47.50%. Moreover, as variation of handpumps non-functionality within kebeles is concerned, it ranges between 11 and 75 % (SZWRD 2008:11-12).

According to researcher experience of the study area, the problem of water supply service is not only because of non- functionality of pumps. But also, there is a problem of service reliability (because of interruption of service & low yield) for functional handpumps because of poor community management of water supply schemes, poor sitting and construction.

Furthermore, there exists no systematic and comprehensive study done in the area so far to establish factors affecting sustainability of water supply schemes in general and handpumps in particular. Therefore, this study aims at investigating major factors contributing to sustainability problem of rural water supply schemes with particular attention to handpumps by considering social, technical, financial, institutional and environmental aspects.

1.3. Research objectives

1.3.1. General objective

The general objective of this research is to **assess factors affecting sustainability of community managed rural water supply handpumps in Aleta Wendo wereda & to make contribution to address the problem.**

1.3.2. Specific Objectives

As its specific objectives, this research attempts:

1. to assess **overall situation of the existing handpumps and its water supply service** in the wereda;

2. to identify **main factors affecting sustainability of rural water supply handpumps** in the study area;
3. to assess **level and nature of community participation** in general and **role of women in particular for handpump water supply schemes development & management**;
4. to assess **institutional capacity of wereda water office** and **institutional supports provided for local communities to manage** their handpumps;
5. to forward **suggestions that help to bring sustainable water supply service** of rural hand pumps in the study area.

1. 4. Research Question

This research study strives to answer the following research question: **What are the factors affecting sustainability of rural handpump water supply schemes in Aleta Wendo wereda**? The answers to this research question will help to identify factors that need to put in place, in order to water supply handpumps be sustainable in the study area.

1.5. Significances of the Study

This study will make a certain contribution for the study area in the following ways: it can contribute by finding out the reasons behind high non-functionality of rural water supply handpumps in the study area; it is significant since development actors in charge of rural water supply can use the findings & recommendations for planning and implementation of community managed sustainable rural water supply handpump schemes. Needless to say, the presence of sustainable, accessible and adequate water supply service has got great contribution for socio-economic development of the community.

1.6. Scope and Limitations of the Study

This research considers only rural handpump water supply scheme among others because of its high non functionality and service unreliability in the study area. In addition, the study considers only water supply aspect of the WASH approach.

1.7. Organization of the Paper

This paper is organized in five chapters. The first chapter deals with background, problem statement and objectives of the study while chapter two presents the review of relevant literatures. Chapter three contains description of the study area and detail description of methodology applied to conduct the research. The fourth chapter comprises the analysis and discussion on field data and the last chapter contains conclusions and recommendations of the study.

CHAPTER-TWO

2. Literature Review

2.1 The issue of sustainability of rural water supply handpumps

2.1.1. Overview on handpumps

Handpumps have been given a high profile in the quest to provide potable water to the worlds' burgeoning rural population by leading players in development like the World Bank, UNICEF and a plethora of international NGOs. Since the water decade of 1980s, thousands of different types of rural water supply handpumps were installed in the developing countries as part of the united nations-led drive to provide safe drinking water (Wood 1994:132).

This type of schemes were vigorously promoted as being the best option by which communities could enjoy a safe and reliable water supply assuming handpumps are: low cost, affordable, easy to maintain, an appropriate technology, readily available, easy to install, user friendly and efficient. Furthermore, the advent of the Village Level Operated and Maintained (VLOM) handpumps in the late 1970s to early 1980s did much to further the handpumps option, particularly in Africa with the Afridev leading the way toward the goal of affordable village-based maintenance to ensure sustainability (IBID).

However, according to Harvey & Reed (2004:5), despite the popularity of handpump, evidence suggests that it has failed to deliver satisfactory levels of sustainability. In 1994, it was estimated that 40 to 50 percent of handpumps in Sub-Saharan Africa were not working, according to RWSN (2004b) there are currently approximately 250,000 handpumps in Africa, less than half of which are operational. This is backed up by data from Uganda and South Africa which indicate similar operational failures rates. An evaluation in Mali in 1997 found 90 percent of handpumps inoperable one year after installation.

Furthermore, accor ing to Reynolds (1992:2), most of handpumps have a hard life. Many are in continuous u se throughout the daylight hours for as long as they can survive such treatment. They ar exposed to the elements, may be a subject to pilferage and vandalism, and can be a con enient scratching post for domestic animals. At least some of users expected to be un ympathetic in the way they use them, not out of any animosity but simply because th y are unaware of the consequences of striking the handle repeatedly, for example.

In this regard, according to Wood (1994:133), VLOM handpumps were developed and installed in rural areas because it was assumed that users themselves would be able to maintain them. In many cases in Africa and other developing countries this has been proved impractical due to a number of technical, social, financial, institutional and environmental problems to be discussed under the forth coming section.

2.1.2. Concept & definitions of sustainability in rural water supply service

The sustainability issues of rural water supply schemes disregard of their types, is explained by different institutions and academic researchers in different ways. According to IRC and WHO (2003), as cited in Brikke F. & Bredero M. (2003:2) a water supply service is sustainable when:

- It functions properly and is used;
- It provides the services for which it was planned, including: delivering the required quantity and quality of water; providing easy access to the service; providing service continuity and reliability; providing health & economic benefits; ...
- It functions over a prolonged period of time, according to the designed life – cycle of the equipment;
- The management of the service involves the community (or the community itself manages the system); adopts a perspective that is sensitive to gender

issues; establishes partnership with local authorities; and involves the private sector as required;

- Its operation, maintenance, rehabilitation, replacement and administrative costs are covered at local level through user fees, or through alternative sustainable financial mechanisms;
- It can be operated and maintained at the local level with limited, but feasible, external support (e.g. technical assistance, training and monitoring);
- It has no harmful effects on the environment.

Mengesha et al (2003:223), defined sustainability of drinking water supply projects as " ...the continued service of water supply project over time to serve their own purposes; proxies of sustainability are those factors affecting functioning, utilization, community participation."

Similarly, Colin and Ball M. (1991:38) described the twater supply sustainability as " ... a water supply program is it should not only provide good water in sufficient quality but continue to provide it. Where good practice has been identified throughout this account, it had been directed to this end: to ensuring that the water continues to be used for the maximum benefits of the whole community."

According to Davis and Brikke (1995:6), sustainability in a rural water supply refers to water supply facilities being maintained in a condition which ensures a reliable and adequate potable water supply and that the benefits of water supply are continued to be realized over a prolonged period of time. On the summery, the emphasis of all aforementioned institutions and writers about sustainability of rural water supply service is that the presence of continual service of water in safe and adequate quantity at least for the designed life cycle of the equipment.

2.2. Approaches in rural water supply

2.2.1. Supply-driven approach to rural water supply

Water is perceived by most rural communities as a right to be provided free by the government, rather than a scarce resource which must be managed locally as socioeconomic good in order to ensure its effective use. This perception is grown out of the approach that has been adopted before 1980s by those actors involved in water supply. This approach was commonly known as supply-driven (Alemu 2006:32).

In other word, this approach is an approach which is commonly known as top-down approach of project planning. According to MoFED(2006:11), top-down approach to project planning is applied by central agencies and works outwards from a starting concern with national conditions. According to aforementioned source, top-down approach is the most logical way of thinking about projects and usually the best approach to new endeavors. It guides project planners according to national/regional realities and objectives in a systematic and comprehensive manner.

According to Musonda K. (2004:31), SDA approach is the first approach used in providing water in rural communities where those that favored highly centralized system. In this approach, communities were selected for assistance on the basis of an external determination of 'need', rather than the communities 'demand' for service. Communities were not involved in the decision-making process about the management of water supply facilities. The nature of service provided was also based on an external perception of 'affordability', rather than on the communities' desire or willingness to pay (Boydel 1999, as cited in Musonda K.2004:31). In rural water supply, this approach is an approach that is dependent and directed by the central governments for managerial, technical and financial support.

The basic needs or supply-driven approach had been adopted for its own merits that were taken to expand water services in the developing nations. The first element is that donors and governments provide the minimum level of improved water service such as

handpumps, to as many people as possible with available funds. The second one was to build up the capacity of government agencies so as to enable them appraise, implement, and manage schemes. And the third one was providing subsides to rural water supply (Kleemeir 1995, as cited in Alemu 2006:32).

Even though, the approach has got some of aforementioned significances, it has been challenged at large for the following limitations. According to MoFED(2006:11), the approach concentrate power at the top over resources and decision making and is generally less sensitive than bottom-up approach to local needs, resources and capacities. Also the approach was found to be not helpful to gain many achievements because of the following three problems. The first problem was that given the high population growth rate, the strategy of the supply-driven approach to water supply would not reduce the number of people without access to safe water supply within a reasonable time period. Secondly, the funds needed to achieve universal coverage have proved to be very far from being a reality. Thirdly, in too many cases, schemes were not sustainable (Briscoe and De Farranti 1995, as cited in Alemu 2006:33).

Generally supply-driven approach is proved to be ineffective in most developing countries. Because of aforementioned serious shortcomings, there appears a general recognition that a transformation from supply-driven approach, that pays little attention to the actual practice and/or preferences of the end users to a demand-driven approach, where users get services they want and to which they are willing to pay and responsive to schemes' up keeping is required. This is because the supply-driven approach makes the rural community to develop the mentality that water is a social right to be provided free by the government rather than as scarce resource which should be managed locally as a socio-economic good in order to ensure its effective use (RSU 1999, as cited in Musonda K.2006:31).

2.2.2. Demand-driven approach to rural water supply

This approach is also commonly known as bottom-up or demand-responsive approach of water supply development. By the early 1990s, World Bank had officially adopted the new approach to water supply. This approach, according to the writers, was adopted in order to correct shortcomings of the basic needs/supply-driven approach, i.e., insufficient coverage , high cost , and poor utilization(kleemeier 1995;WB 1992,1993 as cited in Alemu 2006:34).

According to MoFED(2006:11), the demand-driven approach is applied by the people at grassroots community level. It is people centered approach which is used to plan projects from grassroots level as bottom line. The approach demands series grassroots community level participation in determining and implementing local plans and projects that suits local needs and priorities. Bottom-up approach of project planning builds confidence and ownership of peoples at grassroots community level, because community needs and priorities will be taken into account by the project to be implemented.

Demand-driven approach primarily proposes the necessity of transferring roles from public sector to the beneficiaries and private entrepreneurs. According to DDA, effective demand of consumers i.e., their willingness and ability to pay, will determine who gets what level of services. Proponents of DDA further argue that the new approach can provide improved and sustainable water supplies, replicable on the scale necessary to reach million un-served people who want such services(kleemeier 1995; Please 1984 as cited in Alemu 2006:34).

Furthermore, the approach gives each community and various groups in that community an informed choice of services and service management systems. This means all locally relevant groups, or stakeholders, get information on all relevant aspects& implications of the various water supply options (Smet& Van Wijk(eds) 2002:27). The information to be availed for end users in this approach may include: the amount and quality of water provided; the purpose for which this water will be adequate; potential implication for health and socioeconomic development; investment and recurrent costs involved;

approximate walking distances; requirements and possibilities for sharing service and costs(e.g. through group connections or by forming users groups); prospects for service regularity& reliability; and differences in ease of maintenance(e.g. spare parts& technical skills required) and administration(IBID).

The expected role of the community in DDA differs considerably between urban and rural areas. In urban areas, private companies and cooperatives are thought to handle the management, whereas in rural areas community organizations would generally have to assume all management responsibilities. Government officials are still to take the responsibility of motivating and organizing communities (Brisco and de Ferranti 1998, as cited in Tegegn 2008:21).

As far as effectiveness of DDA at ground is concerned, some empirical works have proved its practicality. In this regard, Whittington et al (2008:2), on their research findings suggested that the demand-driven community management model, coupled with access to spare parts& some technical expertise, has come a long way toward unraveling the puzzle of how to best design and implement sustainable rural water supply programs in developing countries.

2.3. Factors affecting sustainability of rural water supply handpumps

According to Brikke & Bredero (2003:4) and Smet and Van Wijk(eds.) (2002: 30-31), sustainability of any rural water supply schemes relies mainly on five interrelated factors: Community, technical, financial, institutional and environmental.

As one can understand, each factor is very broad and constitutes different important elements. Therefore, some important elements of each factor in relation to rural water supply handpumps are discusses as follows.

2.3.1. Community factors

The community factors which are likely to impact sustainability of RWSS in general and rural water supply handpumps in particular are: the availability of demand or perceived need for an improved service; Community participation (men/women, social groups) in all project phases, including planning, designing, constructing and managing the services and the O&M of the services; and management through locally organized and recognized group.

i) Demand for an improved service

Demand for an improved service by the communities is a prerequisite for sustainability. It is an expression of their commitment, and a way to make communities responsible for their choices and future tasks. However, demand should be promoted because communities must be made aware of the different technology options available, and of their financial consequences. Demand can be manifested in the form of an initial contribution in cash or in kind to capital costs, or in the form of a written solicitation from organized community group to the competent authority/responsible organization(Brikke 2000:46).

As a result, responsible organizations should determine and respond what the community wants, and is able to support and sustain, instead of providing water supply facilities that have not been demanded for. Water supply agencies should ensure that projects that are based on effective demand are given the first priority (McPherson 1994, as cited in Musonda 2004:42).

ii) Community participation

Community participation refers to "an active process whereby beneficiaries influence the direction and the execution of the development project rather than merely receiving a share of a projects benefit" (Paul 1986 as cited in McCommon et al 1990:6).

In order to increase the chances of the water supply system to meet the needs of users, community participation should begin as early as possible in the project development. In fact, community participation should begin as soon as a community has requested water supply facility. Therefore, community members should be directly involved in planning the new scheme and deciding how it can be run, and by so doing, the prospects of its success so improved(Brikke 1993, as cited in Musonda 2004:42).

In this regard, according to Brikke(2000:46), participation of communities(men and women) throughout the whole project cycle is essential since it is a way to motivate, make responsible and build the capacities of communities in the their new tasks and functions. Therefore, community participation in all projects phases, including planning, designing, constructing and managing the services, and in the O&M of the services is very crucial for sustainability of RWSS in general and rural water supply hand pumps in particular.

According to Harvey and Reed (2006:3), community participation involves "mobilizing" a community to become involved in planning and implementing a water supply project. This may take considerable time and should not be rushed. Some communities may become actively involved in water supply activities within a matter of weeks; others may take several months or years. Community participation (including the simplest level of involvement) from early on in a water supply project enhances the future sense of ownership, but ongoing motivation is required for continuing participation. This is of a key importance; just because a community has participated in the planning process does not mean that it will successfully manage its water supply. However, community participation is a prerequisite for sustainability i.e. to achieve efficiency, effectiveness, equity, and replicability.

As far as the way of participation is concerned, some water supply agencies reduce community participation to the provision of labor and locally available materials. In order to ensure ownership and sustainability, however, communities should participate in making major decisions concerning the projects. The community should also participate

in carrying out baseline surveys conducted at beginning of the project, in order to ensure that they continue to participate throughout the project life (Osei-Hwedie, Mwansa, Mfune 1990; Pickford et al 1996; Brikke et al 1995; Umgeni water 1993; Briscoe&De Ferranti 1998, as cited in Musonda 2004:43).

However, the conventional form of community participation in Ethiopia especially during rural water supply handpumps development is restricted to: access road preparation, local material provision (stone in most cases), and fencing around water scheme by the time scheme is developed. After a year or so, however, is impossible to see even the fence around the scheme because of lack of continual motivation of community to participate in the scheme management.

Hence, the danger of not involving the community in the planning and implementation of the water supply is, the community ownership of the water supply system is compromised, and consequently community members expect the provider of the water supply system operate and maintain it for them. Brikke(2000:6), argues that with community participation, much more is likely implementation to be accomplished and services provided cheaply. As result the larger number of community will be supplied with water and also sustainability of the scheme will not be compromised.

iii) Women participation

Community participation should also be looked at from the gender perspective, because women have the responsibility of fetching water and yet they are usually not involved in the decision making processes. Accordingly, women have been consistently excluded from any dialogue about the priority of improved water supply, which has contributed to the disastrous failure of improved water supply systems. It should be borne in mind that women are the prime collectors of water and are also the primary beneficiaries of any improvement and should therefore be involved in any attempt to improve their water supply facilities (Churchil 1987, as cited in Musonda 2004:45).

iv) Community management/organization

Community participation could only be sustained when there is a system for organizing the community (RSU 1999, as cited in Musonda K.2006:31). Community organization, therefore, entails that a community has the institutional capacity to manage the development and operation of the water supply schemes, if it is to be sustainable (McCommon et al 1990:10). Hence, responsibility to manage water supply system should not be transferred onto the community structure that does not have the capacity to operate and maintain it (Musonda 2004:45).

Because of aforementioned reason, community management of water system usually relies on the formation of a water committee which is responsible for all management issues related to water supply in community (Harvey&Reed 2006:4). That means, water committee is responsible for all activities (managerial, operational, technical and financial) of a particular scheme, which cover a large area than a neighborhood and possibly the whole community (Brikkee 2000:171).

Typical tasks of a water committee include: represents the community in contacts with support agencies; coordinate with other community institutions and decision-making bodies; ensures efficient and effective overall management of systems-takes up assigned roles and tasks, ensure equity, organize contributions, organize effective O&M, ensures accurate financial management, promote hygienic or effective use of the facilities, holds regular committee meetings, ensures good communication of all levels, provide information and feed back, and collects information(IBID).

The composition of a water committee varies according to its management and operational mandate. Generally WC is composed of a chairperson, secretary, treasurer and representatives of the users, with a balance between posts occupied by men and by women. In a case whereby the community is directly responsible to technical O&M of the system, the committee also includes the operator and /or care taker (Brikke 2000:173). According to the same source and researcher experience, the WC does not

have legal status. This makes it vulnerable in situations with material, financial, contractual or legal problems. At the same time it is also difficult to make WC accountable for their financial embezzlement.

2.3.2. Technical factors

According to Brikke (2000:45), the technical factors which are likely to influence sustainability of rural water supply schemes in general water supply handpumps in particular are: technology selection; technical skills needed to operate and maintain systems; availability, accessibility and costs of spare parts; and construction quality of the schemes.

i) Technology selection

According to Musonda (2004:49), technology selection is crucial to sustainability of rural water supply schemes because the type of technology chosen affects O&M. If a community is to manage a water supply system, the technology used needs to be the type that community care takers can maintain with little outside assistance. Also, technology must suit the existing locally available skills or skills that can be acquired by community members. Technology is considered suitable if it is socially acceptable, economically viable, technically effective, and environmentally sound. Communities should have a say in technology option. The technology option should not be too technical and beyond the comprehension of community members.

In this regard, according to Geleta et al (2002:20), socio-economic viability, social acceptability and appropriateness of technology influence the ability and willingness to manage the improved water supply systems. The use of appropriate technologies, which are low cost, easy to maintain, simple to use, and readily available is one response to challenge of sustainability. Appropriate technologies are integral to the concept of village operation and maintenance (VLOM) which emerged in the water decade (Haysom 2006:8).

The VLOM concept includes the development of handpumps specifically designed to be maintained by village care takers, but also extends into the institutional arrangements needed to ensure that skills, tools and spare parts are available when needed (Arlosoroff et al 1987:13).

Also, community participation in the selection of technology type in general and the mark of technology depending on their easiness for O&M in particular should be considered. In this regard, study in Mirab Abaya has shown that WCs have never been participated in technology selection activities (Israel & Habtamu 2008:32).

ii) The availability, accessibility and costs of spare parts

Handpump installation is the most widespread solution for supplying water to millions of people in Africa's rural areas. However, at any given moment, average 30 percent of all potentially functional hand pumps in Africa are not working. In some areas, 50 percent or more are non functional, partly due to difficulties in obtaining spare parts (WSP 2006:2).

The problem of spare parts for rural water supply handpumps primarily attributed to lack of formal supply chain mechanism. Hence, Lack of spare parts has been a major constraint in sustainability of water supplies and has been a recurring problem. In some cases, it has led to the complete abandonment of the water supply system (Brikkke et al 1995:30). If sustainability is to be achieved, it should be ensured that after appropriate technology is chosen, spare parts for that type of technology are made readily available(Musonda2004:51).

iii) Availability of toolkits & technical skills needed for O&M

For VLOM handpumps, there should be trained care takers those can under take maintenance work when needed. The care takers should be capable of doing preventive maintenance work, replacement of worn out parts, and maintain breakage. Therefore, in order to discharge those responsibilities, the care takers should have necessary trainings from the very beginning of scheme installation. Their performance also should be

evaluated in continual bases. At the same time the care takers should be provided with necessary toolkits those required for maintenance purposes. However, if necessary skills & toolkits for community handpump care takers were not provided, the sustainability of the scheme will be compromised (Arlosoroff et al 1987:32).

iv) Construction quality of handpumps

From experience, it is not uncommon for the failure of water supply handpumps because of construction quality problems. Common construction quality problems that result in scheme dysfunctionality are: improper site selection due to poor and/or lack of feasibility study, partial penetration of an aquifer, poor casing arrangements, poor gravel packing and poor estimation of well yield. Such kind of well completion problems eventually results in well dry up and as a result handpumps will be abandoned (Harvey & Reed 2004: 140).

2.3.3. Financial/Economic factors

According to Smet & van Wijk (2002:30), important financial factors that are likely to be considered for the sustainability of rural water supply schemes in general and rural handpumps in particular are: financial ability to meet the cost of maintenance i.e. presence of tariff structure covering O&M and replacement costs; willingness & ability to pay; and financial management system.

i) Financial ability to meet the cost of O&M

Failure to adequately cover costs of improved water supply services in developing countries has been identified as major constraints to achieving the goal of safe water supply for all on a sustainable basis. In recent years, increased community financing through user payment for services has been strongly promoted as a solution (Evans 1992:1). In this regard, according to Getachew (2002:77), even small water supply systems require investments, operation and maintenance. These are often costly and thought to be beyond the financial capacity of community, however, experience shows that communities are willing to shoulder portions of the investment costs and to pay for

full O&M provided that they are in need of the service and appropriate community promotion exercise is being carried out.

Although there are undoubtedly some areas in some countries where poverty is extreme, the review of global situation reveals that most rural communities can afford to pay for improved water supply services provided that appropriate technology is used. The reason for this argument is that people in rural areas are already spending large amount of time and energy in water collection (Musonda 2004:47).

As far as payment for water supply service is concerned, Ethiopian Water Resources Management Policy (1999:23) promotes that for rural water supply schemes partial cost recovery principle to be applied i.e. user communities should cover O&M costs. Such kind of payment is proposed to be effected through different tariff structures. The tariff structure that is adopted for rural water supply schemes that provide communal services like handpumps and public stand posts is flat rate tariff, in which all beneficiaries are expected to contribute equal amount either in cash or kind in fixed time interval(for instance, on monthly basis).

ii) Willingness and ability to pay for services

Providing services which people can afford is a pre-condition for cost recovery [partial cost-recovery in rural water supply case in Ethiopia]. Being able to pay for something and being willing to do so, however, do not always go hand in hand. From an economist's point of view demand is only real (or "effective") when it is accompanied by willingness to pay, in cash or kind, for goods or services offered. From this point of view, "willingness to pay" and "demand" essentially mean the same thing (Evans 1992:20).

In order to the communities meet the cost of O&M, community members must be willing to pay for the service. However, not every community member is willing to pay for the services. Willingness to pay for the service is influenced by number of factors. For example, a community with a river near-by is prepared to pay much less for a handpump

than a community with similar income who has to walk kilometers to fetch water. This is why a survey should be done before the project is started to determine willingness to pay (Roark et al 1993; Briscoe& de Ferranti 1998, as cited in Musonda 2004:48).

iii) Financial management system

In order to cover O&M costs and other important replacement costs, the collected money from user community should be managed properly and used for the intended purposes. Necessary training should be given for water committee for prudent financial management. Or else, there should exist transparent working & accountability mechanism in order to avoid misutilization and embezzlement of collected money (Davis and Brikke 1995:66).

2.3.4. Institutional and legal factors

According to Brikke & Bredero(2003:4) and Smet& Van Wijk (2002:30-31), institutional and legal factors that are likely impact sustainability of rural water supply schemes in general and rural water supply handpumps in particular are: policies and legislations; Institutional capacity; availability of technical assistance to communities(from government and NGOs); involvement of formal and informal private sector; and capacity of technical staffs to deal with community development and knowledge of participatory approaches.

i) Policies and legislation

The policy context within which rural water supply projects are developed and implemented is central to provide a supportive environment that ensures long-term sustainability. In absence of good policy, different actors often employ different implementation approaches and technologies, which can lead to a fragmented and unsustainable rural water supply sector (Parry-jones, Reed& Skinner 2001, as cited in Musonda 2004:38). Therefore, development of a comprehensive policy framework in the rural water supply sectors helps government agencies, international development

agencies, and bilateral support organization and others to identify their roles vis-à-vis the development of water supply sector in the national context (IBID).

ii) Institutional capacity and support

According to Brikke (2000:155), institutional capacity is a critical factor in the water supply sector and influenced particularly by the organizational framework and the quality of staff. The organizational framework should encompass all the components of the sector from planning and design to O&M, with support for programs of health education and community participation. There should be clear lines of authority and responsibility, and when several government agencies are involved, coordinating mechanisms are essential. Coordination among stakeholders is crucial but difficult unless there is a formal organizational agreement and framework. Another important requirement for a successful institution is allocation of adequate budget to carry out the mandate, including budget lines for staff salaries, administration, equipment, transportation and training. Unless aforementioned technical, material and financial capacity of the responsible institution is fulfilled, the institution cannot discharge its responsibility properly and as result sustainability of the schemes will be compromised.

Furthermore, according to Misigina (2006:26), one way of enhancing sustainability of rural water supply schemes is the provision of institutional support to community management bodies. Problems that are beyond community level need to be addressed by supporting agencies like government staffs and NGOs. Studies indicate that lack of assistance to local community management body is one of important failures of improved water supply systems. In this case, the capacity of technical staffs is very important factor. The more staffs are capable, trained and professionals, the better would be their effect for the sector.

In this regard, according to Kebede (2003:33), legal recognition of the user groups, as one institutional support, assures the realization of their full capacity as self-help associations. It also facilitates the resource recovery of the system through direct and legal partnership with external support agencies and acquisition of loan whenever need

arises. Sustainable community management requires partnership allowing scope for shared responsibilities among community level water management structures, local government units and government offices for water development.

iii) Involvement of private sector

According to Brikke(2000:153), the private sector may have a role in the design, construction, maintenance , and repair of water supply facilities. In some countries, now a day, private sector is involving in the water supply provision. According to Musonda(2004:32), twenty five-years ago, the private sector almost completely uninvolved in the provision of goods and services in rural water supply. The development of affordable handpumps and rapid expansion of demand for these goods has resulted in a radically different situation today.

However, private sector involvement in Ethiopia is very limited. Even though EWRMP (1999) advocate the involvement of private sector, it failed to be robust enough to attract and involve the sector (Tesfaye 2008:330). According to the researcher's experience, private sector involvement in water supply projects is limited only to pre-implementation and construction activities such as design, civil construction and well drilling. But the involvement should have been extended to post- implementation activities. For instance, spare parts suppliers and local artisan/craftsmanship could have been involved in maintenance of rural water supply schemes in general and rural handpumps in particular. Such kind of involvement can certainly contribute for sustainability of rural water supply schemes.

2.3.5. Environmental factors

According to Brikke&Bredero(2003:4) and Smet&van Wijk(2002:30-31), the most important environmental factors that affect sustainability of rural water supply schemes are: the quality of water source, the quantity of water source and continuity of supply.

i) The quality of water source

The quality of water source determines whether the water needs to be treated or not. It also influences the technology choice. Thus, domestic water should be available in acceptable quality to satisfy minimum requirements for drinking, cooking, and food preparation as a priority in addition to water for washing clothes & utensils, bathing and personal hygiene and for watering small plots and/or small number of livestock or poultry. Therefore, water source to be developed should fulfill a minimum set of quality standards (Dereje 2007:23).

Furthermore, water quality problem can be easily understood and mitigated by routine testing and understanding the nature of geology and ground water resources (Foster et al 2003, as cited in Dereje 2007:24). Otherwise, if minimum quality standard of drinking water is not fulfilled, sustainability of water supply schemes would be questioned.

ii) The quantity of water and continuity of supply

In selecting site & appropriate method of developing and providing water for domestic uses, attention should be given to potential future demands on the system. The system should be designed with a view of possible future expansion in population or other condition requires it. In addition to this, knowing and calculating the different uses of water is important. Single use/user approach is neither efficient nor sustainable. And ultimately it may generate wastage & conflicts between uses & users. (IBID)

Therefore, understanding the hydrology is the key in the process of identifying how the water sites will behave under stress and also the long- term sustainability of water sources under the impact of drought and climate change. Well planned community supplies, which take into account the nature of water resources, will be more sustainable. It is thus vital that for the sound development of water resources, the integrated strategies should be adopted (Foster et al 2000, as cited in Dereje 2007:25).

2.4. Water supply policy, status and prospects in Ethiopia

2.4.1. Water supply policy

Ethiopian Water Resources Management Policy (EWRMP) was enacted in 1999. The overall goal of the policy is to enhance and promote all national efforts towards the efficient, equitable and optimum utilization of the available water resources of Ethiopia for significant socioeconomic development on sustainable basis (EWRMP 1999:1).

In particular, water supply and sanitation policy is one of sectoral policies within EWRMP. Under this section of policy document, different pertinent water supply issues are considered. However, relevant issues in relation to this research topic and objectives are summarized as follows.

2.4.1.1. Objectives of Water supply& sanitation policy

The overall objective of water supply & sanitation policy is to enhance the wellbeing and productivity of the Ethiopian people through provision of **adequate**, **reliable** and **clean water** supply& sanitation services (EWRMP 1999:21).

Some of detailed objectives of water supply& sanitation policy are:

- Provision of, as much as condition permit, sustainable and sufficient water supply services to all the peoples of Ethiopia.
- Carry out O&M of all water supply and sanitation services in a sustainable and efficient manner.
- Creating sustainable capacity building in terms of the enabling environment, including institutions, human resources development, legislation& regulatory framework for water supply and sanitation.

2.4.1.2. Drinking water supply policy

According to EWRMP(1999:22-25), detail policy issues described for drinking water supply encompasses user participation, engineering issues, finance and tariff, research and technical issues, and enabling environment. Some of detail policies in aforementioned matters are summarized as follows:

- Promote the development of water supply on participation driven and responsive approaches without compromising social-equity.
- Create and promote a sense of awareness in communities of the ownership and their responsibilities for O&M of water supply systems and develop participatory management practices.
- Ensure that all water supply undertakings will adequately address costs associated with O&M and be based on "cost-recovery" principles.
- Ensure transparency and fairness in the management of water supply services so as to enhance readiness to pay and participation by the users and communities in the financial management systems.
- Ensure responsibility and financial accountability in the management of water supply services.
- Ensure that rural tariff settings are based on the objectives of recovering O&M costs while urban tariff structures are based on the basis of full cost recovery.
- Develop flat rate tariffs for communal services like handpumps and public stand posts.
- Promote the development of appropriate and affordable handpumps and other technologies including village level operation and maintenance (VLOM) systems.
- Regulate, guide and manage the import of water supply technologies and materials.
- Ensure that the management of water supply systems to be at the lowest and most efficient level of institutional set up, which provides for the full

participation of users and to promote effective decision making at the lowest practical level.

- Develop coherent and streamlined institutional frameworks for the management of water supply at the Federal, Regional, Zonal, Woreda and Kebele levels and clearly define the relationships and interaction among them.
- Build technical capacity in terms of water source investigation, design, engineering, water quality control, O&M, construction technology and facilities.
- Promote objective oriented trainings with special emphasis on trades-level trainings, community participation, administration and finance, and O&M.
- Assist in the establishment of and strengthening of water users associations.
- Equip water supply organizations with the necessary facilities.

2.4.2. Water supply status and prospects in Ethiopia

2.4.2.1. Water supply status

Ethiopia is one of sub-Saharan countries with low water supply coverage. According to MoWR Annual Report (2008:8), water supply coverage of the country is 46.39% for rural population and 82.02 % in urban area and overall water supply coverage of the country is 52.46% in 2006/2007(1999EFY). According to the same source, service coverage is grown by 5% from previous budget year (2005/2006 or 1998 EFY). The water supply coverage distribution among the region is shown in the table below.

As one can observe from the table (2.1), nearly half of population has no access to safe water. Furthermore, there exists considerable disparity among regions: majority of population living in Hareri and Somali regions have extremely low access to safe water as compared to other regional states.

Table 2.1. Regional distribution of water supply coverage in 1998 and 1999 EFY (in Percentage)

S.No	Region	1998 EFY(2005/2006)			1999 EFY(2006/2007)		
		Rural	Urban	Total	Rural	Urban	Total
1	Amhara	36.6	80	41.5	42.45	82	48
2	Oromia	40.2	87.6	46.5	45.0	90.4	50.9
3	SNNPR	53.0	64.5	54.0	58.0	66.0	59.0
4	Tigray	42.8	50.9	44.3	51.15	60.0	52.8
5	Afar	41.1	73.0	44.0	51.0	73.0	52.98
6	Somali	21.5	60.0	28.0	23.26	60.0	29.44
7	B/Gumuz	46.0	66.2	48.0	48.72	85.56	52.33
8	Harari	29.0	21.0	24.0	29.24	21.0	24.13
9	Gambela	41.4	37.0	40.6	49.43	72.9	53.71
10	Diredawa	57.0	72.0	68.2	65.07	72.0	70.21
11	Addis Ababa	-	90.1	90.1	-	94.42	94.42
	National	**41.2**	**78.8**	**47.3**	**46.39**	**82.02**	**52.46**

Source: MoWR 1999 EFY (2005/2006) Annual Report

2.4.2.2. Water supply schemes functionality status in Ethiopia

Scheme functionality status is one of important indicator of water scheme sustainability. However, considerable numbers of developed water supply schemes are not functional in the country because of multifaceted factors. The scheme non-functionality is contributing for already existing low water supply coverage.

According to MoWR Annual Report (2007:30), number of non-functional schemes in the country is 25% in average. However, the rate varies from 17% in SNNPR to 30% in many regions (Afar, Somale, B/Gumuz, Hareri, Gambela, Diredawa). Furthermore, it is possible to see from table: 2.2 that regions with low water supply coverage have got high scheme non-functionality rate.

Table 2.2. Regional distribution of non-functional water supply schemes in 1998 EFY (2005/2006)

S. No	Region	Non-functional schemes (in %)	Remark
1	Amhara	23	
2	Oromia	25	
3	SNNPR	17	Inconsistent figure
4	Tigray	20	
5	Afar	30	
6	Somali	30	
7	B/Gumuz	30	
8	Hareri	30	
9	Gambela	30	
10	Diredawa	30	
	National	**25**	

Source: MoWR 1998 EFY (2005/2006) Annual Report

2.4.2.3. Water supply prospects in Ethiopia

To improve the existing water supply situation in Ethiopia, the government has planned and implementing different programmes. In this regard, PASDEP and UAP are the most important ones to mention.

Specifically, a Plan for Accelerated and Sustained Development to End Poverty (PASDEP) is a five year comprehensive government plan for a period of 2005/06-2009/10 (1998-2002 E.C). According to this plan, the target is to raise water supply coverage from 34.5% to 77.5% in rural areas, and from 42.2% to 84.5% for the

population as the whole. To achieve this during the program period, study and design of 738 towns, construction work for 514 towns and rehabilitation work for 228 towns will be carried out during five year period. Regarding rural water supply, construction of 1870 deep wells, 12,755 shallows, 101,355 hand dug wells, 420 ponds, 780 cisterns and 15 surface water sources and 11, 455 spring development will be undertaken. Moreover, 47,399 schemes rehabilitation works will be carried out during the same period.

As far as water schemes sustainability is concerned, PASEDP planned to reduce malfunctioning water schemes from 25% to 5% in the end of program period. However, the program period of PASDEP is left with one year only. Hence, its achievements versus plan to be known after program evaluation.

Second, rather ambitious plan which is made to improve WASH status of country is Universal Access Plan (UAP). According to MoWR(2006:6), UAP is a 7 year plan (2006 to 2012 (1999 to 2005 E.C), which has been prepared to meaningfully change the low level of water and sanitation coverage and thereby to fully benefit parts of the society who had no access to the service before. The target of UAP is to raise water supply coverage 98% in the end of program period for rural population within 1.5km radius and 15 liters/person/day and 100% for urban population within 0.5km radius and 20liters/person/day.

However, According to Tegegn(2008:93) on the thesis done in SNNPR, one of regions planned 100% achievements of WASH, the implementation of UAP is facing a complex and multi-faceted challenges According to him, if the situation continues with past and present trends it will be very difficult to meet the objectives of the UAP.

2.5. Conceptual /Theoretical framework

Sustainability is a complex and dynamic concept which is made up many interrelated components. As can be seen from the literature section of this paper, sustainability of rural water supply handpumps depends on community, technical, financial, institutional and environmental factors. Furthermore, each factor comprises of important elements that have to be considered to ensure sustainability of water pumps.

As far as community factors are concerned, there should be a demand from community for improved water supply handpumps before development of the schemes. Community participation in general and women participation in particular should be ensured starting from planning to final management stage of the scheme development. Overall management of implemented handpumps should be undertaken by locally organized and recognized water committees. Furthermore, staffing of water committees should be gender sensitive to include women as decision making body for handpumps management.

As technical factors, water supply projects should consider village level operated and maintained (VLOM) handpump for ease of community management. Also, adequately trained and skilled technicians those can undertake minor maintenance of pumps should be created within user communities. Besides, important toolkits that are required to undertake maintenance works should be availed. Furthermore, spare parts supply system should be established in a way that the communities can access and afford them if needed for maintenance. Also, construction quality of handpumps during well excavation/drilling and top works construction should be supervised by relevant professionals to avoid construction quality problem.

Concerning financial factors, user communities should make regular contribution for O&M of handpumps. However, in order to maintain the existence of regular contribution for O&M the amount of contribution should be based on users' ability and willingness to pay taking into account minimum requirement for covering overall O&M cost of the pumps. Also, practice of saving users contribution in local financial institutions should be

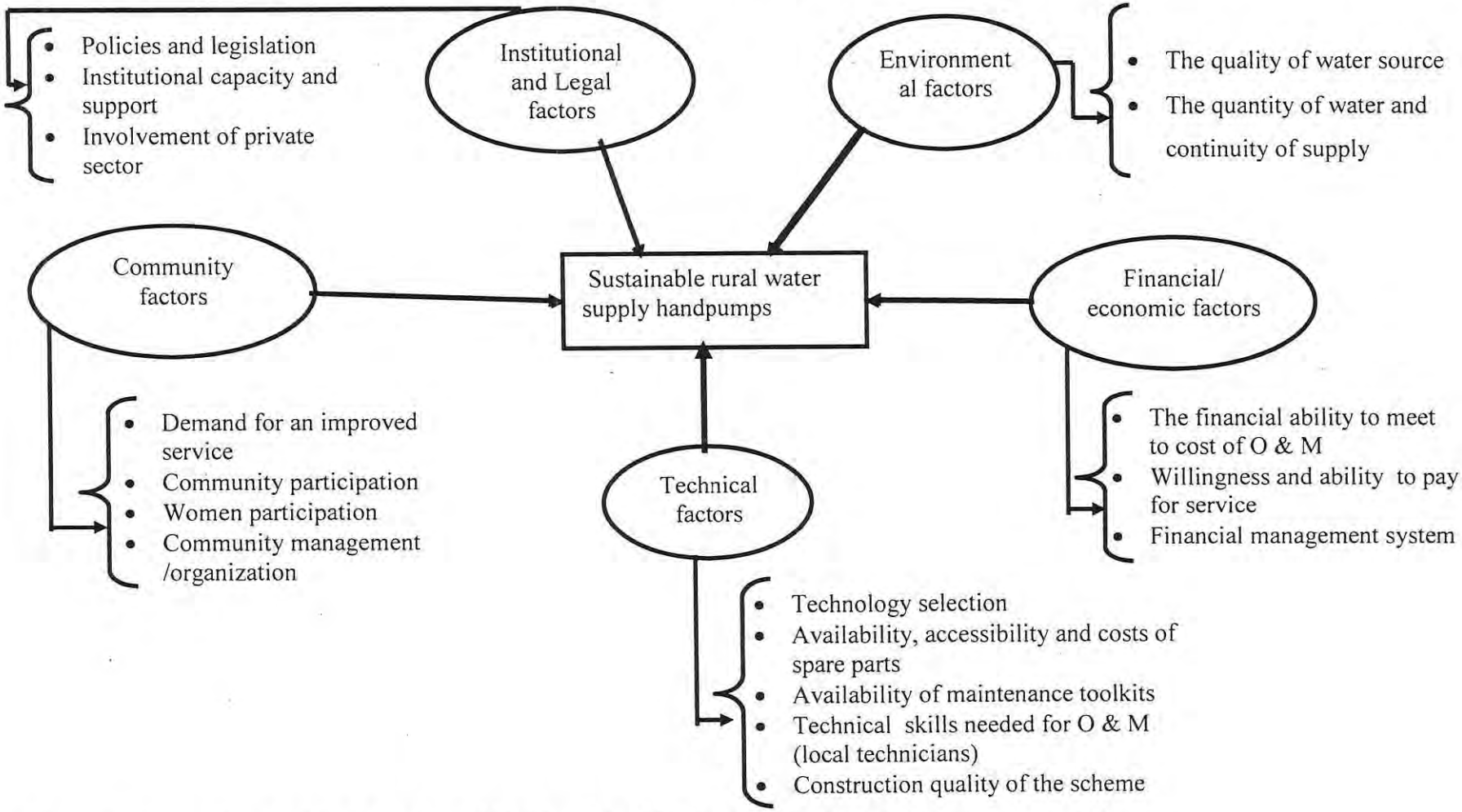
there so that the maintenance of emergency breaks and cost of spare parts can be financed with little down time period of pumps.

With regard to environmental factors, in order to avoid pump disuse and service unreliability due to water quality problem and inadequacy of well yield, integrated feasibility study should be there before commencement of well excavation/ drilling for handpumps. Also, potential future users' number and impact of climatic variation on water level need to be considered during planning of pumps to avoid the water source inadequacy and to ensure continuity of supply.

Regarding institutional and legal factors, there should exist policies and legal frameworks under which water supply schemes are developed and managed. Also, there should exist a room for involvement of private sector. Furthermore, capacitated local public institution responsible for monitoring and management is required. Also, the external support rendered for community management should have some form of continuity with defined and clear phase out strategy.

So, this study employs the following conceptual framework to assess the sustainability problem of rural water supply handpumps by examining the existence or absence of factors those contribute for water supply schemes sustainability. (See fig. 2.1)

Figure 2.1. Conceptual framework of sustainable rural water supply handpumps



Source: Adapted from Brikke & Bredero 2003, Musonda 2004, Smet & Van Wijk (eds) 2002, Dereje 2007

CHAPTER-THREE

3. Description of the study area and methodology

3.1. Description of the study area

Aleta Wendo wereda is one of 19 rural weredas in Sidama Zone, SNNPR. The wereda is located at 65km in south of Hawassa town. Its geographic location is between $6^0$46' and $6^0$72' latitude north and $38^0$21' and $38^0$51'longitude east. The current population of the wereda is 166, 842, of which 84,979 are male and 81,863 are females (FDRE, PCC 2008:58).

The wereda is further divided into 27 kebeles for administrative purpose. The administration center of the wereda is situated in Aleta Wendo town, which has got its own town administration and government structure. Therefore, the wereda administration is responsible for rural parts only. Geographically, Aleta wendo wereda is bordered with Dalle wereda in north, Bursa in south, Hula in the south east and Aleta chuko wereda in the western direction. (See figure 3.1)

Total land area of the wereda is 27, 873ha, among which 64% is covered with permanent crop, 25% annual crops, 8% covered by natural, cooperatives and private forest, 2% covered by grazing land and remaining 1% of land is covered by others. Furthermore, wereda is known for production of enset (staple food in area), coffee and chat. The former is main source of food and the latter are sources of income for local inhabitants (WoFED, 2008).

As far as agro-climatic condition is concerned, 37% of landmass of wereda constitutes highland /dega/ agro-climatic condition while the remaining 63% is categorized under midland/woyena dega/agro-climatic zone. Annual temperature of the wereda varies between 15. 1^0c to 22. 5^0c while the annual rain fall ranges between 80cm to 160cm.

researcher joined the inventory team in the study area and the data were collected by the team with assistance of the researcher on the way of filling inventory formant and the way of GPS use. The inventory exercise is conducted in March, 2009. (See Annex: 6 for scheme inventory format)

3.2.3 Sampling methods & sample size determination

The research design used in this study was cross-sectional study design whereby different data were collected at a time. In order to obtain the required information that are relevant to meet the objectives of the study, **probability and non-probability sampling techniques** were employed to select sample handpumps, household survey respondents, participants of FGD and key interview informants.

According to scheme inventory result, there are 101(53 functional and 48 non-functional) rural handpumps in the wereda. Among 101 water supply handpumps, 19 of them are abandoned because of water quality problem and well drying. Some of handpumps which are abandoned because of quality problem did not give any service to community since their construction. Besides, 10 handpumps are rope pumps and they are not community managed. Rather they are privately owned. As a result, 29 handpumps were excluded from total population of handpumps.

The remaining 72, community managed handpumps were stratified as functional (48HPs) and non-functional (24HPs). Then after, 10percent (10%*72=7) i.e. 7 sample handpumps (5 functional& 2 nonfunctional) were taken by applying **proportionate stratified random sampling method**. This type of sampling method is selected to enhance representativeness of sample schemes to that of total schemes. 10% of total schemes were taken for the sake of manageability due to time and cost factors.

After determination of sample schemes, 40% HHs users of the sample handpumps were selected by applying simple random sampling (SRS) method by using random numbers table. The SRS technique was applied since beneficiaries in the study area has got almost

identical socioeconomic and cultural background. The sampling frame for HHs selection was the record of beneficiaries list. As the following table (3.1) shows, totally 128 HHs were selected and included in the survey.

Table 3.1. Total numbers of beneficiaries of sample HPs and sample size determination

S. No	Kebele	Site name	Well Type	Status of HP	Sample Size Determination	
					No. of HH beneficiaries	40% of HHs
1	H/Chawa	Gobicho	HDW	functional	49	20
2	H/Waeno	Sada	HDW	functional	57	23
3	Gowadamo	Aliwono	SW	functional	27	11
4	Belesto	Waeno	SW	Non-functional	49	20
5	D/Ilimate	Alelcho	SW	functional	27	11
6	D/Ilimate	Kawado	HDW	Non-functional	80	32
7	Dobe	Samata	SW	functional	27	11
Total					316	128

Source: Water committees from respective community, 2009

3.2.3. Data collection methods and tools

To generate primary data, the main data collection mechanism employed was HHs survey using open and close-ended structured interview schedule. Quantitative data were also generated through the survey mechanism. Furthermore, to enrich primary data collected from the HHs survey and to generate qualitative data, FGDs and KII were conducted. The detail of each data collection method is discussed as follows.

3.2.4.1. Households (HHs) survey

128 HHs those benefit from sample handpumps were interviewed by using open and close-ended structured interview schedule. Before the start of actual households' survey, the interview schedule was pre tested in order to check its validity and clarity. Hence, 6 households were interviewed randomly: 4 from functional handpumps and 2 from non-functional ones. Then after, certain modification was made on data collection format since some understandability problems were realized for HHs on technical issues.

The reason behind for selection of interview method of data collection is because considerable number of beneficiaries can not read and write. The individuals interviewed were parents of the family in most cases.

The HHs survey was conducted by 4 recruited and trained enumerators, who are fluent in local language (Sidamigna) with close supervision of the researcher. With regard to their educational status, three of the enumerators are diploma holders from TVET in water supply and sanitation& electro mechanicals and one of the enumerators was a surveyor with a certificate from technical school. (See Annex: 1 for Interview Schedule used)

3.2.4.2. Focus group discussions (FGD)

In order to supplement, complement, and validate the information obtained from HHs survey, FGDs were conducted with water committees, selected women groups and wereda water office staff members. The FGDs were conducted by using checklists /structured questionnaire guide. (See Annex: 2 for Checklist/structured guide)

Five FGD sessions where conducted during field work. Specifically, two FGDs were held with water committees (one group from functional and other one from non-functional water supply handpump). Similarly, another two FGDs were held with selected women beneficiaries from functional and from non functional handpumps considering their prime role in collecting and using water. The remaining one FGD was held with Woreda water

office head and staff members from relevant sections in relation to this study. Each FGD session comprised of 5 to 9 participants and administered by 2 individuals at a time. Accordingly, the researcher had facilitated the FGD sessions while the enumerator had taken necessary recordings and pictures. The recorded materials were transcribed after the filed work. (See Annex: 5 for Pictures of FGD)

3.2.4. Key informant interview (KII)

For further triangulation of information obtained from HHs and FGDs with water committees, selected women groups and Wereda water offices in-depth key informant interviews were conducted with individuals purposively selected from community members, wereda water office, zonal, and regional offices. Also, one individual was interviewed from an NGO currently working in the study area. KII was conducted with 9 individuals. The interviews were conducted by using checklist/ structured interview guide. (See Annex: 3 for KII Checklists/guide; Annex: 4 for list of individuals)

3.3. Data Analysis

The scheme inventory data were collected and stored in computer using MS-Excel spread sheet and also mapped by using GIS software (Arcview GIS 3.2a). Other primary data were analyzed by using both quantitative and qualitative data analysis methods. The primary data collected from households' survey were analyzed by using descriptive statistics such as percentage, mean, standard deviation, frequency distribution and cross tabulations. To handle the analysis of quantitative data statistical package for social scientists (SPSS) software version 15.0 was used as an analysis tool. On other hand, qualitative data generated from FGDs, KII and personal observations were analyzed qualitatively to triangulate the analysis and reinforce data obtained from households' survey.

CHAPTER-FOUR

4. Data analysis and discussion

4.1. Characteristics of sample population

Knowing socioeconomic and demographic characteristics of respondents is vital to understand their characteristics and role in socioeconomic development. Accordingly, in this study total of 128HHs are surveyed in six kebeles those use water from 7 randomly selected community managed handpumps. Based on the result of survey, demographic and socioeconomic backgrounds are discussed in this section.

4.1.1. Demographic characteristics

4.1.1.1. Sex composition and age structure of respondents

The following table (4.1) shows the respondents sex profile and age structure. Accordingly 70(54.7%) of respondent, out of total 128HHs interviewed are male while 58(45.3%) are females. This study included more male than female because the beneficiaries of each handpump are listed by head of HHs. In the study area numbers of families headed by males exceed that of headed by females.

With regard to age structure, out of 128 respondent, 122(95.3%) were found economically active (15-64) age group. The average age of respondents was 36.05 years with standard deviation 14.38. This group of the people is expected to be participating actively in process of planning, implementation and management of water supply projects and any development activities.

Table: 4.1. Sex composition and age structure of respondents

Issues	**Respondents**		
	Category	**Frequency**	**%**
sex	male	70	54.7
	female	58	45.3
	Total	128	100.0
Age Structure	Below 15	1	0.8
	15-64	122	95.3
	Above 64	5	3.9
	Total	128	100

Source: survey result, 2009

4.1.1.2. Marital status and family size of respondents

As table (4.2) shows, out of 128 surveyed respondents, 8(6.3%) are single, 110(85.9%) married, and 10(7.8%) are widowed. As on can understand the great majority of sample populations are married as their marital status is concerned. With regard to family size of respondents, out of 128 respondents, 66(51.6%) have family size of below 5, 49(38.3%) are with family size of 5 to 9 while the remaining 13(10.2%) are with family size above 9 members within a single household. The average family size was 5.92, with standard deviation of 2.68 during survey.

Table: 4.2.Marital status and family size of respondents

Issues	**Respondents**		
	Category	**Frequency**	**%**
Marital status	single	8	6.3
	Married	110	85.9
	widowed	10	7.8
	Total	128	100.0
Family size(in person)	Below 5	66	51.6
	5-9	49	38.3
	Above 9	13	10.2
	Total	128	100

Source: survey result, 2009

4.1.2. Ethnicity and religion of respondents

As can be seen from table (4.3), almost all of respondents belong to Sidama ethnic group. Out of total respondents, 123(96.1%) constitutes Sidama, 3(2.3%) Amhara and remaining 2(1.6%) of respondents belongs to Oromo ethnic group as far as ethnicity is concerned. With regard to religion of respondents, out of total respondents, 113(88.3%) are Protestant, 7(5.5%) are Muslim, 4(3.1%) Catholic, 1(0.8%) Orthodox and remaining 3(2.3%) respondents do not belong to any religion category.

Table: 4.3. Ethnicity and religion of Respondents

Issues	Respondents		
	Category	Frequency	%
Ethnicity	Sidama	123	96.1
	Amhara	3	2.3
	Oromo	2	1.6
	Total	128	100.0
Religion	Protestant	113	88.3
	Orthodox Christian	1	0.8
	Muslim	7	5.5
	Catholic	4	3.1
	none	3	2.3
	Total	128	100.0

Source: survey result, 2009

4.1.3. Socio-economic characteristics of respondents

4.1.3.1. Educational level and income source of respondents

As educational level of respondents concerned, table (4.4) shows that out of 128 respondents, 30(23.4%) are illiterates, 5(3.9%) able to read and write, 28(21.9%) first cycle complete, 47(36.7%) second cycle complete, 14(10.9%) high school complete and 4(3.1%) are above high school. Unfortunately, educational level of respondent in the study area is good unlike many research reports conducted in rural areas. About 73% of respondents are complete of primary education (1^{st} and 2^{nd} cycles). This is good opportunity to plan and implement water supply projects and other development activities with target communities in the area since educated people can understand and adapt with new practices better than illiterate ones.

With regard to income source of respondents, out of 128 respondents, major income source of 118(92.2%) respondents is agriculture. The rest 5(3.9%) and another 5(3.9%) respondents replied that their major income source is business/peaty trade and government employment respectively. This result shows that dominant income source of family in the study area is agriculture.

Furthermore, among total respondents, only 38(29.7%) have got second income source in addition to their primary one. Among respondents, relatively diversified their income,

20(52.6%) are involved in business/ peaty trade. The rest are engaged in agriculture (23.7%), daily labor (13.2%), government employee (5.3%) and also 5.3% are employee of NGO. The average monthly income of respondents in study area is found to be 265. 16 birr during survey time.

Table: 4.4 Educational levels and major income source of respondents

Issues	**Respondents**		
	Category	**Frequency**	**%**
Education level	Illiterates	30	23.4
	Able to read and write	5	3.9
	First cycle complete	28	21.9
	Second cycle complete	47	36.7
	High school complete	14	10.9
	Above high school	4	3.1
	Total	128	100
Major income source	Farming/agriculture	118	92.2
	Business/peaty trade	5	3.9
	Government Employee	5	3.9
	Total	128	100.0

Source: survey result, 2009

4.2. Handpumps & water supply situation in the study area

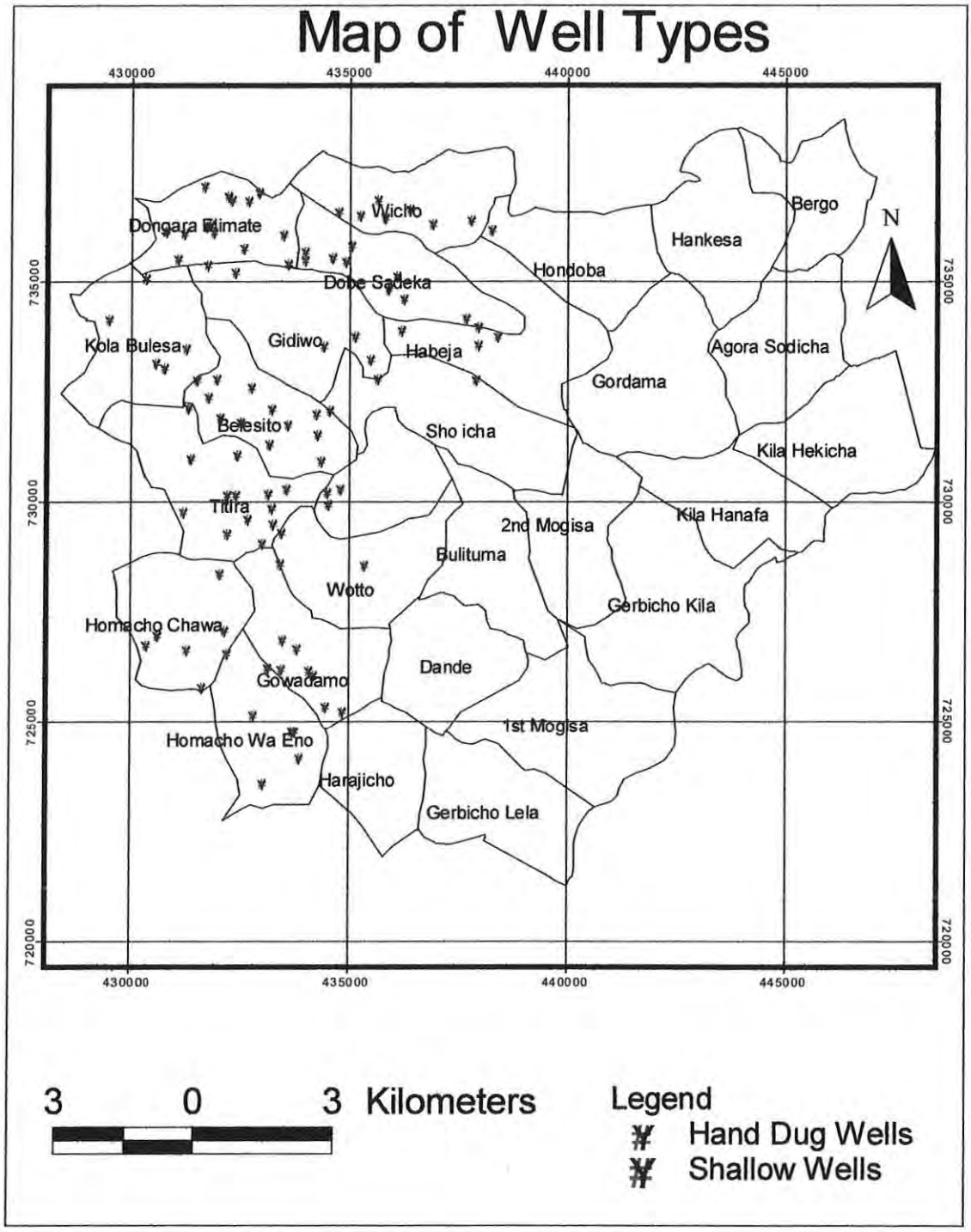
4.2.1. Overview of handpumps in the Wereda

According to the recent inventory result of water supply schemes, there exist 101 different types of water supply handpumps in the wereda. The pumps are found within 12 rural kebeles out of 27. The wells in which handpumps are installed are either hand dug wells (HDWs) or shallow wells (SWs). The HDWs are manually drilled wells with average depth of 17.81m while SWs are machine drilled wells with the average depth 36.76m below the surface in the study area. As far as the distribution of the wells concerned, 60(59.4%) are HDWs and 41(40.6%) are machine drilled shallow wells. (See figure 4.1 on next page showing well types mapping in the wereda)

Among 60 HDWs, 10 were installed by rope pump, which is recently introduced technology in the study area by support of Japan International Cooperation Agency (JICA). The rope pumps are not community managed water supply schemes, rather they are privately owned ones. The owners take the pumps in the form of loan for 2000 Birr to be effected in period of two years. The owners install the rope pumps in their own traditional HDWs since privately owned traditional hand dug wells are common water supply sources in the study area. The rope pump technology is under implementation as a pilot project in the area since last one year.

With regard to amount of beneficiaries concerned, 19,759 (about 12 percent) people get water supply services from handpumps in the wereda. Currently, aforementioned number of population are not getting water from the hundpumps because considerable number of pumps became non-functional because of different factors, those to be dealt under a section discussing factors affecting sustainability of water supply handpumps in the wereda. Needless to say, users whose pumps failed to give service shifted to secondary sources, such as distant water points in other community, unprotected springs, and traditional hand dug wells, and rivers.

Figure 4.1. Well types map of the study area



N.B. There is no either hand dug or shallow wells fitted with handpumps in the eastern part of the study area. Water supply source in that part is mainly perennial springs.

As far as implementers of the pumps are concerned, there are about 12 different governmental and non governmental organizations those are involved in the HPs development since late 1980s.Out of total handpumps developed in the area 45(44.6%) are developed by South Water Works Construction Enterprise (SWWCE). SWWCE is the only public water construction enterprise engaged in construction of water supply schemes in SNNPR. From the side of non governmental organizations, 17(16.8%) water supply handpumps were developed by Resurrection and Life Organization (RLO), which is faith-based local NGO based in Hawassa. But during scheme inventory the only active NGO in the study area was Samaritans Purse (SP).

Generally, among total water supply handpumps, 67(66.3%) are developed by government while remaining 34(33.7%) are developed by NGOs. This figure shows that, even though NGOs have contributed a lot for provision of water supply handpumps in the study area, greater share of schemes construction is in the hand of government.

4.2.1.1. Types of handpumps and their functionality status in the Wereda

As far as types of handpumps are concerned, three kinds of handpump are seen being used by communities during inventory work. As one can see from table (4.5), the dominant handpump installed in the wereda is Afridev (also see figure 4.2 showing handpumps type). It accounts for 77(76.2%) out of total handpumps. Indian mark II accounts 14(13.9%). The remaining 10(9.9%) are rope pumps those are recently introduced in to the study area as pilot project. Unlike the former two, the latter handpumps are owned privately while the formers are managed and owned by community.

With regard to pumps suitability for village level operation and maintenance (VLOM), Afridev and rope pump are VLOM pumps, whereas Indian Mark II is not (Arlosoroff et al 1987:87).

Table: 4.5. Types of handpumps

Handpumps Category	Frequency	Percent	Cumulative Percent
Afridev	77	76.2	76.2
Rope Pump	10	9.9	86.1
Indian Mark II	14	13.9	100.0
Total	101	100.0	

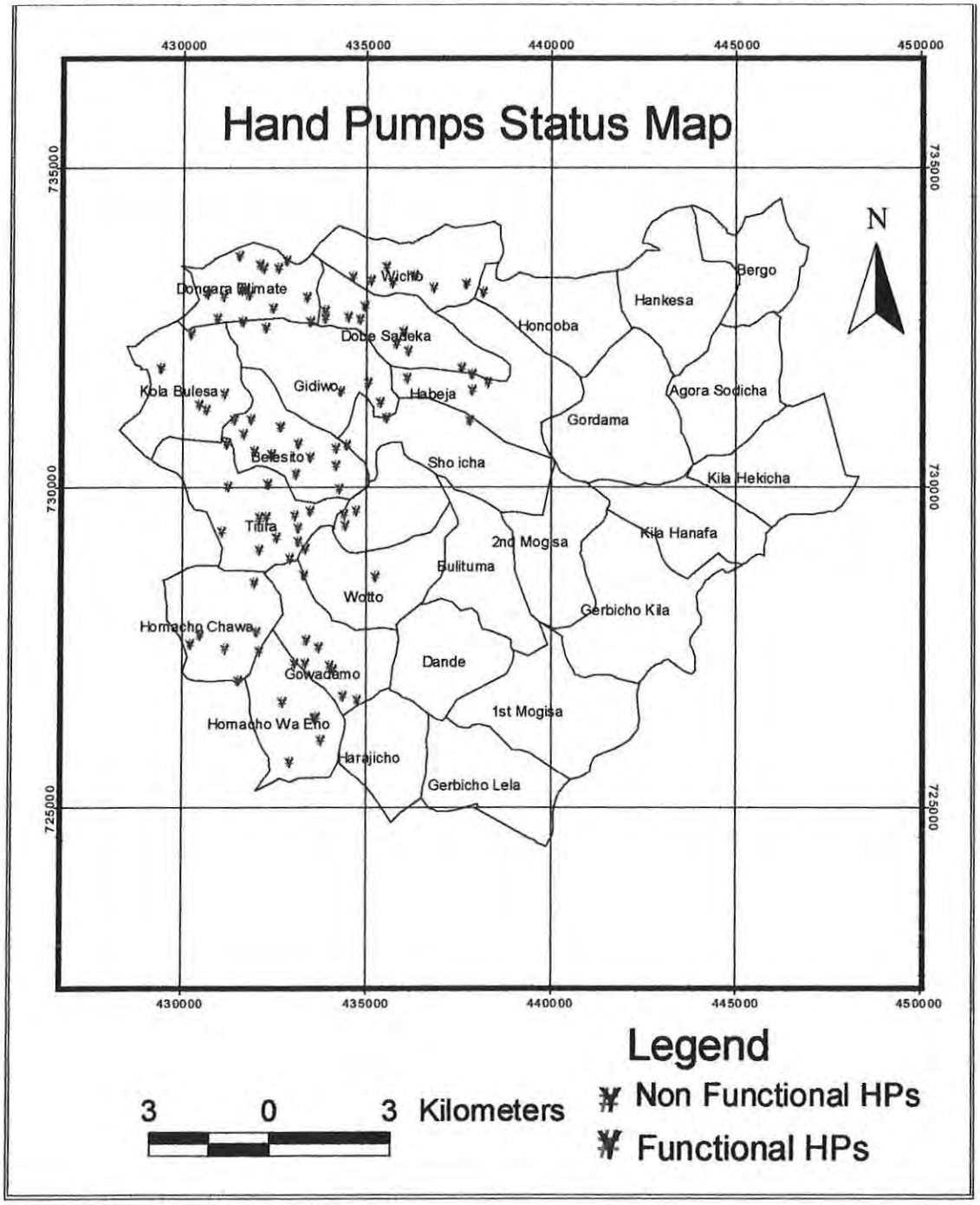
Source: Scheme inventory result, March 2009

Fig: 4.2. Afridev (left), Indian Mark II (middle) and Rope Pump (right) handpumps

Source: Pictures taken during fieldwork, 2009

As far as functionality rate of handpumps are concerned, out of total 101 handpumps, 53(52. 5%) are functional and 48(47.5%) are non functional by the time of survey. As discussed in the next section, even majority of functional handpumps were providing service with problems i.e. with low yields and frequent interruptions as learned from beneficiaries. As a result, considerable numbers of beneficiaries have run out of potable water supply source, or else have shifted their fetching place to other villages that are relatively far from their home. See figure (4.3) about distribution of functionality status of HPs in the study area.

Figure 4.3. Handpumps functionality status map in the study area



N.B. There is no either hand dug or shallow wells fitted with handpumps in the eastern part of the study area. Water supply source in that part is mainly perennial springs.

As far as non functionality of handpumps with respect to their type is concerned, the following result has been obtained from scheme inventory.

As one can see from the table (4.6), out of total 77 Afridev HPs 31(40.3%) are non functional and 46(59.7%) are functional. But the contribution of this pump type for functionality and non functionality for overall HPs is 86.8% and 64.6% respectively. It has got a greater share for both statuses of handpumps. This is because it is dominant technology in the area. However, its VLOM nature did not saved its failure because of some other reasons to be discussed in later sections.

With regard to rope pumps, their functionality and non functionality status are equal. 5(50%) of them are working and the same amount were not working during survey. The share of these pumps for functionality and non functionality of overall hand pumps in the area were 10.4 and 9.4% respectively.

However, according to Van der Wal et al (2006:6), evaluations show that 90% of the Rope pumps continue working, even after years of operation. This high percentage is due to the simplicity of the pump. The users understand the working of the pumps and are able to maintain it and, if necessary repair it themselves or with the help of a local workshop 'around the corner'.

On contrary to aforementioned description, half of the rope pumps are not working after one year of their installation in the study area. During FGD with wereda water office staff members, they underlined that the rope pumps are not working because of one single spare parts failure, so called piston. This item could not be found in the wereda and region as well.

Eventually, surprising result was observed for Indian Mark II HPs. Out of total 14 HPs of this type, only 2(14.3%) of them are working. The remaining 12(85.7%) are not working

during the inventory. The contribution of these pumps for total functionality and non functionality were 3.8% and 25% respectively. This finding confirms that non suitability of this type of technology for local level management both for community and wereda level. Moreover, as discussed earlier, Indian Mark II handpumps are not VLOM pumps.

Table: 4.6. Cross tabulation of handpump types with their respective functionality status

Type of handpump * functionality status of handpump cross tabulation

			Functionality status of handpump		
			Non functional	Functional	Total
Type of handpump	Afridev	Count	31	46	77
		% within type of handpump	40.3%	59.7%	100.0%
		% within functionality status of handpump	64.6%	86.8%	76.2%
	Rope Pump	Count	5	5	10
		% within type of hand pump	50.0%	50.0%	100.0%
		% within functionality status of handpump	10.4%	9.4%	9.9%
	Indian Mark II	Count	12	2	14
		% within type of handpump	85.7%	14.3%	100.0%
		% within functionality status of handpump	25.0%	3.8%	13.9%
Total		Count	48	53	101
		% within type of handpump	47.5%	52.5%	100.0%
		% within functionality status of handpump	100.0%	100.0%	100.0%

Source: Scheme inventory result, March 2009

4.2.1.2. Managerial and financial aspects of handpumps

To know the managerial and financial aspects of hundpumps, the inventory team collected information on managerial and financial issues along with other pieces of information. For analysis of community management situation, rope pumps are excluded because they are not community managed. Accordingly, out of 91 community manage handpumps, 83(91.2%) were managed by water committee. The remaining 8(8.8%) do not have managing body.

As far as the users' payment is concerned, the inventory exercise has shown that out of total 91 communities managed handpumps, there is practice of payment in form of monthly contribution on 40(44%) handpumps. The users of the remaining 51(56%) hand pumps do not contribute for O&M of their schemes.

In this regard, according to Davis& Brikke(1995:63), one of the important tasks of water committee is to organize and manage the collection and use of O&M fees from beneficiaries and to keep accurate records of payments and expenditures. In this regard, however, most of water committees are not discharging their responsibility properly in the study area. Details of these issues will be discussed in the section under community and financial factors affecting sustainability of community managed rural water supply handpumps.

4.2.2. Current Water supply situation of respondents

All respondents interviewed were users of handpumps within their community at least by the time the handpumps were new. But during this survey, out of total 128HHs, those are using from their handpumps were, 76(59.4%). The remaining 52(40.6%) were not getting the water supply service from their original handpumps because of pumps non-functionality.

In response to question provided to respondents to know from where they are getting water supply service after their handpumps became non functional, the following results were obtained. As the table (4.7) shows, among total respondents those their handpumps were not working during survey, 45(86.5%) are using from developed water source (i.e. protected spring, handpumps) in other community. The rest 7(13.5%) respondents are using from undeveloped water source (river, traditional HDW and unprotected springs).

Table: 4.7. Current drinking water sources for respondent, those their handpumps became non-functional

Water sources	Frequency	Percent	Cumulative Percent
river	3	5.8	5.8
protected spring	15	28.8	34.6
traditional HDW	1	1.9	36.5
HDW fitted with HP	18	34.6	71.2
SW fitted with HP	12	23.1	94.2
unprotected spring	3	5.8	100.0
Total	52	100.0	

Source: survey result, 2009

This finding shows that people are very aware of the benefits of using water from developed (clean water) source. That is why the majority of them are fetching water from developed water sources by traveling out of their community. But according to respondents, community KII and FGD with water committee and selected women groups in Dogora Ilimate kebele, Kawado Small town, the women and children travel longer distance to fetch water from other community. Furthermore, the queuing time is other problem because of additional users. In this regard, one woman articulated her problem as follows:

> *Currently, my children are students. So, most of time, I myself have to travel to fetch water from safe source. If we drink water from our unprotected HDW, it will be bad for our health. Hence, for sake of our health, I must travel where safe water found in other community. Sometimes, I send my children to fetch water off school times. When they come back with water they feel much tired. Sometimes, they complain illness because of the load. Because of that reason, I prefer to fetch water myself. The*

problem when I myself travel to fetch water, I can not prepare food on time for my children coming from school. Besides, the community that their handpump is functional is not happy about us fetching from there. They disgrace us as if we broken our handpump knowingly. Formal users of that community do not respect our turn even. Hence I can say we are fetching through begging. I carry water long distance on my back; there is blazing sun during day time; if I travel early in morning to fetch water, my children got to school without eating their breakfast. Therefore, we are punished much because of our pump failure (W/ro Buzinesh Burka, D/ilimate kebele, Kawado community)

Some respondents are still going to unsafe water sources such as rivers, traditional HDWs and unprotected springs for mere reason of pump failure. The health implication of unsafe water source is also considerable.

The problem on service delivery is not only restricted to beneficiaries for those their water supply handpumps became non functional. But also for those their water supply handpumps are functional by the time of survey. The problems are interruption of service delivery because of scheme failure, insufficiency of water in the well, delay of pumps without getting maintenance once became non functional.

In response to question provided to know how many of the respondents, those their water supply handpumps were working during survey, are dependent on their main water supply source, the following finding was obtained. Out of 76 respondents those their water supply handpumps were functional, 50(65.8%) were not going to secondary sources(sources out of the main water supply sources) to collect water. The remaining 26(34.2%) are still going to secondary sources even though their water supply handpumps were functional because of insufficiency of water. If we sum those respondents whose water supply handpumps were non functional with those still going to secondary sources while their handpumps were functional, it is possible to say that about 78(61%) HHs are still going to secondary sources to fetch water.

For questions forwarded to know functionality situation of the handpumps since time of construction, the following responses were obtained. As one can see from the following table (4.8), out of 128 respondents 110(85.9%) have experienced non functionality problem of their handpumps since time of construction. Only 18(14.1%) of respondents did not faced the service discontinuity because of pump failure. This finding clearly shows that the water service interruption is prominent phenomena in the study area. The major reason according to beneficiaries and wereda water office for pump malfunctioning is mechanical problem specially failure of spare parts such as seals and rods.

The functionality situations of hand pumps were also examined for last one year period. For questions delivered for respondents those their hand pumps were functional during survey, the following results were obtained. The reason behind considering these groups of respondents were, because of non functional handpumps were stayed more than one year without maintenance. Accordingly, as table (4.8) shows, out of 76 respondents 40(52.6%) were faced the problem of interruption of their water supply service since last one year while the remaining 36(47.4%) did not. The frequency of interruption is concerned, the water supply service of respondents has been interrupted at least one to three times within a year period.

In order to enhance service reliability, timely maintenance of malfunctioning water supply schemes is important. In this regard, the response of respondents for question asked to know how fast the maintenance of handpumps were under taken in the study area once the pumps became non functional, has given the following results. In this regard, as one can see from the table (4.8), out of total respondents 110(85.9%) said that their handpumps were in state of disrepair once become non-functional from a month to more than a year.

The above findings clearly shows that the practice of fast maintenance when pumps became non-functional looks slow-moving in the study area. The reason behind this practice is not straight forward. It has got social, technical, financial and institutional dimensions. These factors will be discussed in detail in the succeeding sections.

Table: 4.8. Functionality situation of water supply handpumps

Issues	Respondents			
Have you ever faced non functionality problem with HP since construction?	Response	Frequency	%	Cum. %
	Yes	110	85.9	85.9
	No	18	14.1	100
	Total	128	100	
Have ever faced non functionality problem since last one year?	Yes	40	52.6	52.6
	No	36	47.4	100
	Total	76	100	
How long the HP was in the state of disrepair once fail in to disuse?	Up a month	7	5.5	5.5
	1-2 months	32	25.0	30.5
	3-6 months	15	11.7	42.2
	7-9 months	1	0.8	43.0
	10-12 months	2	1.6	44.5
	More than a year	53	41.4	85.9
	Still functional	18	14.1	100
	Total	128	100	

Source: survey result, 2009

Figure 4.4. Some of non functional handpumps for more than a year, Belesto PA (Left), Dongora Ilimate(Right)

Source: photo taken during fieldwork, 2009

4.3. Factors Affecting Sustainability of Rural Water Supply Handpumps

4.3.1. Community factors

4.3.1.1. Demand for an improved service

According to Brikke (2000:46), presence of demand for an improved water supply service by the communities is a prerequisite for sustainability. It could be taken as an expression of their commitment, and a way to make communities responsible for their choices and future tasks. Furthermore, the presence of demand for improved water supply service can be manifested in the form of initial contribution in cash or in kind to capital costs, or in the form of a written solicitation from organized community group to the competent authority/responsible organization.

In relation to this, the question was presented to respondents in order to know whether they have demand for water supply handpumps before its construction to their respective communities. In the response the following result has been obtained. As the following table (4.9) shows, out of 128 respondents 99(77.3%) have demand for improved service before construction of water supply handpumps within their respective community while 29(22.7%) have not demanded for improved service.

Furthermore, as table (4.9) shows, concerning the initiator for water supply hand pump to be developed to the community, 68(53.1%) of respondents said community, 26(26.6%) of respondents said government, 15(11.7%) of respondents said government and community together, 7(5.5%) of respondents said NGO and the rest 4(3.1%) of respondents mentioned reasons other than the aforementioned ones.

With regard to the form/ways the community presented their demand to improved water supply situation, out of 99 respondents those demanded improved water supply service, 34(34.3%) respondents said they applied to WWRDO, 30(30.3%) and 32(32.3%) respondents said they raised the issue orally to kebele administrator and government officials during public conferences respectively. The remaining 2(1.6%) and 1(0.8%) respondents said they had raised the issue orally to an NGO and Wereda agriculture office respectively.

Table 4:9. Communities demand & initiation for handpumps development

Issues	Respondents		
Have you demanded for water supply before the construction of the present handpump?	Response	Frequency	%
	Yes	99	77.3
	No	29	22.7
	Total	128	100
Who was the initiator for handpump development within your community?	Community	68	53.1
	Government	26	26.6
	Community & government	15	11.7
	NGO	7	5.5
	Others	4	3.0
	Total	128	100

Source: survey result, 2009

The above findings show that community has played a major role both in demanding improved water service and initiation of the idea for implementation of the projects, which practice to be encouraged for future development endeavor as well for any community development plan.

4.3.1.2. Community participation and sense of ownership

Participation of user community in any development activity in general and in water supply projects in particular is an important factor to sustain projects. Participation of communities(men and women) throughout the project cycle is essential since it is a way to motivate, make responsible and build the capacities of communities in the their new tasks and functions.

The conventional way of community participation in rural water supply project is by provision of labor and locally available construction materials such as stone and wood. But in some cases every input of the projects comes from the implementing agency and

end users contributions in terms of ideas and material provision are neglected. Having this in mind, sample respondents were interviewed whether they have participated in development of their water supply handpumps, the phase in which they participated, their contribution and their sense of ownership towards the scheme.

With regard to participation, as the following table (4.10) shows, out of 128 respondents, 102(79.7%) respondents had participated in the development of the scheme while remaining 26(20.3%) did not participate in the development of their water supply scheme. With regard to the phases in which they had participated, among 102 respondents, 53(52%) said they had participated in all phases (during planning, construction, after construction), 41(32%) respondents said during construction, 7(5.5%) respondents said during and after construction. The rest 1(0.8%) respondent said he had participated in planning phase only.

As far as the contribution of the respondents during handpumps development is concerned, the following results have been obtained. As the table (4.10) shows, among the total respondents who had participated during development of their water supply handpumps, 33(32.4%) contributed labor and money, 22(21.6%) participated by contributing labor, local material and money, 19(18.6%) contributed labor, 17(16.7%) contributed money only, 8(7.8%) contributed labor and local material, and 2(2%) contributed labor and meal.

As one can understand from this analysis most of respondents have replied that they have contributed labor and money. But as learned from community KII's, the money contributed was neither for sharing investment cost nor for future O&M cost. The contribution of money was to purchase livestock in order to slaughter for government workers except on one site, in which money was contributed for future O&M cost by promotion of an NGO who has developed water supply handpump in H/Chawa community.

Table: 4.10. Situation of community participation during handpump development

Issues	Respondents		
Have you participated in development of water supply handpump?	Response	Frequency	%
	yes	102	79.7
	No	26	20.3
	Total	128	100
In which phase you participated in development of handpump?	Planning	1	0.8
	Construction	41	32
	During& after construction	7	5.5
	In all(planning, const,post const)	53	52
	Total	102	100
What was your contribution in development of water supply handpump?	Labor	19	18.6
	Money	17	16.7
	Labor& local material	8	7.8
	Coffee & meal	1	0.8
	Labor & money	33	32.4
	Labor & meal	2	2
	All(labor, material, money)	22	21.6
	Total	102	100

Source: survey result, 2009

Whenever community participation is discussed, it is important to see the role of women in the development of water supply schemes. It should be borne in mind that women are the prime collectors of water and key beneficiaries of any improvement of water supply and hence should be involved in any attempt to improve water supply facilities. In relation to this, the study has investigated participation of women in development of the water supply handpumps in their localities. Accordingly, in the response to question delivered to know women's participation and their contribution, the following result has been obtained.

As can be seen from table (4.11), out of total 128 respondents, 112(87.5%) respondents replied that women had participated in the development of water supply handpumps, 15(11.7%) respondents said women's did not participate and the remaining 1(0.8%) respondent did not know whether they did or not. This statistics shows that women had involved in the development of water supply handpumps.

But as far as their way of participation is concerned, among 112 respondents those replied as women had participated in development of the handpump, 101(89.4%) respondents said that their participation was restricted to coffee and meal provision for the workers, 6(5.3%) respondent said that women had contributed meal and labor. The remaining 2(1. 8%) and another 2(1.8%) of respondents said that the women had contributed meal & money, and labor respectively.

Table: 4.11. Situation of women's participation in development of handpumps

Issues	**Respondents**		
	Response	**Frequency**	**%**
Did Women participate during development of water supply handpump?	Yes	112	87.5
	No	15	11.7
	I do not know	1	0.8
	Total	128	100
In what way/form were women participate in development of water supply handpumps?	Coffee & meal provision	101	89.4
	labor	2	1.8
	Meal & labor	6	5.3
	Meal & money	2	1.8
	Money	1	0.9
	Total	112	100

Source: Survey result, 2009

The above finding shows that women's way of participation was entirely confined to catering during development of water supply handpumps. Women were assigned to prepare and bring food and drinks to the workers. This role is very much linked to their

routine task in the study area and hence it is possible to conclude that women did not make any significant decision in the water supply projects. The reason behind the low level of women's participation in decision making is mainly attributed to the local culture, which restricts women's roles to domestic sphere.

Furthermore, the ultimate goal to promote demand responsive approach & community participation in general and women's participation in particular is to enhance sense of ownership of the user community and as a result, ensure scheme sustainability. With regard to this issue, out of total 128 respondents, 119(93%) respondents said that they feel sense of ownership for their water supply hand pump while the remaining 9(7%) respondents said they did not feel the sense of ownership.

The above figures clearly show that the community/beneficiaries sense that the scheme developed within their community belongs to them. However, the figures also show that only feeling sense of ownership neither guarantees nor warranty for sustainability of water supply schemes. Had it been the sense of ownership that ensures sustainability of the handpumps, the considerable number (about 48%) handpumps would have not been non-functional in the study area. Therefore, other factors are equally important to ensure sustainability of water supply handpumps.

4.3.1.3. Community management/ organization

As discussed in the literature part, community participation can only be sustained if there exists a system for organizing the community. Community organization therefore entails that a community has the institutional capacity to manage the development and operation of the water supply schemes, if it is to be sustainable (McCommon et al 1990:9). Furthermore, without proper community organization structures, effective community participation has can hardly ensure sustainability. Hence, the responsibility to manage water supply system should not be transferred onto the community structure that lacks the capacity to operate and maintain schemes.

In line with this, the study has investigated the prevailing community management system in the study area. It is observed that all sample water supply hand pumps have got established water committee. The numbers of members of water committees were five in four schemes and seven in three schemes. As their gender composition is concerned, the number of women in water committee varies from 20% to 40% i.e. more than 50% the water committees are staffed with men.

However, in the response to question delivered to know whether the management bodies/WCs are adequately performing their duties and responsibilities the following findings were obtained. Out of 128 respondents, 40(31.3%) respondents said that WCs are discharging their duties and responsibilities adequately while the remaining 88(68.8%) respondents replied that the WCs are not adequately discharging their duties and responsibilities. As this result shows, majority of respondents are not pleased with the performance of the water committees.

As far as the problems of water committees are concerned, respondents mentioned that the WCs are not discharging their responsibilities adequately because: they lack interest & commitment as there is no incentive for their work; they do not open the pump on time; they discriminate among users; transfer duty onto one another; some of them do not have adequate knowledge about their roles and responsibilities. The respondents' recommendation to improve the performance of the water committees are the followings: WCs should be capacitated through trainings; the non-performing ones should be replaced by other concerned individuals; government sector offices should follow up the WCs performance; incentive mechanism should be established to motivate them; and there should be accountability mechanism of poor performance.

Furthermore, as observed during filed work, non functional handpumps are not maintained for long period. The main reason for this was inability of WCs to mobilize users in order to raise money to purchase spare parts and fence around water pumps. The inability of WCs to mobilize community shows their lack of commitment for

responsibility given due to reasons discussed earlier. Nevertheless, contributing money for spare parts and fencing around handpumps are considered as pre-requisite for users before maintenance of handpumps in the study area. In addition, concerning those non functional handpumps, WCs did not made any formal contacts with wereda water office for maintenance and resumption of the service of their water supply handpumps.

On other hand, even with functional hand pumps, the water committee's performance was found to be weak in managing the schemes. Except on two handpumps, those are located in H/Chawa and Dobe Samata communities, the remaining three functional handpumps are not fenced properly. Also, the pumps lack locks to safeguard them from children and animals. (see figure 4.5)

Figure: 4.5. Functional handpump without proper fencing and protection, Gowadamo, Aliwono site

Source: photo taken during field work, 2009

During FGD discussion with WCs, the following important issues were realized that are not addressed by implementing agencies. Among seven sample handpumps taken randomly for the study, three day trainings on water scheme and financial management was given for water committees in one community only, which makes 14% of sample handpumps. Remaining WCs, those are elected to manage on six handpumps (86% of sample) were given responsibility without any training how to manage their schemes and finances collected from the users. Similarly, training for community technicians was only given in a community mentioned above, who received two spanners as toolkit for maintenance purpose. The rest of WCs are deprived of those things. Furthermore, all water committees do not have working manuals and by-laws to discharge their duties and responsibilities properly. Also, the WCs do not have a legal status.

Therefore, the cumulative effect of aforementioned problems has impacted effective community management of water supply handpumps and also led to dissatisfaction among users on performance of water committees. As ultimate results, those problems have contributed to service unreliability and scheme non-sustainability in the study area.

4.3.2. Technical factors

4.3.2.1. Technology selection

Use of appropriate technologies which are low cost, easy to maintain, simple to use and readily available is one of the key factors determining sustainability of water supply schemes. Appropriate technologies are integral to the concept of village level operation and maintenance. The community should also play a role in selection of technology options to fit into its context. In this regard, the study has investigated whether the community had their say in the technology selection, whether the technology option (HPs) are easily operable and manageable by the communities and other related issues.

In the response to question delivered to respondents to know who selected their water supply technology option the following result has been obtained. As can be seen from table (4.12), out of 128 respondents, 86(67.2%) replied that their water supply scheme technology was selected by government, 21(16.4%) of respondents said their water

supply scheme technology was selected by NGO. Among the remaining respondents 12(9.4%), 8(6.3%) and 1(0.8%) had replied that their water supply scheme technology was selected by community, both community& government, and all in collaboration (community, government, NGO) respectively. according to this finding 107(83.6%) respondents are replied that their water supply scheme technology was selected by implementing agencies (either governments or NGOs). The result also shows that the users did not have their say in technology selection of water supply hand pumps.

With regard to easiness of their handpump for operation and management the following result has been obtained. As the table (4.12) shows, among 128 respondents, 96(75%) were replied as their water supply handpump is not easy for operation and management while the remaining 32(25%) respondents said that their handpump is easy for operation and management.

Furthermore, as the same table (4.12) shows, in the response to question delivered to respondents to know difficulties of operating and managing their water supply hand pumps, the following results has been obtained. Among 96 respondents those find their water supply handpumps difficult for easy operation and maintenance, 42(43.8%) respondents mentioned the reason as lack of skilled community technicians and 25(26%) replied that because of easily breaking parts. 11(11.5%) replied because it is hard to move handle and easily breaking parts. The remaining 7(7.3%), 4(4.2%), 3(3.1%), 3(3.1%) and 1(1%) respondents replied that lack of technician, toolkits& spare parts; lack of adequately skilled technician & repair is costly; hard to move handle; lack of community technician& toolkits and lack of spare parts respectively. However, 55.2 % of respondents did not support change of hand pump type.

Implication of majority's objection for change of handpump type is that because respondents are optimistic that users can operate & manage handpumps if appropriate trainings of local technicians, availability of toolkits and spare parts are secured.

Table: 4.12. Situation regarding technology option [Existing HPs technology]

Issues	Respondents		
	Response	Frequency	%
Who selected this type of technology option for water supply?	Community	12	9.4
	Government	86	67.2
	NGO	21	16.4
	Community& government	18	6.3
	All(Community, GO, NGO)	1	0.8
	Total	128	100
Is the technology option [HP] easily operable &manageable by the users?	Yes	32	25.0
	No	96	75.0
	Total	128	100
What do you think are the difficulties in operating & managing the handpump?	Hard to move handle	3	3.1
	Easily breaking parts	25	26.0
	Lack of community technicians	42	43.8
	Lack of community technicians & toolkits	3	3.1
	Lack of technician, toolkits , and spare parts	7	7.3
	Hard to move handle and easily breaking parts	11	11.5
	Lack of spare parts	1	1.0
	Lack of technicians and repair is costly	4	4.2
	Total	96	100
Do you suggest change in handpump type?	Yes	71	55.2
	No	57	44.8
	Total	128	100

Source: survey result, 2009

4.3.2.2 Availability of skills and toolkits needed for O&M

To enhance the sustainability of rural water supply handpumps, creating trained and skilled community technicians at the scheme level is important. Not only training of community technicians, but also provision of necessary toolkits to undertake the minor maintenance work is mandatory.

In this regard, in order to know the situation in the study area, respondents were asked whether there exist skilled/ trained community technicians within their community. Accordingly, out of 128 respondents, 112(87.5%) replied that there is no trained community technicians while the remaining 16(12.5%) respondents mentioned that there are trained technicians in their community. According to observation by the researcher during the field work, there exist trained technicians only in one community among seven sample water supply handpumps. The rest six communities did not have trained technicians and toolkits as well.

With regard to the community that has got water technicians, the technicians were given two day training by the implementing agency (i.e. an NGO). Furthermore, this community was given few hand tools (two spanners: No 18&24). However, the interview made with one of the technicians revealed that they have not undertaken any maintenance activities till now since their handpump has not had any problem. For the question asked whether they can repair if pump failure occurs sometimes in the future, he said "I do not think so because we did not got adequate training".

In the response to the question who carry out repair and maintenance when needed, almost all of respondent said government particularly WWRDO carries out repair and maintenance of the water supply handpumps.

4.3.2.3. The spare parts: availability, accessibility and costs

Since handpump parts are needed to move in order give water, they are subjected to wear and break downs. Specially, parts such as seals and rods frequently wear out and break due to mechanical pumping. So the availability, accessibility and affordability of spare parts are very important factors in order to make the service reliable and sustainable.

In this regard, according to WSP (2006:2), at a given moment, averages of 30% of all potentially functional handpumps in Africa are not working. In some areas, 50% or more are non functional due to in parts difficulties in obtaining spare parts. Further more, the

lack of spare parts has been a major constraint in the sustainability of water supplies. In some cases it has led to a complete abandonment of schemes.

In connection to this issue, the study has investigated the availability and accessibility as well as the affordability of the spare parts by communities when needed for repair of the pumps. As the following table (4.13) shows, out of 128 respondents 120(93.8%) respondents replied that the spare parts are not available and easily accessible at community level when needed, while the remaining 8(6.3%) respondents replied that spare parts are available and easily accessible at community level when need. For the question asked to know from where they obtain spare parts when needed, almost all of respondents said government provides it.

Furthermore, as same table shows, in response to question delivered to respondents to know their view about affordability of the spare parts when needed, the following response category has been obtained. Out of total respondents, 115(89.8%) replied that the cost of spare parts could not be afforded at community level while remaining 13(10.2%) respondent replied could be afforded at community level.

Table: 4.13. Regarding handpumps spare parts

Issues	**Respondents**		
	Response	**Frequency**	**%**
Are spare parts available & accessible at community level when needed?	Yes	8	6.3
	No	120	93.8
	Total	128	100
Are spare parts affordable at community level when needed?	Yes	13	10.2
	No	115	89.8
	Total	128	100

Source: survey result, 2009

4.3.2.4. Construction quality of handpumps

Quality of construction is one of the technical elements which affect sustainability of handpumps. These elements comprise proper sitting for drilling/excavation, well completion and construction of top works of the pump. As one can imagine, these issues are too technical and beyond the capacity of community to asses their quality. Furthermore, well completion reports are required in order to evaluate the work is done at good or not. Unfortunately, most of handpump fitted wells did not have well completion report. For this reason, in this study, respondents were asked how they evaluate overall construction quality of their handpumps from what they have observed so far.

Accordingly, out of 128 respondents only 33(25.8%) replied that the overall construction qualities of their handpump were not good. The remaining 43(33.6%) respondents replied that overall construction quality of their handpumps were good and the rest 52(40.6%) as very good.

Among seven sample handpump those were selected for HHs survey, one community (i.e. D/ilimate PA, Kawado town) has complained about the over all construction quality of their water supply handpump. Their argument was the depth excavated was very shallow and hence adequate ground water was not taped. Hence, no water will come out during dry season according to water committees on FGD. Also the community complained the construction quality on top work referring to the way it has cracked.

From observation during the study, it was learnt that some handpumps are found located/drilled very close to marshy area and as result abandoned without giving any service for communities because of water quality problem. This clearly shows that inappropriate site selection for construction led to non sustainability of hand pumps in the study area. (See figure 4.6)

Figure 4.6. Handpump located on marshy ground (left), top work cracked HP(right)

Source: photo taken during field work, 2009

4.3.3. Financial/Economic factors

4.3.3.1. Existence of user payments and its adequacy for O&M

As discussed in the literature review part, the existence of users' payment and the adequacy of that payment for O&M is important to ensure sustainability of rural water supplies in general and rural handpumps in particular.

Further more, EWRMP promotes that all water supply undertakings to adequately address costs associated with O&M and be based on "cost-recovery" principles. And also the policy stipulates that rural tariff settings should be based on objectives of recovering O&M costs while urban tariff structures are be based on basis of full cost recovery. These policy provisions are in order to enhance sustainability of water supply schemes.

In line with this, the study has investigated the actual practice on ground and users position towards the existence of users payment and its adequacy for O&M of their scheme. As the following table (4.14) shows, in the response to question delivered for respondents to know whether they pay for developed water supply service the following

result has been obtained. Out of total 128 respondents, 94(73.4%) respondents replied that they pay for developed water supply service while 34(26.6%) respondents replied that they did not pay for the water supply service.

The form of the payment is entirely in cash and the majority of respondents pay 50 cents per month per household in flat rate tariff. Mostly, the money is collected during coffee harvest time because the communities usually get money in this time by selling their coffee than other seasons. This seems a good practice because for people whose livelihood is based on the agriculture, it is difficult to have money through out the whole year. In this regard, as Davis and Brikee(1995:41) suggest, suitable season should be considered for users payment for agricultural communities because of marked variation in their seasonal income.

Furthermore, the study has investigated that whether the users are paying regularly for their water supply service. In this regard, as the table (4.14) shows, out of 128 respondents 55(43%) had replied that they regularly pay for their water supply services while the remaining 73(57%) do not pay regularly for water supply service. The study findings show that some users have only paid for once or twice for a purpose of fencing around the pump and to pay for pump care takers.

However, most users did not pay regularly because monthly contribution practice was not realized in their respective communities. Specifically three communities-Kawado village town, Balesto and Homacho Chawa have not entered to this practice. During the survey time, the former two communities' handpumps were not functioning. But as learned from KII and FGD with water communities in the two villages, the users were not paying regularly even during the handpumps were functional. This finding shows that regular finance source is not established for O&M cost of the handpumps in some communities in the study area.

Paying for water service does not necessarily mean the users support the existence of payment for water service. As observed during field work, community members those do

not contribute for water service in the places where regular monthly contribution mechanisms established, can not use the water. In the response to question delivered to respondents to know whether they support the existence of user fee/ water tariff the following result has been obtained. As the table (4.14) shows, out of 128 respondents, 103(80.5%) replied that they support the idea of paying water tariff/ user fee while the remaining 25(19.5%) respondents do not support the idea.

Table: 4.14. User contribution issues for O&M of handpumps

Issues	**Respondents**		
	Response	**Frequency**	**%**
Do you pay for developed water supply service?	Yes	94	73.4
	No	34	26.6
	Total	128	100
Do pay regularly for the service?	Yes	55	43.0
	No	73	57.0
	Total	128	100
Do you support the idea of paying water tariff/user fee?	Yes	103	80.5
	No	25	19.5
	Total	128	100

Source: survey result, 2009

As far as the reason for supporting the existence of user fee/water payment is concerned, the majority of respondents support the existence of user payment for the reason of maintenance and payment for care takers. Others reasoned their support for maintenance and since service is better. The remaining respondents justified their support for existence of user fee to under take maintenance, pay for pump care takers and service is better. The few respondents replied that there should be payment for potable water.

The study finding shows that majority of the respondents support the existence of water tariff/user fee for their water supply service. This attitude of respondents can be a positive ground to establish regular user fee mechanism within beneficiaries in study area.

As far as affordability and adequacy of water user payment is concerned, the response of those respondents regularly paying user fee/water tariff was analyzed and the following results have been obtained. As the following table (4.15) shows, out of 55 respondents

those are paying user fees regularly, 35(63.6%) said the payment is affordable while remaining 20(36.4%) respondents said it is not affordable. With regard to adequacy of the payment, 46(83.6%) respondents said the payment is not adequate while only 9(16.4%) respondents replied as the payment is adequate to cover O&M. Majority of respondents agreed that the user fee is not adequate to cover all O&M because the contribution is minimal.

Table: 4.15. Situation of affordability and adequacy of user payment

Issues	**Respondents**		
	Response	**Frequency**	**%**
Do you think payment is affordable?	Yes	35	63.6
	No	20	36.4
	Total	55	100
Do you think payment is adequate to cover all O&M?	Yes	9	16.4
	No	46	83.6
	Total	55	100

Source: survey result, 2009

4.3.3.2. Willingness and ability of users to pay for service

As discussed in the preceding section, about 80.5% of respondents are supportive of the existence of water tariff/ user fee for water service. Needless to say, this finding shows a large number of respondent beneficiaries are in favor of the payment. Even though, the existence of beneficiaries those support the user fee is one positive step forward to establish regular finance source for O&M costs, it is not the only thing required to do so. The respondent's support for existence of user fee shows only their willingness to pay. But it does not show their ability to pay. As discussed in literature part and also according to Davis&Brikee(1995:1) and Gelta et al(2002:26), O&M cost can only be recovered from users if they are both able and willing to pay for water supply service.

In relation to this respondent beneficiaries were asked amount of money they are willing and able to pay to cover O&M costs of water supply handpumps. As the following table (4.16) shows, out of total respondents 35(27.3%) replied that they are willing and able to pay 1.0 Birr per HHs/ month, 23(18%) respondents 50 cents, and 17(13.3%) respondents

2.0 birr per HHs/month. Furthermore, as one can see from the table, respondents those pay 50 cents and blow comprise only 31.3% of the total respondents. However, 68.7% of respondents replied that they have willingness and ability to pay more than 50cents per HHs/month, which the users are paying currently in the study area. The mean value of the respondents willingness and ability to pay is 1.58 Birr per HHs/month with SD=1.62. This high SD shows that the mean value is affected by extreme values such as 0 and 8 Birr. However, the modal value of respondents' ability and willingness to pay is 1.0 Birr per HHs/ month. Therefore, it is reasonable to make the monthly contribution of the user fees 1 Birr per HH in the study area according to this analysis. This analysis also shows that majority of respondents are paying half of the payment of their effective demand.

Table: 4.16 Amount showing users' willingness and ability to pay for water supply service (Per HHs/month)

Amount in birr	Frequency	Percent	Cumulative percent
0.00	12	9.4	9.4
0.25	3	2.3	11.7
0.40	2	1.6	13.3
0.50	23	18.0	31.3
0.85	8	6.3	37.5
1.00	35	27.3	64.8
1.25	1	0.8	65.6
1.50	3	2.3	68.0
2.00	17	13.3	81.3
2.50	1	.8	82.0
3.00	6	4.7	86.7
4.00	5	3.9	90.6
5.00	9	7.0	97.7
6.00	1	0.8	98.4
8.00	2	1.6	100.0
Total	128	100.0	

Source: survey result, 2009

4.3.3.3. Financial management system

In the preceding parts of this section, the importance of user payment, existing practice of user payment in the study area, user willingness and ability to pay has been discussed. However, it is needless to say that the money collected should be managed properly and utilized for the purpose it was collected for. Therefore, prudent financial management system should be established.

In relation to this, the study has investigated the way the money is collected from users or user fees/water tariff is being managed. In the response to the question delivered to respondents to know who manages the water fees collected from users, the following result has been obtained.

As the following table (4.17) shows, out of 128 respondents 120(93.4%) are said that water committee manages the water fee collected from users. The same response has been obtained from community KII and FGD with water committees. The water committees those are participated on FGD did not have opened the bank account to save the money yet. They mentioned, the money collected from users is small. Therefore, they pay it for pump care takers and as result no money was deposited in bank. But according to WWRDO, some other community has got deposit in a bank to be signed and drawn by joint signature of WC chairperson, secretary and treasurer. However, the WWRDO should agree for the reason the WCs draw the money and should write support letter for local financial institution if there is a need to draw the deposited money. Therefore, WCs alone can not draw the money according to their will. During KII, head of WWRDO mentioned that this mechanism designed to avoid misutilization of users' money. These discussions show that government office, particularly WWRDO also has the part in the management of user contribution.

Furthermore, financial management requires honesty and capacity to properly manage the users' money. For this reason the question which elicits this issue has been delivered for respondents during survey. As the table (4.17) shows, among 128 respondents, 94(73.4%) replied that scheme managers has both honesty and capacity to manage the money

collected from the users while the remaining 29(22.7%) replied that the scheme managers do not have honesty and capacity to manage the money collected from users. Anyway, this result shows that majority of respondent are confident of their delegate on financial management.

Table 4.17. Financial management situation of handpumps

Issues	Respondents		
	Response	**Frequency**	**%**
Who manages the water fees collected from users?	Water committee	120	93.8
	Government	-	-
	NGO	-	-
	All in collaboration	1	0.8
	No one	5	3.9
	No response	2	1.6
	Total	128	100
Do you think the WC has both capacity and honesty to manage money?	Yes	94	73.4
	No	29	22.7
	I do not know	5	3.9
	Total	128	100

Source: survey result, 2009

4.3.4. Environmental factors

4.3.4.1. The quantity of the water supply

The yield of the water supply handpumps in relation to the number of beneficiaries is one of important issue to be discussed as far as the sustainability and service reliability of water supply schemes are concerned. As known from handpumps inventory result, some of the handpumps in the study area were abandoned due to low yield. Furthermore, seasonal variation, population growth and non functionality have impact on the adequacy of the water supply in the community. Consequently, the pressure on the schemes will be increased and the sustainability of the schemes will be threatened.

In the relation to this issue, the study has interviewed the respondents whether their water supply is adequate. Accordingly, out of 128 respondents, 75(58.6%) replied that their water supply source is not adequate for beneficiaries while remaining 53(41.4%) replied as their water supply source is adequate for beneficiaries. This finding shows that larger

number of respondents replied that their water supply source is not adequate. The respondents mentioned that increase in number of beneficiaries, shortage of water in the well during dry season, limited fetching hour, inadequate depth excavation/drilling of the well, and pumps failure as the cause for inadequacy of their water supply. The users recommended for development of additional handpumps, timely maintenance during pump failure and the rehabilitation of low yield wells.

4.3.4.2. The quality of the water source

Water quality problem is a typical environmental factor which affects water schemes sustainability in some locality since water quality is the result of water-rock and soil interaction in given geological formation. For instance, numbers of water supply schemes are abandoned in rift valley area, in Ethiopia because of high concentration of fluoride ion in the water source. According to researcher experience, major water quality problem in the study area is high iron concentration in ground water and hence some deep wells are abandoned as result.

Aforementioned water quality problems due to high concentration of fluoride and iron are known as chemical water quality problem and can be identified by laboratory analysis and impact on users and conveying pipes. But common water quality problems that can be identified at household level are physical water quality problems such as odor, taste and turbidity.

In the relation to water quality problems, the households were asked whether their water has got water quality problem or not. Accordingly, out of 128 respondents, 121(94.5%) replied that their water supply source do not have water quality problem while only 7(5.5%) respondents replied that their current water supply source has water quality problem. The latter group of respondents complained metallic taste of water, some times. The majority of respondents do not have any complainant on quality of their water supply.

However, as discussed under the construction quality section and as the following figure (4.7) shows, there exists hand pumps those are totally abandoned because of water quality problem in the study area since the pumps are located in marshy ground. This implies that the environmental factor, especially water quality problem, has also contributed for handpumps sustainability problem in the study area.

Figure: 4.7. Picture of abandoned handpump located/drilled in marshy ground, Gowadamo PA.

Source: photo taken during field work, 2009

4.3.5. Institutional factors

4.3.5.1. Institutional Capacity of Wereda Water Resources Development Office

As discussed in the literature review, the institutional capacity is a critical factor in the water supply sector and influenced particularly by the organizational framework and the quality of staff. The organizational framework should encompass all the components of the sector from planning and design to O&M, with support for programs on health education and community participation.

Furthermore, other important requirement for a successful institution is availability of adequate budget to carry out its mandates. In relation to this, the study has investigated the organizational capacity of the Wereda Water Resource Development Office, which is responsible for water supply provision and managements in the wereda. The issues addressed during the study were: organizational frame work, human power situation with respect to total required personnel, budget situation and material resources of the office. Furthermore, the political power of the office also addressed because it is important to resource sharing and to exercise its role with full capacity and power.

As the following table (4.18) shows, out of total required positions in WWRDO, only 45% of the positions are occupied while the rest 55% of the positions are vacant. Furthermore, the team which is responsible to follow up, assists and under take the major maintenance of already developed water supply scheme has got only a single person. 75% position of this team is vacant. On other hand, strengthening of this team is important to ensure sustainability of water supply schemes in general and rural handpumps in particular in the study area.

As far as qualification of the staff is concerned, 6(60%) of them have got diploma from technical and vocational education center (TVET) in the fields of Water supply and sanitation, electro mechanicals and irrigation. 2(20%) of the staff have got diploma from private colleges in management, 1(10%) staff member has got certificate in surveying and the rest one individual is trainee of TTI (teachers training Institute).

Table: 4.18. Summary of human resources of WWRDO during survey

Division	Staffing Situation				
	Staff type	**No. required**	**Occupied positions**	**Vacant positions**	**% of occupied positions**
Office of head	support	4	1	3	25%
Water supply service improvement, community participation and training section	Technical	5	4	1	80%
Water supply development and quality control team	Technical	5	2	3	40%
Water supply schemes maintenance team	Technical	4	1	3	25%
Subtotal		**18**	**8**	**10**	**44%**
Mines& Energy development team	Technical	4	2	2	50%
Total		**22**	**10**	**12**	**45%**

Source: Aleta Wendo WWRDO, 2009

As far as material resources of the office are concerned, it is one of the areas that the WWRDO is under capacitated. Specifically, the office has got only one old motor bicycle as transportation facility to under take the activities of every section. Furthermore, the office has got a single telephone line for communication and two small rooms to accommodate all staff members. The latter is permitted for them by wereda main administration for temporary use. As discussed during the FGD with staff member and KII with acting head of office, there is no facility for secretarial purpose such as computers, printers and copy machine. Furthermore, it is mentioned on FGD, there is no adequate basic maintenance toolkits to undertake the maintenance of dysfunctioning water supply schemes.

One of critical factor which undermine or enhance the capacity of given organization is budget allocation. In this regard, the trend in budget allocation & its allocation category was investigated in for the last three budget years. As the table (4.19) shows, except 2001 EFY budget, almost large amount of money is allocated for salary, which by itself makes no difference for development challenge of the sector.

Table: 4.19. Summary of Budget Allocation of WWRDO (1999-2001EFY) in Birr

S.no	Budget year(EFY)	Total Budget Allocated	Budget Category		
			Capital	Recurrent	
				Running	Salary
1	1999	118,562	0(%)	15,000(12.65%)	103,562(87.35%)
2	2000	119,004	0(%)	15,876(13.34%)	103, 128(86.66%)
3	2001	408,191	238,000(58.31%)	50,000(12.25%)	120,191(29.44%)

Source: Aleta Wendo WWRDO, 2009

As far as the political power of WWRDO is concerned, unlike other sectors, head of the office is not a member of wereda cabinet. Furthermore, the position is neither politically appointed nor merit based. This is not yet decided by Regional WRDB. Therefore, heads of these offices in the region are only acting individual assigned by woreda administration. Furthermore, as it is mentioned above, since the office delegate cannot attend wereda cabinet meeting during budget allocation and other crucial decisions, on sector issues, the staff and acting office head complained seriously that the resource allocation to the WWRDO is not fair. The wereda staff focus group discussant and KI interviewee argued that even though the government has given attention to universal access of the water supply, no enough power and resource is given at lower/wereda level. Furthermore, they mentioned that their office has a challenge even to sustain water supply schemes with community because of aforementioned constraints.

4.3.5.2. Institutional support for community management

One way of enhancing sustainability of rural water supply schemes is the provision of institutional support to community management bodies by government staffs or NGOs. Also, problems that are beyond community level need to be addressed by supporting agencies.

According to Davis& Brikke(1995:84), governments need to support O&M strategies adopted function well, and enforce that standards are established and maintained. This will entail monitoring management systems, the quality and quantity of water being supplied, the efficiency in supply of spare parts and the appropriate choice of new schemes. Furthermore, NGOs working in water supply can support community management by giving necessary scheme management training for water committee and technical trainings for local technicians. Besides, there are some experience with NGOs those supported spare parts and toolkits for community management of water supply schemes.

In the relation to this issue, this study has investigated whether institutional support has been rendered so far or not for community management in the study wereda, since existence of institutional support can contribute for water schemes sustainability. As the following table (4.20) shows, out of 128 respondents, 70(54.7%) replied that they have received supports from government to enable them manage their water supply hand pumps while the rest 58(45.3%) respondent said they did not receive support from government. The supports, government rendered for the community mentioned are: scheme maintenance, disinfection, advice, follow-up, rod cleaning, spare parts, replacement of pumps and trainings.

As the same table shows, in response to question delivered to respondents to know whether community/water committee obtained any support from NGOs in relation to managing their water supply schemes to make properly functional and sustainable,

108(84.4%) respondents replied that the did not got any support from NGO on the matter. However, 13(10.2%) respondents replied that they have obtained trainings and maintenance tools. The latter case is observed on one village which their handpump were developed by SP, which is only active NGO in the area during field work.

As the table (4.20) shows, with regard to continuity of support either from government or NGOs is concerned, the following result has been obtained. Among total 128 respondents, 77(60.20%) replied that the support given from external body did not have form of continuity while the rest 51(39.8%) respondents said it has got the form of continuity. The above results and discussions made with FGD and Community KII explained that the supports are limited to early stage of scheme development.

As learned from WWRDO during FGD with staff members and KII with office head, the office could not make continuous follow up and monitoring of rural water supply schemes status because of resource constraints. But, the WWRDO attempting to respond community demand especially for maintenance of pump failures not proactively but reactively. However, in order to make community management effective continuous follow up and monitoring of management situation should be done to ensure sustainability and service reliability.

Table: 4.20. Situation of institutional support for community management of HPs

Issues	**Respondents**		
	Response	**Frequency**	**%**
Do community/WC receives an external support from government to enable them for effective mgt of handpump?	Yes	70	54.7
	No	58	45.3
	Total	128	100
Do community/WC receives an external support from NGO to enable them for effective mgt of handpump?	Yes	13	10.2
	No	108	84.4
	I do not know	7	5.4
	Total	128	100
Did supports given from government & NGOs have form of continuity?	Yes	51	39.8
	No	77	60.2
	Total	128	100

Source: survey result, 2009

CHAPTER-FIVE

5. Conclusions and Recommendations

5.1. Conclusions

The assessment made on sustainability problem of community managed rural water supply handpumps has revealed multifaceted factors (community, technical, financial, institutional and environmental) that are hindering the sustainability of schemes in the study area.

As far as community factors are concerned, the study has shown that the users have played a role in demanding the improved water supply service and participated during development of water supply handpumps. The participation of users during development of their water supply hand pumps, has contributed to the enhancement of sense of ownership among the user communities towards their scheme. However, the study has also revealed that, there is a weakness with regard to women participation and water committees' performance in managing their water supply schemes.

Even though, women are prime collectors and users of water supply service, their participation in handpumps development was restricted to catering. Furthermore, number of females in WCs of sample handpumps is not satisfactory and responsibility of women within WCs is limited to a mere membership in most cases. The position of chairperson and secretary within WCs seems reserved for male members of WCs. Generally, the study has shown that women decision power on water scheme development and management issues curtailed by men dominance in contrary to their prime roles in collection and use of water supply service.

The study also shown that, WCs are not performing adequately in managing their water supply handpumps. They lack interest, commitment and incentives for their work, they do not open pumps on time; they discriminate among users; some of them do not know their responsibility; they did not mobilized community adequately; they did not fenced handpumps properly, and also some handpumps lack locks to safe guard from children

and animals. Further more, study find out that WCs were not capacitated by implementing agencies to discharge their duties and responsibilities properly.

With regard to technical issues, the study has shown that there exist varying problems under this category: lack of community technicians and toolkits; lack of spare parts, and problems related with construction quality. As far as community technicians are concerned, there is no trained community technicians for water supply handpumps with exception of handpump which is located H/Chawa kebele, Gobicho site. The only maintenance tools found among the user community are spanners (No. 18& 24), which was only the case with the handpump in aforementioned kebele.

With regard to spare parts issue, it is a great challenge in the study area. Also, the Wereda and Zonal water offices do not have spare parts supply system. There are no formal private suppliers engaged in supply of spare parts in the study area. The only place to access pump spare parts occasionally is the Regional Water Bureau. Furthermore, this study has shown that formal hundpumps spare parts supply chain mechanism is not established yet in Wereda and Region as well.

As far as financial/ economic factors are concerned, even though there exists a practice of users' contribution for O&M of water supply HPs in the study area, majority of beneficiaries do not pay contribution regularly. In this regard, study has shown majority of users do not contribute for O&M of water supply hand pumps on regular basis. This implies that regular financing mechanisms for O&M of handpumps are not established yet in number of community in the study area. However, the positive thing the study revealed concerning the payment is that a great deal of users support existence of user fees for water supply service. This attitude of respondents can be a good ground to establish regular user fee mechanism within beneficiaries in the study area.

With regard to adequacy of the contribution, a great majority of the users agreed that the current amount of contribution is not adequate to cover all O&M costs. The users' willingness and ability to pay were found to be 1Birr/HHs/month while current monthly

contribution is 50 cents per HHs. Therefore, the financial increase to improve O&M situation of handpumps could be attained by revising the community contribution in the study area.

As far as institutional factors are concerned, WWRDO, which is responsible to water supply provision and management within the study area, has got severe institutional capacity problems in terms of human power and material resources. Furthermore, no adequate budget is allocated for the water supply office to fully discharge its duties and responsibilities.

As far as environmental factors concerned, the study has shown that majority of users fail to get adequate water from their water supply handpumps because of low yields, increased beneficiaries and seasonal variations. With regard to water quality problem, the majority of users do not have water quality problem in their handpumps. However, some handpumps became non functional because of water quality problems in the study area especially due to inappropriate site selection which emanated from poor and/or lack of feasibility study.

5.2. Recommendations

In order to resolve the prevailing high water supply handpumps sustainability problem in study area, the researcher makes the following recommendations:

- Community management model to rural water supply handpumps through elected water committees is not problem by itself. The problem occurs when necessary inputs not provided for WCs such as: adequate water schemes and financial management trainings; working manuals and directives; by-laws and legal status of the water committees to fully discharge their responsibilities. Therefore, these important inputs should be fulfilled for water committees by implementing agencies or concerned authorities. Furthermore, follow up and monitoring of the performance of the WCs should be conducted in regular basis.
- Even though women are prime collectors and users of water supply services, their role and influence did not come in to light during schemes development and management in the study area. Therefore, necessary consultation and promotion should be done to involve women during planning, construction and management of water supply handpumps. The role of women's should go beyond catering to include active participation in decision making processes. Furthermore, number of women in WCs should be at least fifty percent. It is also logical to make their representation even more since water issues concern them more than any one else. It is also important to improve women's position within the WCs, which is currently limited to a mere membership, through capacity enhancement interventions.
- Most of water supply handpumps in the study area are VLOM. Therefore, adequate trainings should be given for community technicians to undertake minor maintenances. Furthermore, necessary toolkits should be provided for their work. Inclusion of women community technicians should be considered for the maintenance work, since they sense service interruption or loss more than males and hence they take measure more urgently when problem occurs.

- Handpumps are mechanical devices. As result, their parts are subjected to wear through usage. Especially, fast wearing parts such as seal and rods can be

mentioned. Therefore, spare parts supply chain should be established urgently. To do so, the establishment of spare parts revolving fund (SPRF) by government and establishing at least one supply center in the wereda capital is essential. This mechanism is feasible since, let alone spare parts, community members/individuals are taking rope pumps those are provided by Regional Water Bureau with support of JICA. Also, private sector should be encouraged for manufacturing of pumps and spare parts within the country in order to secure sustained supply of spare parts.

- According to EWRMP, O&M costs of rural water supply schemes should be covered by user community. Hence, users should contribute regularly in order to cover O&M cost of water supply schemes. In this regard, tariff rate should be revised based on the users' ability and willingness to pay in study area, which is 1Birr/HHs/month instead of 50 cents tariff currently in place. Also, practice of saving collected user fees in local financial institutions should be strengthened.

- Low yield of wells and water quality problems has contributed for non-functionality of handpumps in the study area. The problem occurred because of inadequate excavation/drilling and inappropriate site selection. Therefore, necessary feasibility study should be conducted by relevant professionals before commencement of wells excavation/drillings. Also, excavation/drilling supervision should be made by appropriate professionals in order to avoid yield deficiency of the wells and partial penetration of the aquifers [water bearing formation].

- At last, not least, institutional capacity of the WWRDO in terms of human power, material and financial resources should be enhanced through adequate allocation of budget for recruitment of staff, purchase of materials and logistics, and allocation of adequate recurrent and capital budget so that office can fully discharge its responsibility.

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Annex 1: Interview Schedule for Households Survey

Interview schedule for Household survey

A.A.U

School of Graduate Studies

College of Development Studies

Objective: The purpose of this interview schedule is to generate relevant information on problems to sustainability of rural water supply schemes in Aleta Wendo Wereda with particular attention to hand pump water supply schemes.

The study is conducted for M.A Degree in development studies at the college of Development studies of A.A.U. It is expected that the study will come up with viable findings on problems to sustainability of rural water supply hand pumps and will contribute to the socio-economic development efforts by supporting government's attempt to increase the coverage of safe, adequate and sustainable water supply to all community in the long-run. Also it can save wastage of scarce capital because of schemes dysfunctionality.

The study is conducted only for the academic purpose and the respondents and response will not be deployed for other purpose. The information you will provide is very essential for the success of the study. Therefore, you are kindly requested to answer all questions and give reliable and complete information on the issues. All information you provide will be treated confidentially.

Instruction for interviewer:

1. Introduce your self
2. Inform the respondents, the interview schedule is only used for the purpose of development and contribute for improving the living standard of the society and tell them that their name and response is not deployed for other purpose.
3. The interview schedule has got two parts. Therefore, circle their answer among alternative choices for questions with alternatives and write down in brief the opinions of respondents for questionnaires that require explanation.

Name of interviewer _____

Date of interview _____
Interview conducted: Woreda Aleta Wendo
Kebele _____
Community _____

Interview schedule identification no: _____

Name of Respondent:_____

Thank you for your cooperation and patience in advance!!!

Part one: Background information

1. Sex ? 1. Male 2. Female
2. Age? (in complete years) _____
3. What is your current marital status?
   1. Single 2. Married 3. Divorced 4. Widowed 5. Separated
4. Number of family members /family size/? _____
5. Ethnic group?

   1. Sidama 2. Amhara 3. Wolayta 4. Guraghe 5. Others, specify _____

6. Religion?
   1. Protestant 2. Orthodox Christian 3. Muslim 4. Catholic
   5. Others, specify _____
7. Educational level?
   1. Unable to read and write (illiterate)
   2. Able to read and write
   3. First cycle (1-4) complete
   4. Second cycle (5-8) complete
   5. High school (9-10), complete
   6. Above high school
8. Rank your family source of income in accordance with their importance?
   1. Farming /agriculture _____ 3. Government employee_____
   2. Business /peaty trade _____ 4. Daily labor _____
   5. NGO employee _____ 6. Others, specify _____
9. Average monthly income of the family (in Birr) _____

Part Two: current water supply situation

10. Which one is your main source of water for drinking now?
    1. River 2. Unprotected spring 3. Traditional hand dug well
    4. Hand dug well fitted with Hand pump 5. Shallow well fitted with Hand pump
    6. Others, specify _____

11. For what other purpose do you use the water from the main source in addition to drinking?

_____

12. If your use of water from main source does not cover the entire household utility purposes, from where you get water for remaining activities. (List the sources in your frequent use order)

1st _____

2nd _____

3rd _____

13. Do you still go to the secondary/the sources other than the main sources/ sources of water for drinking purpose 1. Yes 2. No

14. If your response to Q13 is "Yes", why you do so?

_____

15. Are/were you the beneficiary of developed potable drinking water from hand pump?

1. Yes 2. No

16. If your response to Q15 is 'Yes', does the hand pump function now?

1. Yes 2. No

16.1. If your response to Q16 is 'No', when was it become non-functional?

(In no of years, in months) _____

16.2. Why do you think it is non-functional? _____

16.3. If your response to Q16 is "Yes", have you ever faced the non-functionality problem with the HP since the time of construction?

1. Yes 2. No

16.4. If "Yes", to Q16.3, how frequent it is problematic (fails to provide service) since the time of construction

1. Frequent 2. Sometimes 3. Rarely 4. If other, specify _____

11. For what other purpose do you use the water from the main source in addition to drinking?

_____

12. If your use of water from main source does not cover the entire household utility purposes, from where you get water for remaining activities. (List the sources in your frequent use order)

1st _____

2nd _____

3rd _____

13. Do you still go to the secondary/the sources other than the main sources/ sources of water for drinking purpose 1. Yes 2. No

14. If your response to Q13 is "Yes", why you do so?

_____

15. Are/were you the beneficiary of developed potable drinking water from hand pump?

1. Yes 2. No

16. If your response to Q15 is 'Yes', does the hand pump function now?

1. Yes 2. No

16.1. If your response to Q16 is 'No', when was it become non-functional?

(In no of years, in months) _____

16.2. Why do you think it is non-functional? _____

16.3. If your response to Q16 is "Yes", have you ever faced the non-functionality problem with the HP since the time of construction?

1. Yes 2. No

16.4. If "Yes", to Q16.3, how frequent it is problematic (fails to provide service) since the time of construction

1. Frequent 2. Sometimes 3. Rarely 4. If other, specify _____

21. Who selected the site for development of hand pump?

1. Community
2. Government
3. NGO
4. All in collaboration
5. Other, specify _____

22. Have you participated in the development of the water supply hand pump?

1. Yes 2. No

22.1. If your response to Q22 is "yes", at which phase you participated?

1. during planning
2. During construction
3. Post-construction
4. In all
5. If other, specify _____

22.2. What was your contribution in development of hand pump?

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

22.3 If your response to Q22 is "No", why do you think the reason for not participating?

1. Not asked
2. Everything is done by the implementing agency
3. Lack of awareness
4. Other, specify _____

22.4 Do you feel sense of ownerships to the developed hand pump?

1. Yes 2. No

22.5. Did women participate during water scheme development?

1. Yes 2. No

22.6. If your response to Q22.5 "Yes" in what form? _____

22.7. If your response to Q22.5 "No" what do you think the reason behind their non-participation?

1. Burden of home activities
2. Religions reason
3. Cultural reason
4. Non-permitting husband
5. Not interested
6. Others, specify_____

23. Is there established management system for the developed water supply hand pump?

1. Yes 2. No

23.1. If your response to Q23 is "Yes", who manages the hand pump?

1. Water committee
2. Government
3. NGO
4. If other, specify _____

23.2. Does the management body adequately perform their duties and responsibilities?

1) Yes 2) No

23.3. If your response to Q23.2 is "No", what do you think the reason?

_____

23.4. If you responded, Q23.3 what do you suggest to be done so that the management body perform their duties and responsibilities adequately?

_____

24. Do the community/water committee receives any external support from government to enable them effectively manage their water supply hand pump?

1. Yes 2. No

24.1. If your response to Q24 is "Yes" what support did the community get from the government organizations in relation to managing the water supply schemes to make properly functional and sustainable? _____

25. What support did the community get from NGO in relation to managing the water supply schemes to make properly functional and sustainable? _____

26. Did the support given to the community from government and non-governmental organizations have some form of continuity?

1. Yes 2. No

27. What types of supports are needed by the community to make the water supply hand pump functional for long period of time? _____

Part Four: Technical Factors

28. Who selected this type of technology option for water supply?

1. Community
2. Government
3. NGO
4. All in collaboration
5. If other, specify _____

29. Is the technology option (the hand pump) easily operatable and manageable by the beneficiaries?

1. Yes 2. No

Q29.1. If your response to Q29 is "No", what do you think are the difficulties

1. Hard to move the handle
2. Easily breaking parts
3. Other, specify _____

Q29.2. Do you suggest a change in hand pump type? 1. Yes 2. No

30. Is/Are there community technician/s that has/have taken basic training to carry out repairs and maintenance when the hand pump encounter problem or non-functionality?

1. Yes 2. No

Q30.1. if your response to Q30 is "Yes", are any of them are females?

1. Yes 2. No

Q30.2. Is/are he/she/they equipped with necessary tools to carryout repairs when needed?

1. Yes 2. No

Q30.3. If your response to Q30 is "No", who carriers out repairs and maintenance when needed? _____

31. Are spare parts are available and easily accessible at community level when needed?

1. Yes 2. No

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

1. Purchase on market
2. Given by regional/zonal/Woreda water offices/government agency/.
3. Donated by NGOs
4. If other, specify _____

33. Are spare parts affordable at community level when needed?

1. Yes 2. No

34. How do you evaluate overall construction quality of the water supply hand pump?

1. Not good 2. Good 3. Very good

4. If other, specify _____

Part Five: Regarding financial factors

35. Who financed the developed water supply hand pump?

1. Community 3. NGO 4. All in collaboration
2. Government
5. If other, specify _____

36. Do you pay for the developed water supply service? 1. Yes 2. No

Q36.1. If your response to Q36 is "Yes", in what form you pay? How much do you pay per household/month?

_____

Q36.2. Do you support the idea of paying water tariff/user fee?

1. Yes 2. No

Q36.3. If your response to Q36.2 is "Yes", what is your reason for supporting water payment?

1. To undertake scheme maintenance 3. Since the service is better
2. To pay water caretaker and technicians 4. Potable water should cost money
5. Other, specify _____

Q36.4. If your response to Q36.2 is "No", why not? _____

1. Lack of awareness about its importance.
2. Dissatisfaction with the service
3. Water is natural gift, so no need of payment
4. I don't have confidence on water committee
5. Other, specify _____

Q36.5. Do you think the payment is affordable? 1. Yes 2. No

Q36.6. How much money are you willing and able to pay for the service per month?

_____

Q36.7. Do you/your family/regularly pay for the water supply service?

1. Yes 2. No

Q36.8. If "No", why do you not pay regularly? _____

37. Who set the price of the water fees?

1. Community 4. All in collaboration
2. Government 5. If other, specify _____
3. NGO

38. Do you think the water fees collected from the beneficiaries is adequate to cover all O & M costs of the hand pump?

1. Yes 2. No

Q38.1. If your response to Q38 is "No", why do you think to reason? _____

_____

39. What costs of the water supply hand pump are covered by fees collected from users?

1. costs of minor repairs
2. Costs of major repairs
3. Salary of care takers
4. Costs of community technicians
5. Costs of spare parts
6. If other, specify _____

40. Who manage the water fees collected from the users?

1. Water committee
2. Government
3. NGO
4. All in collaboration
5. If other, specify_____

41. Do you think the scheme managers have the capacity and honesty to mange the money collected?

1. Yes 2. No

41.1. If your response to Q41 is "No" what do you suggest to be done to resolve the problem? _____

Part Six: Regarding Environmental Factors

42. Do you remember in which season the water supply hand pump was developed?
    1. During the dry ("Bega")
    2. During the wet ("Kirmit")
    3. If other, specify _____

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

    Q43.1. If your response to Q43 is "No", what do you think the reason for inadequacy?

    _____

    Q43.2. what is your suggestion to tackle the problem? _____

    _____

44. Do you think the water supply source now you are using has water quality problem?
    1. Yes 2. No

    Q44.1. If your response to Q44 is "Yes", what kind of water quality problem you observed?

    _____

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

    _____

    _____

    _____

Thank you again!!!

Annex 2: Checklist for Focus Group Discussions

1. Checklists for FGDs with Water Committee, selected Women groups and woreda water office

I. Checklists for points of Discussion with water committee's

Date of discussion _____

Kebele _____ community _____

Hand pump status _____

1. When did the committee established? (Before scheme construction, during scheme construction, after scheme construction)
2. By whom the water committee members selected? How many members the committee has? Who decided the number of members? And what is the gender disaggregation of committee with individual responsibilities? Are all members are working now? If not how many are not working and what are their reasons?
3. Does the water committee have legal recognition? (Yes/No). If 'No' what do you think the problem manifested on water supply hand pump because of lack of legal recognition?
4. To whom the water committee is accountable for? What is your reporting mechanism?
5. Does the water committee equipped with necessary manuals and working guidelines? (Is there any by-law?)
6. Are there activities the committee does regularly? (Yes/No), if 'Yes' could you mentions the major once?
7. Did /are the beneficiaries pay user fees regularly? (Yes/No), if 'No" why do you think the reasons and what measures have been taken to solve the problem?
8. How the water committee does manage their financial resource? Do you have bank account and /or financial record?
9. What are the types of expenses do you have? Is money collected from use fees covers your expenses? (Yes/No), if "No" how do you cover uncovered expenses?

10. Are there care takers with necessary tools and skill those can carry out maintenance during hand pump breakdown within community or committee? (Yes/No). If your answer is "No" who undertakes the maintenance work?
11. How and from where the spare parts are obtained when needed? Which part of pump fail most commonly?
12. What supports (financial, technical and others) have been given to the community /committee from the external (government and NGOs) to sustain the water supply service?
13. How does the committee evaluate community participation in general and women's participation in particular at all phases (pre, during, post implementation) of the hand pump? How were the contributions?
14. Did scheme management and administration training was given to water committee and or community by scheme-providers? (Yes/No). If 'Yes' when was the training provided? What was the issue/content of the trainings?
15. Did the scheme providers adequately prepare the committee to manage and sustain the water supply? (Yes/No), if 'No' why do you think the reasons?
16. From your past experience, what are major problems encountered in relation with your water supply hand pump and service delivery? (place in order of their seriousness)
17. What remedies do you recommend to be done for hand pumps to be functional sustainably in your community and else where in the wereda?

Thank you for your collaboration and patience!!!

II. Points of Discussion with selected women group

Date of discussion _____

Kebele _____ community _____

Hand pump status _____

1. Who is responsible to fetch water for domestic purpose mainly? Why?
2. How do you describe the importance of water for women?
3. Did the women consulted or participated before and during implementation of the water supply hand pump? (Yes/No).
   3.1. If "Yes", what were the role/ contribution women in each phase?
   3.2. If 'No', what is the reason for not participating /consulting the women?
4. Does the management of the scheme involved women in water committee? (Yes/No). If "Yes" do you think are they discharge their responsibility like male members?If "No" what is the reason behind?
5. How do you see the benefits of having developed hand pump with in your community versus the traditional sources?
6. Have you faced the problem with the hand pump non-functionality? (Yes/No), if 'yes', from where do you get water at that time? What do you think the reason for the problem?
7. How do you evaluate overall performance of the hand pump?
8. From your past experience, what are major problems encountered in relations with your water supply hand pump and service delivery? (place the problem in order of their seriousness),
9. What solutions do you recommend to be done for hand pump water supply scheme to be functional sustainably in your community and else where in the wereda?

Thank you for your collaboration and patience!!!

Annex 3: Checklist for Key Informant Interviews (KII)

I. Checklist for interviewing key informant from governmental officials (regional, zonal, and Wereda) water sectors

Date of interview _____

Name of the organization represented _____

Position of the respondent_____

1. What are the major goals or objectives of the establishment of your organization in relation to rural water supply?
2. Is there regional water resources management policy in general and water supply policy in particular? (Yes/No)
   2.1. If "Yes", what the policy says about cost of rural water supply, its cost recovery mechanism and recurrent expenses?
   2.2. If "No" what national policy says about issues mentioned above?
3. Do you prefer hand pump technology among others? (Yes/No)
   3.1. If "Yes" what is the reason? What type and mark of hand pumps do you prefer? Why?
4. How do you evaluate the status of hand pumps implemented by you office and others in region /zone/ wereda now?
5. Did the government institutions adequately prepared the community to manage and sustain their water supply hand pumps? (Yes/No), if 'No', what are the reasons?
6. What types of institutional supports your office is providing to the lower government offices/community in sustaining the functionality of the hand pumps? And how frequent are the supports?
7. Are spare parts and toolkits readily available, affordable at regional /zonal/ wereda and community level? (Yes/No), if 'No', where do you get it?
8. Are there spare parts store at regional/zonal/ Wereda or community level? If "No", why?
9. Are there competent private sectors that provide spare parts in the region? (Yes/No). If 'Yes' who are they? How communities obtain from them? If 'No' what is the reason for non-involvement of private providers?

10. What problems are faced by your organization/ office to make the rural water supply hand pump sustainable?
11. How do you see the coordination of your organization /office with the lower governments and stakeholders to support the scheme service?
12. What requests are mainly reported to your office from the lower government offices/ community in relation to water supply?
13. How does your office undertake major repairs that are beyond the financial and technical capacity of the community /Wereda/ Zonal water desks? Are there well trained professionals for the same?
14. What are the major problems/causes for rural water supply hand pumps failure in the region/zone/ Wereda?
15. What responsive measures have been taken by the regional /zonal/ Wereda water office to improve the status of hand pumps?
16. What are the major problems associated with the provision and management of the rural water supply schemes in general and rural water supply hand pumps in particular?
17. What interventions mechanisms/strategy do you recommend to alleviate existing problem in the water supply sector and to enhance sustainability of rural water supply schemes in general and that of hand pumps in particular?

Thank you for your collaboration and patience!!!

II. Checklists for interviewing key informant from NGOs working on rural water supply hand pumps in the Wereda

Date of interview _____

Name of organization represented _____

Position of the respondent _____

1. When did you organization started working in Aleta Wendo Wereda? Is your organization is currently active in the area? In which Kebeles you intervented?
2. What is the role of your organization regarding rural water supply related activities?
3. How many water supply schemes have been implemented by your organization since time of intervention and how many people/households have benefited from the service as a result? And how do you evaluate the status of the schemes now?
4. Explain how you identify and prioritize water-needy communities?
5. In what ways the participation of the local communities taken into consideration during the development of the water supply schemes?
   5.1. What was the role of the community pre and during implementation of the project? (problem identification, prioritization, site selection, project design selection, technology and service level selection)
   5.2. How did women participation ensured in different stages of implementation?
   5.3. How did the handover of the schemes taken/takes place at the last?
6. Is your choice of technology includes development of rural hand pumps? (Yes/No). If "Yes" why you selected hand pump as technology option?
7. What are the present water management strategies of the hand pumps you have constructed? How do you see it?
8. How do you handle issues related to O&M of the hand pumps and availability of spare parts?
9. What are your strategies to ensure long-term sustainability of the water supply hand pumps you installed?

10. Is there a government body that assesses the performance of your activities? (Yes/No). If 'Yes' who are they? How? How do you see your relation and coordination with regulating body from inception to scheme hand over?
11. What do you think are the major problems/causes for rural water supply hand pumps failure in the Wereda?
12. What major problems did you observed from your experience in relation to provision of water supply and management that undermine the proper functioning of the hand pumps or that contribute to non-functionality?
13. What solutions do you recommend to alleviate the problems of non-functionality and improve the status of the hand pumps to serve the community for long period of time?

Thank you for your collaboration!!!

III. Checklists for interviewing key informants from community member/PA leader

Date of interview _____

Title of respondent in community _____

Status of the hand pump _____

Name of community _____

1. When was water hand pump developed? By whom?
2. What was drinking water source before construction of the scheme?
3. How do you compare the situation of drinking water before and after the construction of the hand pump? What benefits obtained by using developed hand pump?
4. What was the role of community in general and women's in particular before and during implementation of the hand pump?
5. Is the hand pump is functional now? (Yes/No)
   5.1. If "Yes" is it giving proper service to community now? (Yes/No)
   5.2. If "No", what major problems are there in connection with service delivery?
6. If your answer to Q5 is "Yes", when it became non-functional? What do you thinks the reason for the pump failure? What solutions do you recommended to avoid such total failure of pump?
7. Who manages the hand pump?
8. Can you tell me how and when the water committee came into being? How do you see their composition?
9. Do you know to whom the water committee accountable?
10. What will be done if water committee mismanages the scheme? (Technical inability, corruption, discrimination, etc). What can the Kebele/you do if it/you gets information of mismanagement by the water committee?
11. How do you participate personally is hand pump management?
12. How do you see the performance of the water committee in scheme management? (financial management, transparency, reporting, quality of service delivery, complaint acceptance and correction)
13. What do you think should be done to tackle the challenge facing water committee in hand pump management?

14. How do you explain the community demand for water in relation to its population? (pressure on scheme, community contract, difficulty in providing quality service, others)
15. What complaints are there about the use of the water supply hand pump? (quality, quantity, distance, waiting time, scheme failure, speed of maintenance lack confidence on water committee, etc)
16. What do you recommend to be done by user community and government to make water supply hand pump serve community for long period without a problem?

Thank you for your collaboration and patience!!!

Annex 5: Pictures of Focus Group Discussions held with WCs, selected Women groups and Wereda Water office staff members and last one is picture with community KI

Annex 6: Rural Water Supply Inventory Format for Hand Dug well and Shallow well fitted with hand Pump

Zone _____ Woreda _____ Woreda Population _____

s. No	Kebele	Kebele population	Village	Site Name	Distance from Woreda town	Location			Type of pump	Pump position	Depth of the well	Pump yield	Constructed y	Year of construction	Water quality observed	Status of the scheme				Population served with in 1.5 km of the source	Total population served
						X	Y	Elevatio n								F	NF		Abandoned		
																	Duration	Defect			

1. Types of hand Pump
   1. Afridev
   2. Rope pump
   3. Indian Mark II

2. Reason for non-Functionality
   1. Due to Mechanical problems
   2. Due to low yield
   3. Due to Water quality problem
   4. due to construction problem

3. Yield Estimation
   Based on pumping at 60 strockes per minute

4. Water Quality
   1. Turbidity, Scores = 1
   2. Odour, if discernable smell, scores=2
   3. Taste scores = 3
   4. If iron is suspected, scores = 4
   5. If Fluoride suspected. scores = 5

Further Notes:

Does the system have water committee? _____

Do the users pay for water? _____

Is there cattle trough? _____

Is there concrete ring in the well? _____

Approved by Name, Signature, Date and Stump

1. Kebele Administrator: _____
2. Woreda Water office: _____

Declaration

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

Declared by:

Candidate

Confirmed by:

Advisor