ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

COLLAGE OF SOCIAL SCIENCES AND HUMANITY

ASSESSMENT OF PROBLEMS TO SUSTAINABILITY OF RURAL WATER SUPPLY AND MANAGEMENT SYSTEMS IN MACHAKEL WOREDA, AMHARA REGION.




A THESIS SUBMITTED TO THE SCHOOL OF GRADUATE STUDIES ADDIS ABABA UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF ARTS IN GEOGRAPHY AND ENVIRONMENTAL STUDIES

BY

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Acronyms

AAU	Addis Ababa University
ADF	African Development Fund
BoFED	Bureau of Finance and Economic Development Amhara Region
CSA	Central Statistics authority
E.C.	Ethiopian Calendar
ECA	Economic Commission for Africa
EGoWRD	East Gojjam Office of Water Resources Development
FGD	Focus Group Discussion
IDR	Institute of Development Research
IRC	International water supply and sanitation center
M.A.S.L	Meters above sea level
KII	Key Informant Interview
MoWR	Ministry of water Resources
MWoWRD	Machakel Woreda Offices of Water Resources Development
MoFED	Ministry of Finance and Economic Development
NGOs	Non-governmental Organizations
O&M	Operation and Maintenance
PAs	Peasant Associations
PASDEP	Plan for Accelerated Sustainable Development to eradicate Poverty
RWS	Rural Water Supply
RWSS	Rural Water Supply Schemes
UN	United Nations
UNECA	United Nation Economic Commission for Africa
UNDP	United Nation Development program
UNICEF	United Nations Children and Education Fund
WATSAN	Water Supply and Sanitation
WB	World Bank
WHO	World Health Organization
MDGs	Millennium Development Goals
UAP	Universal Access Program
WSP	Water and Sanitation Program
WOWRD	Woreda Office of Water Resources Development

Abstract

Adequate and sustainable water supply in rural areas of Machakel Woreda is very low. Efforts made so far to improve the existing water supply situation have been threatened (vulnerable) by multiple interlinked problems. Knowledge of the problems of rural water supply and communities' management can help improving the problems of rural water supply in the future. Thus, the objective of this paper was to assess the Problems to Sustainability of Rural Water Supply and Management Systems in Machakel Woreda, The researcher focuses on descriptive and cross-sectional survey research design where different data at points in time are collected to obtain the necessary information by applying both probability and non-probability to sampling designs to identify the sample kebeles and water supply schemes as well as the sample households. Household surveys, observation, key-informants interview and focus group discussion were used for primary data collection. Documents review from different offices was used as a tool to collect valuable information for secondary data. Three stage sampling method was used for primary data collection. For the selection of kebele administration stratified sampling method was used based on agro-climatic zones. Two kebele administrations were selected from Woyna Dega and one from Dega agro-climatic zones. Both Purposive sampling method and simple random sampling method was employed for village and households' selection. Household survey was conducted in three selected kebele administrations and 150 household heads were randomly drawn from the total 979 water supply user heads of households. Three focus group discussions were held with water committee members, and kebele administration officials and 15 observations were conducted at different water points. For data analysis a combination of quantitative and qualitative methods were employed. The method used for data analysis was simple description: like percentage, average, standard devotion, tabulation and charts (figures). In conclusion various factors are interacting to maintain the intended objectives of any water supply project. The utilization of water sources mainly depend on their functionality, this in turn depend on the magnitude and types of community participation. The whole purpose focused to sustain the continued use of water supply project, distances from the water pints, the involvement of community at all stage of water development, building of adequate skill and considering the modest water services fees. It is also known that water office took the responsibility of to be handed over water supply schemes, unfortunately the water offices were not yet skill full and resources full to mange and maintain the existing schemes .Lack of tools, spare part, poor water committee's effort, low senses of ownerships of rural water supply schemes by the user communities. The study revealed that weak institutional capacity, poor financial management and weak linkage between water committees and Woreda Water Office are identified as the main problems in the study area. The evidence in the study area also indicates that poorly managed water supply scheme has adversely affected access to potable water supply, especially where water supply schemes interruption was with high frequency. The policy implication of the study is strengthening of the institutional capacity (technical, financial human recourse and management capacity at Woreda and village (local) level Improving construction quality, strengths community participation and capacity building of the community in order to improve the rural water supply scheme management is recommended for the futures.

Chapter one

Introduction

1.1 Background of the study

Water is among the most essential natural requisites for sustenance of plants, animals and humans. It is a basic requirement for the healthy functioning of the entire world's ecosystem (UNDP, 2004). The total quantity of fresh water on the earth could satisfy all the needs of human population if it was evenly distributed and accessible (Melkamu, 2008)

Water supply has an important role in both social and economic developments. Improved public heaths, better living standards and economic developments are intimately related to the availability and accessibility of adequate water supply with good quality (Hofkes E.H, 1986)

However, in many parts of the world people lack enough water supplies (UNDP, 2004). It is estimated that 800 million people do not have access to safe drinking water and almost 2.6 billion have limited accesses to adequate sanitation (UNDP, 2006). Unavailability of safe, adequate and affordable water seriously affects social, economic and health conditions of a society. More specifically children and women, who are directly involved in water collecting and managing activities at households levels are more vulnerable to problems (Tefesse, 2009)

Concerning the issues and problems of drinking water supplies and sanitation services, conferences and workshops are held in many parts of the world. Among them, an international water conference organized by the UN in March 1978 in Latin America has historical and paramount importance, for, it passed a resolve to involve the target community users in the water supply and managements (ECA, 1978). The conferences emphasized the needs to involve the target groups throughout the whole phase of the projects planning's, i.e. constructions, operations, maintenances, managements, monitoring and evaluations.

The 1978 conference also summarized the subsequent Africa regional water conference, organized by the Economic Commission for Africa (ECA) the same year and adopted the resolution of the international water conferences of Argentina at Mor del Plata that advised all developing countries, including Ethiopia, to involve the target communities in the planning, construction, operation and maintenances as well as monitoring and evaluation of water supply schemes (ECA, 1978 cited, Lechissa, 2008)

In sub-Saharan Africa the proportions of people with access to potable water supply and adequate sanitation is very low (UNDP, 2006**).** Safe water supply coverage in rural parts of Ethiopia is very marginal (Mengesha *et, al.* 2002). The great majority of rural population use unsafe and polluted water, as a result of this, the communities are exposed to large variety of water borne diseases (Dessalegn, 1999) To solve this problem the government of Ethiopia is implementing universal access plan (UAP) program for water supply hygiene and sanitation sector since 2006. The objective of this program is to achieving universal (98%) access to safe water supply for the country's 77 million people by *2012 (MOWR, 2006).* This would mean providing services to 50.9 million new users in just 7 years. To achieve the success, community's active participation in the provision and management aspects on the existing water sources is the key issue to sustainability (Paulos *et,al.*,2009)

1.2 Statement of the Problem

Access to safe, sufficient and affordable water is one of the basic indispensable human right as well as a prerequisite for improving the over all life of a society. The provision of sufficient potable water for peoples within reasonable distances from a reliable and acceptable source is essential for people's wellbeing and sustainable economic progress (Yimer, 1992 (Hofkes E.H, 1986). It has been widely argued that safe, adequate, and accessible supplies of water together with proper sanitations are surely basic needs and essential components of primary health care. However, the majority of the people in the developing nations have no access to clean drinking water, which has resulted in low per capital consumption and ill health (UNDP, 2006).

To investigate the problems, United Nation declared in the 1980-1990 decade as International Drinking Water Supply and Sanitation (IDWSSD) with it ambitious a target is to cover 100% of requirements of safe water supply and sanitation (Black ,1998). However, after more then two decades there were more than one billion people of the world without access to safe and adequate water supply most of them are found in Africa and Asia (Mesngesha, et,al.,2002).

According to (CSA, 2004) lack of safe water is the major cause of water borne diseases and deaths in most developing countries, including Ethiopia. In Ethiopia rural water supply program, which affect the majority of the population, had not been given sufficient attention until recent time. The sources of nearly all-domestic waters in rural areas are generally said to be ground and surface waters. However, the potential of ground water in the country is not known due to lack of adequate study. The rural populations in the country largely obtain its waters from unprotected springs, open ponds, wells, rivers, etc which are usually vulnerable to pollution. They also cover long distances during drought and dry periods when ground water level is lower. This means that for many month of the year, water has to be carried from long distance (MoWR, 2002).

Unless, the water crisis is addressed, the millennium development goal may not be achieved. This is because water is significantly inter linked with child mortality, maternal death, primary education, gender equality, poverty reduction, hunger and environmental sustainability (SIWI, 2008).

As part of the solution to lack of coverage, governments, non government, international and local organizations from all over the world are trying to implement the programs of safe water supply and sanitation for many years (prokopy, 2005). However, these endeavors in most areas are constrained by lack of sustainability of the water supply infrastructures (ADF, 2005). These problems are even worse in Ethiopia where it is quite common phenomena to observe non-functional water supply structures without adequate protections. Further, it can be indicated that as many as one out of the four rural water facilities are broken down or poorly functioning in developing countries and construction

of new systems cannot even take pace after the failure of the old ones in some countries (Aschalew, 2009).

Some reports from Ethiopia as well as other developing countries showed that insufficient and inappropriate technologies account for the failures of some of the water schemes and projects. Added to it are inadequacies of available water, poor physical structures, low reliabilities of the services, distances time required to collect water and low awareness of people regarding uses of water which affect the continued functioning and optimal utilizations of water supply schemes (Mengesha *et, al.*, 2002). Other main problems in sustainability of rural water supply efforts in developing counties are the lack of participation of community and water users in the whole process of development and management of the schemes (Aschalew, 2009). If communities are to be considered as the managers of their water supply sources, then we should know what attitudes and potential they have and how they should be organized, supported and maintained to enhance the routine supply and sustainability of potable water supply. Although during recent times, there is some progress in rural water supply as some projects are constructed in the Machakel woreda, majority of the population still uses traditional sources water points where again it is common to observe non–functional water sources each kebeles. So the researcher has targeted to assess the main problems that are affecting the water supply schemes and communities' participation in the provisions and management aspects to achieve the sustainability of the schemes in the Machakel woreda.

1.3 Objectives

General Objectives

The general objective of this research has been to assess problems to sustainability of rural water supply and management systems in Machakel Woreda.

Specific Objectives are

1. To assess the existing water supply status/progress / in the study area.
2. To identify problems related to potable water supply and management systems in the study area.
3. To asses the participation of the community in the rural water supplies and management aspects.
4. To asses the main factors that affect the functional sustainability of the water supply schemes in the study area.
5. To identify the nature of institutional support given to the local communities in managing the rural water supply schemes.

1.4 Research Questions

1. What is the level and progress of rural water supply in the study area?
2. What are the main problems facing of rural water supply and management systems in the study area?
3. How is the participation of the rural community in the water supply and management aspect of the schemes? looks like
4. What are the main factors that affect sustainability of the water supply schemes in the study area?
5. What is the nature of institutional support given to the local communities in managing the schemes properly?

1.5 Significances of the Study

The study is believed to be important, since it expects to assess the main problems of rural water supply and communities' participation in the provision and management of the schemes. Thus, the study will serve as a reference for those working in the planning and design of rural water supplies, communities to manage the existing schemes in efficient

and effective ways and it may initiate interested researchers to undertake a more comprehensive investigation of a greater understanding of the issues.

1.6 Scope and Limitations of the Study

Although the study is devoted to the investigation and assess of the problems to Sustainability of Rural Water Supply Schemes and Management Systems in Machakel Woreda it has a primary focus on some limited aspects of the research topic. In brief, the study is limited:

i) to investigate a project's intervention strategy in relation to integrating the aspects of sustainability at the stage of project planning, management, and implementation; and the impact of this on a system's service performance in the post construction period i.e. during the period of service delivery.

ii) Investigation of socio-economic factors within a household that have impacts on a household's ability and willingness to pay user's fee and consequently on water use pattern; and analyzing their relevance to sustainability of the system water supply schemes.

iii) Investigating the way of achieving financial-self reliance and proper operation and maintenance of a water supply system contributes to the overall sustainability of rural water supply system.

The main reasons for selecting Machakel Woreda as a study area were

1. The fact that water supply is a privileged field for the study and intensity of the problems and the specific situations in the area has driven the attention of the researcher to select the study area.
2. Lack of any systematic study undertaken to address the problems of rural water supply and management systems on the study area.

The limitations of the study include:

1. Poor infrastructures which hindered with accessibilities of the schemes regarding to in depth observation of the situation,
2. Reluctant of the targeted group in the cooperation with the researcher to provide reliable and proper information.

1.7 Organization of the Thesis

The thesis consists of six chapters. The introductory part is the one section that deals with background/ overview of the study /, statement of the problem, objectives and research questions, and significance and limitations of the study. The Second chapter explains the methodology adopted for the study including sources of data, decision regarding sample procedures and sample size and statistical tools used in data analysis. Review of some relevant literature is presented in the chapter three. Then chapter four deals with geographical profiles of study area, it followed by chapter five which contains the data analysis and discussions. Finally, the paper is summarized with conclusions and some recommendations to over come the main problems of rural water supply schemes.

1.8 Definition of operational terms

Access to water supply service: According to UAP access is defined as the ability of an individual/household/ community to get the service within a reasonable distance and quantity. For rural community's access is 15 liter per day per capita within 1.5 km, while for urban communities' access is 20 liter per day per capita with in 0.5 km distance.

Bega: dry season in Ethiopia

Community: refers to the group of households living in a particular area and share a water supply scheme.

Dega: An area with an altitude of 2300 to 3000 meters above sea level, and relatively high level of rainfall

Developed or improved water supply: a water source (spring, well, etc) which was constructed by qualified people and protected from possible contamination

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

Hand Dug wells: water well dug by human labor and hand tools. It could be open or fitted with hand pump.

Shallow well: water well drilled by drilling machine

Protected spring: natural springs protected from contamination by constructing structures at their sources. Some are without distribution pipelines (capped at spot) and others are with distribution pipelines and more than one water point.

Jarican: plastic container used to fetch water

Kebele: Smallest Administrative Unit

Kiremt: wet or rainy season in Ethiopia

Kolla: An area characterized by an altitude of 500 to 1500 meters above sea level; low level of annual rainfall and hot temperature

Rural Water Supply Schemes: refers to water supply points installed in rural areas that included protected HDW, SWS, PS and deep wells.

Rural water supply: refers to provision of clean and safe water for rural communities through construction of protected HDWs, shallow wells, protected springs and deep wells.

Safe water: water supply service with adequate quantity and acceptable quality

Traditional water sources: refer to any water source used by the rural people for domestic purposes that is not properly constructed by qualified people to protect from any possible contamination.

User fee: payments charged in rural areas for water supply service.

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

Water supply agencies refer to all institutions (Government, NGO, donors, private sectors and others) which are involved in the provision of water to the community through funding and implementation.

Water supply schemes: infrastructures (hardware) built to deliver water supply services

Water supply service: delivering water services for domestic purposes

Water supply: supplying of clean water for human use and livestock.

Woreda: District level of administrative Unit

Woyna Dega: an area with altitude ranging from relatively moderate level of rainfall and temperature

Chapter Two

Research Design and Methodology

2.1 Research Design

The researcher focuses on descriptive and cross-sectional survey research design where different data at points in time are collected to obtain the necessary information by applying both probability and non-probability to sampling designs to identify the sample Kebeles and water supply schemes as well as the sample households.

2.2. Data types and Methods of Data Collection

The researcher has used primary as well as secondary data for the assessments of the problem.

2.2.1 Sources of Primary Data

2.2.1.1 Household Survey: To generate information at household level the researcher used closed and open ended questionnaires and interviews, to collect primary data concerning all relevant variables such as problems of rural water supply, communities' participation in the provision and managements systems, the role of water committees, factors affecting the sustainability of rural water supply schemes associated uses and misuses of the schemes as well as problems with technical issues.

2.2.1.2 key-informants interview (KII): are used to collect background information about the status of rural water supply, status of communities' participation, in operation, maintenances, management aspect and sustainability of the water supply schemes. The researcher has conducted interviews with the selected individuals, who are believed to have good information about the area and that of the subject matter, kebele administration officials as well as Woreda water resource office experts and Zonal water office professionals.

2.2.1.3 Focus Group Discussion (FGD): The researcher conducted three focus group discussions with water committee members, and kebele administration officials in the selected sample kebeles. For each group discussions, five to seven members had been identified to participate in the three selected kebeles. The researcher used different checklists for each Focus Group Discussions.

2.2.1.4 Observation: In addition to the above tools, the researcher also used observation methods to assess physically the existing water schemes, their state of development, the distances of water sources from the dwelling places, the functional sustainability of the schemes and matched it with the checklists to assess the reliability of the data collected.

2.2.2 Sources of Secondary Data

Secondary data collection are other main tools for research work, for which the researcher used journal, report from woreda offices of water resource development, Zonal water offices and regional offices on the socio-economic conditions of the study area.

2.3 Decision Regarding Sampling Procedures and Sample Size

The researcher employed different stages in the sampling procedures to determine sample kebeles, district villages /*gots/*and households.

First stage; Selection of Kebeles

Out the total 24 rural kebele administrations of the Machakel Woreda, all, except four rural kebeles having water supply and sanitation interventions. Thus, twenty rural Kebeles of the Woreda were taken as a sampling frame.

According to the Woreda Agriculture and Rural Development Office, the Woreda has three distinct types of agro-ecology, namely, Dega (high altitude), Woyna dega (mid altitude) and Kolla (low altitude) consisting, respectively, of 12,10 and 2 rural kebeles. Thus, the three agro ecological zones formed the base for three distinct strata's/group of kebeles /because, except agro ecology differences, all rural Kebeles of the Woreda are characterized by similar cultural settings and socio-economy conditions. Based on this stratification, most of the Northern parts of the Woreda is organized into Dega (highland) kebeles and while the eastern, western and central parts of the Woreda consists of Woyna dega climate and the southern western parts have Kolla kebeles. Out of these the researcher has selected Sostu Deber Shelel kebele from Dega randomly from Dega kebeles even if some parte of the kebele under Woyna dega, Yewula kebele administration has been selected from Woyna dega climate. The Kebeles of kola zones are remote and inaccessible to the researcher. Therefore, to Amarie- Yewebesh, kebele administration were selected based on accessibility of kebeles to the center of the Woreda, availability of transport and

due to this, the researcher has employed purposive sampling methods (Fig 4.1 in chapter four).

Second stage; Selection of District Villages' /*Gots*/ and Selection of water schemes

According to Woreda Office of water resources developments, the total numbers of rural water supply schemes by the end of 2010 were 126. Out of the total these 27 are located in the sample kebeles (6 in Sostu Deber shelel, 7 in Amarie –Yewebesh, and 14 in Yewula). From each sample kebeles, the researcher picked up four villages by simple random sampling techniques (lottery method) and purposively sampling techniques the reason for selecting four villages from each sample kebeles for the sake of to mange time and material resources(Table, 2.1).

The researcher has not selected the water points constructed in the year 2010, because some schemes are not yet officially handed over to the community, communities had no enough experience in utilizing, and managing the system and it is feet that a large amount of information could not be available in these villages. Therefore water supply schemes that were established before 2010 were take in selecting sampling schemes frames.

Third stage; Selection of Sampling Households

As for the size of the sample households was concerned the researcher decided to select 150 households. It was approximately 15.32 % of the total number of households. This totally was allocated proportionately to the 12 sample villages according to their number of households by using the formula.

$$ni = \frac{NiS}{N}$$

Where,

ni= number of samples for in the each villages/gots/

Ni= number of households of in villages/gots/

S= Total number sample

N= ∑Ni i.e. number households the in villages

$\sum_{i=1}^{12} Ni$ = (N1+ N2+N3+N4….N12)

Table 2.1: Sample Kebeles, villages and Household Respondents

Sampled Kebeles	Gots /district villages/	Type of schemes	Functional status	Total number of households in the sample villages (Ni)	Allocated No of samples (n)	Distribution of sample households by sex of household heads	
						M	F
Sostu Deber shelel	Guilt	Hand dug well	NF	73	11	31	24
	Chewamba –Snewaldo	Spring development	SF	91	14		
	Mukite	Spring development	F	96	15		
	Megug	Shallow well	F	97	15		
Amarie-Yewebesh	Yewebesh	Hand dug well	NF	70	11	26	18
	Dega - Amarie	Spring development	NF	73	11		
	Zebebeb	Spring development	SF	75	12		
	Deber Yewebesh	Shallow well	F	68	10		
Yewula	Siso	Shallow well	F	90	14	30	21
	Deber	Hand dug well	F	92	14		
	Yewula	Spring development	NF	73	11		
	Yecholet (Gelavite)	Shallow well	NF	81	12		

Sources, MWOWRD, 2010 and filed survey

*__F__ functional **SF**, semi -functional **N**, non functional

2.4 Method of Data Analysis

Quantitative and qualitative methods of data analysis were used to analyze the data gathered from field. The primary data collected from household respondents through structured questionnaires were first checked for accuracy then; tabulated and analyzed by using statistical package for social science (SPSS version 13 soft ware). Descriptive statistics such as frequency, percentage, mean and standard deviation were used to analyze the data quantitatively. The data were presented in tables, charts, figures.

Qualitative data were gathered through focus group discussions, key informant interviews, personal observations and secondary data (document review) obtained from different offices were analyzed qualitatively.

Chapter Three

3. Review of Related Literature

3.1 Rural Water Supply

The term rural water supply covers also the measures taken to satisfy the demand for water in predominantly rural area. Rural areas of this kind may be typified by nomadic way of life, peasant way of life, peri-urban peasants' way of life. Rural water supply embraces the supply of drinking and house hold water to rural population (Lechissa, 2008).

It also refers to access to a verity of water sources mainly, surface, underground, rain water that are used for various household purposes, like drinking, food preparation, hygiene related purposes, washing cloths and body, as well as far livestock drinking, etc (Forrest B., Wright, 1977).

Drinking water is one of the indispensable human rights and governments have a duty to make their citizens water secure. These duties have different care components constituting water security right to sufficient, safe, physically accessible affordable and acceptable water for personal and household uses **(**UNDP, 2004**)**

3.2 Approaches of Rural Water Supply

There are two approach mainly used in the provision of rural water supply. These are supply driven approaches and demand drive approaches.

3.2.1 Supply Driven Approach

This approach has been adapted from its own elements are to expand water services in the developing nations. The first element is that donors and governments provide the minimum level of improved water services such as hand pump to as money people as possible with available funds, the second one is to build up the capacity of government agencies and the third one is providing subsidies to rural water supply (Kleemeier, 1995, Sara Jennifer & Katzh Travis, 1997).

Rural water planner and supplier had been applying the so called "blanket approach" which uses analogous planning procedure technology, choice implementation strategies, and management options that are mainly project centered. These processes were

irrespective of local social, economic, and environmental aspects and thus lead to the frail of many rural water provision efforts (Wijk-Sijbesma, 2002**).**

The assumption behind supply-driven approach refers to the idea that provision of clean water would contribute to economic growth and government agencies should construct and maintain subsidized water services (Broscoe, J and David F., 1998).

This means that majority of decisions concerning the improvement of a community water supply have been from out side. Because of this, communities have become dependent on external support to keep improved water supplies working (Evans E., and Appleton, 1993).

According to the international Drinking Water Supply and Sanitation Decade (IDWSSD), which was set at the beginning of the 1980 it was aimed to, provide water and sanitation to all in 1990. However, it could not achieve its intended goals and the extended efforts during the decade, further under lined the limitations of centralized approach. The day-to-day costs of running the programs are already too much for most water agencies, because it was largely supply derived approach (Evans E., and Appleton, 1993).

The role for project planning implementation cost recovery, operation and maintenance and water supply schemes ownership are poorly defined and less communicated to the beneficiaries (Broscoe, J and David F., 1998). The (Bank, 1997) UNDP and World Bank working paper, 1997 summarized the features of supply oriented approaches as:

- Supply driven: staff of implementing agencies alone decided to construct water supply facilities to the communities based on existing facilities to the communities and prevalence rate of water borne diseases.
- Top-down decision making; intended beneficiary communities had no role in determining design; no financial stake and no sense of owner ship.
- Construct and hand over; no attempt was made to organize the community and build its capacity for operation and maintenance of water supply schemes.
- Over all results: the emphasis was on increasing coverage without the necessary safe guard at community and government level to ensure sustainable operation and

maintenance of service facilities to water supply programs with limited attention hence, on the intended objectives many of the facilities did not lost longer.

3.2.2 Demand- Responsive Approaches (DRA)

Now a day there is paradigm shift in rural water supply approach from centralized ownership or government oriented approach to decentralized community based economic and environment friendly approach considering the user communities' desire and sustenance and evolve different solution for maintenances, managements and financial options (Kleemeier, 1995).

DRA represent a shift form top-down state centered to communities centered approach, whereby, government was setting the target with little involvement of the intended beneficiaries or communities for genuine demand responsive approach to rural water supply system (*MOWR, 2003).*

The Demand- responsive approaches associate a number of issues. The provision of improved water supply to communities should not only base on their need. Nevertheless, communities' should also take the initiative to improve their water services. The range of technical options should also relate to cost implications. Further more, the basic principle of cost sharing need to be specified and capital operation and maintenance has been made clear from the out set. The involvement of communities in all aspect of the project cycle will help to create a sense of ownership (MOWR, 2003).

DRA is more time and money requiring approach .The advantages that it builds capacity of community members, its easiness to reach more communities and the achievements of sustaining established facilities are more valuable (Muluken, 2005, De Rege j., 2005).

Water supply and sanitation project should be seen in holistic manner in demand responsive approaches, because their roles are more than meeting the demands of domestic household uses and drinking purposes. Hence, the important thing is linking of rural water supply project with other income generating activities, like as livestock forming, land management, small-scale irrigation, which can gradually up, lift local economy and ensure

sustainability. According to (Francis B. C., 2004, Sara Jennifer & Katzh Travis, 1997) the characteristics of demand responsive approach to rural water supply are as follow:

- Informed decisions-Community members make informed choices and decisions about planning, allocating, constructing, managing and maintaining the supply schemes.
- The role of the government it is in facilitating the service provisions thorough, designing, clear national policies, strategies, encouraging stakeholders' participations & consultation and enhancing building processes.
- Willingness-to-pay*:* It establishes clear linkages between the type and level of service people want, and how much they are willing to pay for these services.

3.3 Community Participation in Rural Water Supply and Management

3.3.1 Community Participation in Rural Water Supply

Definition of participation (Cohen and Johm M., And Upnoft Norman, 1977) all of them include, in some measure, the notion of contributing, influencing, sharing, or redistributing power of control, resources ,benefits, knowledge, and skill to be gained through beneficiaries involvement in decision making.

There is also much debate among practitioner and in the literature about whether participation is a means or an end or both. As to (Robert, 1992) for the purpose of this study, community participation in the rural water supply is defined as a voluntary process by which people including the disadvantaged ones (income, gender, ethnicity, or education), influence or control the decision that affects them, the essence of participation is exercising voice and choice.

Various but over the long run, sustainability will depend on minimizing transaction costs in horizontal and vertical interaction. Participation is viewed, as a means to define ends, not as an end in it self of the goal. Therefore, it is to optimize participation to achieve the desired project goals not simply to maximize participation. The desired goal in rural water supply system and developing the human, organizational and management is sustained improvements *(*(Narayan , D., 1995)**.**

The principle underlying participation is to give people a voice but it is constrained by the choices that people make because they vary infinitely. Thus, a community may decide to sub contract maintenance to an independent mechanic rather to under go training and take turn doing the work. (Arturo, 1992) mentions the role the participation plays in effectiveness of infrastructure. There are several reasons that contribute of community's participation in the project effectiveness. Rural water supplies projects were consider effective if they increase access to reliability and convenience they demand. Effective water projects produced health related, economic, time saving and environmental benefits, among others (Narayan , D ., 1989) .Users can facilitate effective water project in several ways at different stages. They may contribute to voluntary labor, contribution in cash or Kind as cost saving element, increase feelings of local pride and commitment better project design, redesign, site selection, resources mobilization, construction, maintenances of facilities beyond the life of the project that increase feeling of local pride and commitment. Others suggest that the use of contractors or construction team of agencies is more efficient by avoiding problems of delays and increase over burdening. Poor construction leads to frequent break down and dislike of further contribution toward operation and maintenances (Wijk-Sijbesma C. V., 1981).

In addition to participation in the construction, communities can make a real contribution in the operations and maintenances, by providing volunteers for training of local operators, taking responsibility for the inspection by problem reporting and through social control as individual and community (Wijk-Sijbesma C. V., 1981).

3.3.2 Managing Rural Water Supply

Managing rural community water supply successfully means operating and maintaining a system on day-to-day basis so that it continues to works and supply water as planned. In it broadest sense the management of water supply also includes the promotion of Hygiene handling and the use of water to improve the health of the people in the community (Aklilu, 2009).

According to *(*Davis and Grvay Gerry, 1993) there are several approaches under taken since the 1980 international drinking water and sanitation program for managing rural water supply some of them as follows.

3.3.2.1 Agency Management

This approach used in managing rural water supply favors highly centralized system .This is an approach where government agency operates and maintains rural water supply schemes for the community. In other way, centralized system in rural water supply management is an approach that is dependant and directed by the central government. The community may or may not pay for services based on government policy. It may not involve in decision-making process about management of the water supply facilities (Musonda, 2004). Some have also noted that centralized approach to rural water supply management proved to be ineffective in developing countries because of

- Shortage of spare parts and tools, which can result infrequent and prolonged breakdowns and, in some case, abandonment of equipment. This shortage in turn may be due to several factors. At the time of installation donors might not have included enough spare parts.
- Shortages of service vehicles make the support of operation and maintenance very difficult.
- Poor conditions of pay and employment conditions in government services often means that maintenances of water supply schemes are unenthusiastic an extra works (Davis and Grvay Gerry, 1993, Aklilu, 2009)

3.3.2.2 Collaborative Approach

This method of running rural water supply schemes reduces the burden, and shares management, and operation responsibilities among concerned agencies (government agencies, NGOs, the private sector) and the community. Because, it has been realized that, although communities can take up a substantial share of responsibility, external support services are still required (UNICEF, 1999).

3.3.2.3 Community Management

Community management is the management option whereby communities rather than government institution or private sectors, have control over the management of their water supply schemes. The actual responsibility of the management lies ideally with a representative group of community, often referred to as water committee, chosen to take up this task, although this group may have option of involving local caretakers as in change of ensuring sustainable services and who is accountable to the committees' at large (Melkamu, 2008, World Bank , 1992). Community management did not come spontaneously nor do they exist in vacuum. According to (Steve R., and M., Sohail Khan, 2004, Schouten T., and Moriorty P., 2003) Community management has a long history of trial in the rural water supply sector, especially with failure of the centralized management on their water supply systems. According to (Lockwood, 2004, Evans E., and Appleton, 1993) the common principles of community management and some supporting reasons as to why the community management approach has been adopted by many governments are as follows:

- **Participation** in the development process with broader community support for the implementation and it continue Nance indefinitely.
- **Control** on direct and indirect operation and managements of its own water supply system, including the strategic decisions about the process from the design phase to long term O and M.
- **Have sense of ownership** although formal legal ownership of physical infrastructure is highly desirable it may not always be possible in existing legal frame work of equal importance in the perception of ownership by the user community.
- **Have Cost sharing**, which is closely linked to the question of ownership that need some elements of contribution to the recurrent costs of running and maintaining the system, depending on individual circumstances where contributions need not always be of financial nature.

3.4 Challenges of Rural Water Supply

Despite the concerted efforts of the government, the communities and sector partners, the water supply situations have not improved substantially. According (Francis B. C., 2004) mation that the following as the main causes for marginal rural water supply coverage in developing countries:

- **Weak policy environment**: leaders of most developing countries lack strong organizational framework, and good governances that result in weak policy environment for water supply and sanitation sector. Underinvestment, undefined ownership, poor participation, weak regulations, and conflict priorities are the out comes of weak policies.
- **Insufficient financial and human resources** despite sharply increasing demands for rural water supply services has been constrained by insufficient investment and human resources, lack of capacity to mobilize resources from user community, local government and private sectors.
- **Environmental accessibility and management accessibility** of the limited fresh water resources, in most cases, is not easy because of the physical and climatic conditions of the areas. In addition to this, changes in land use/ land cover around the supply sources are affecting the quality and quantity of the sources.
- **Gender and community involvement** there is lack of community participation in all phase of the projects moreover the participation of women is very limited.
- **Weak involvement of private sector** in the process of water supply has resulted in lack of accountability, lack community ownership, poor sustainability and weak management of supply systems. The involvement of the private sector can ease large burden of expanding the services by government.

Ethiopia like other sub-Saharan countries faces a number of challenges in improving water supply coverage (Tegegn, 2008). One of the main constraints is lack of adequate financing. The use of available funds tends to be inefficient and remains largely under utilized. Most systems and facilities are poorly constructed, designed and utilize technologies that are not appropriate (MoFEED and UNDP, 2005).In addition to this (Melkamu, 2008) reported that

the difficulty in finding appropriate water sources coupled with scattered settlement pattern and nomadic ways of life styles, significantly influence the opportunity to increase and sustain access to water for rural population. On the other hand (Yacob Arsano *et,al.* 2010 **,** MoWR, **,** 2003) lists number of problems that face the rural water supply; the most common ones are as follows:

- The water committees are weak and unable to operate the water paints in sustainable ways ,
- Lack of systematic reporting by water committees and poor communication with woreda water desks ,
- In the case of water boards (water committees) description of duties and responsibilities are missing ,
- The woreda water office are not equipped with adequate transportation equipments, tools, spare parts and Shortages of human resource capacities and expertise are in Water Supply offices.
- The artisans, technicians trained for installations, operations and maintenances do not stay long as they get employments elsewhere because of Shortages of capital budget for the expansion of water supply services, particularly at woreda level, in spite of increased financial flows to the sector;
- Because of absence of special tariff contributions, the poor and elder people are fetching water from other sources, allocated at large distances and probably with lower quality of water.

3.5 Sustainability of Rural Water Supply Schemes

Broad ranges of definitions of sustainability in rural water supply are used. In different studies on the topic majority of these definitions are similar in nature but there are slight differences in emphasis. As (Black M., 1998, Hodgkin J., 1994) note, there arise problems for objective quantification of sustainability. That is to say, different groups of water user, donors, national and local governments, etc' have different perceptions of sustainability based on the relative value attached to its achievements. Different organizations may

choose to use sustainability from different angle, like technical performances, empowerments, social equity or the environment.

Sustainability of rural water supply schemes refers to whether or not the schemes continue to function over time. It also refers to the provision of safe, adequate, water supply facilities at reasonable costs on long-term basis. It is evaluated on different dimensions such as, the extent to which the new scheme continues to supply at same rate the quantity needs as planned at the beginning and the environmental aspect of the supply continues to be improved (Carter *et,al,* 1999, Mengesha *et, al.* 2002).

3.5 .1 Key Issue of Sustainable Rural Water Supply Systems

A sustainable rural drinking water supply system involves a number of issues that are internal and external to the community. The following are key issues that are of a paramount importance to sustainable and/or community managed rural water supply systems:

- Community participation and involvement,
- Women's participation and involvement,
- Cost-sharing and cost recovery
- Community awareness raising and education,
- Baseline survey of Water resource,
- Repair and maintenance services,
- Water user's management body and structure,
- Management capacity building/management procedures of water committees,
- Technology selections,
- Institutional support, (Carter *et,al,* 1999, Hodgkin J., 1994)

3.5 .2 Determinants of sustainability

A number of studies have identified various determinants of water system sustainability, grouped in to technical, institutional, environmental and social aspects. Some of them are as follow:

3.5 .2 .1 Technical and /or Technological Issues

Appropriate technology selections, construction quality of the schemes, technical skills needed to operate and maintain the system, availability, accessibility and affordability to spare parts and toolkits are important technical and/or technological factors that contribute or undermine water supply program in the rural areas.

3.5 .2 .2 Technology Selection and Construction Quality

If a community is to manage a water supply system, the technology used needs to be the type that community caretakers can maintain with little outside assistances. The technology must suit the locally available skills or that can be acquired by community members. Technology is considered suitable if it is socially acceptable, economically viable, technically effective and environmentally sound.

According (Musonda K., 2004) communities should have a say and participate in technology option. However, study in Mirab Abaya, Ethiopia has shown that water committees have never been participated in technology selection activities (Tegegn, 2008).

In addition to selection of appropriate technology, careful engineering design and quality water projects construction are important in RWS program particularly in poor communities. Regarding this group (Carter *et,al,* 1999) shows it may be disastrous for poor people when a facility breaks down and cannot be repaired because of a fault inherent in the design or construction. If the initial scheme was paid for from communities (users) resources, they will probably be unable to make the effort a second time; if an outside agency helped, the attitude is likely to be you have had your share, no more now!.

3.5.2.3 Availability, Accessibility and Affordability of spare parts and Toolkits

To provide adequate water for all, continuous investment on water supply projects and ensuring the sustainability of the existing ones that need O and M is important. Hence, appropriate tools for carrying out repairs should be made available to keep continuous service delivery of rural water supply schemes. There is also a need to ensure that spare parts are affordable. This is because at the moment most communities cannot afford the cost of spare parts (Musonda K., 2004, Carter *et,al,* 1999) also argued that to improve the

sustainability of rural water supply projects spare parts and toolkits must be available. However, study made by (Bezabih, 2008) in Menge Woreda of Benishangle Gmuz, Ethiopia shows that the difficulty of access to spare parts at all community is the major technical related rural water supply schemes problems in the area. He further added that none of the implementing agencies has ensured availability of spare parts to the community. (Brikke F.and Davis J., 1995) has also argued that lack of spare parts has been a major problem in sustaining water supply projects and has been a recurrent problem.

3.5 .2 .4 Lack of Technical Service for Operation, Maintenance and Rehabilitation of Rural Water Supply System

The Difference between maintenance and rehabilitation of project is defined as follows: Maintenance is a minor activity carried out by a technician with skilled labor and caretaker services provided by the villages. Rehabilitation on the other hand means major overhaul and reconstruction, often costing as much as a new project. Further distinction is made between maintenance and repair. Maintenance is carried out by the villager maintenance worker and concerns on preventive care to ensure that the system continue to function. Where as repair is required, when the system has actually broken down and need out side assistance in terms of material and expertise .The main objective of rehabilitation of rural water supply projects, are to improve the water quality and to raise water production to demand level (IRC, 1990).

In many places once the construction phase has been completed the project is really only just beginning. This is the stage when many projects failed because they are considered being finished. A well-organized maintenance structures is required for smooth operation. One of the most important steps in establishing sustainable community water supply system is arranging for efficient operation and maintenance of the facilities. With out proper care, a water facility will deteriorate and fail to provide the services for which it was designed and built. A malfunctioning system will almost certainly be improperly used and eventually abandoned by the community. It is crucial that the community understand that without proper operation and maintenance by trained system operators, no water

supply facilities will continue to function properly and safely. Such proper functioning is essential for sustainability of water supply system. Operations and maintenance plans should not only list maintenance tasks, but also provide a detailed task schedule focused on preventative maintenance and specifying responsibilities (IRC, 1990).

For a water supply, system to run sustainable needs well-trained people to operate its. There fore Capacity building and training at local level are also highly linked to the projects success. Experience tells that for operation and maintenance to be long lasting, communities need to be trained before, during, and after facility construction, make choices based on all available options, and be given the opportunity to develop their capacity (IRC, 1990).

Involvement of user volunteers will increase the feeling of community owner ship and responsibility for the schemes. The prime aim is to create a system that will keep all the schemes functional by ensuring that repair is carried out as soon as possible. The involvement of the community in preventive maintenance and repairs will relieve a considerable burden from the government. Involvement of user ensures regular servicing to increase schemes life and repair is likely to be carried out more quickly. It is hoped to involve women in the care taking as much as possible as they are who collect the water and who suffer if the pump is not functioning properly (IRC, 1990).

Rehabilitation of defective schemes can provide an economic alternative to invest in new projects, but that decision should not be automatic. Just as with a new scheme, the rehabilitation option has to be evaluated by balancing community needs, preference, and capacity to sustain with the support potential of the water agency. In assessing the scope for rehabilitation, the community and the agency together need to review what went wrong last time and ensuring that lesson are incorporated in any remedial measure. Above all, rehabilitation should not simply be a matter of replacing broken equipment or infrastructure. The most common cause of failure is organizational: either the agency or the community has been unable to provide the resource needed to keep the system in operation. Replacement of failed parts will not eliminate that causes, unless it is combined by appropriate organizational changes and acceptance by both the agency the community (IRC, 1990).

3.5.2.5 Problems Related to Cost – Sharing and Cost-Recovery

Charging money for the provision of water has always been a controversial issue. The operation, maintenance, and management of a water supply costs money. Weather it is agency managed or community managed, the money for the running of a supply system must come from somewhere. The cost can include from the regular replacement of a worn out buckets and major pipes to recovery of the initial investment /capital cost. If dependence on outside support is to be reduced to a minimum, the users must contribute financially to the management of their own water supply system. Although access to water is the right of an individual and it should be' free', provisions of safe and adequate water supply will costs money. Besides, such issues as who should cover, who is going to set the tariff and how it is to be collected and administered and what type of strategy is relevant to sustain a water supply system financially are still debatable issues. In fact, countries may follow a wide range of policies to address the issues such as from 'free water' delivery to "full cost recovery." Whatever types of policies are followed, here, it should be noted that the issue of financial sustainability is still unresolved, and is a hotly debated one in the rural water supply scenes (Water and Sanitation Program, 2000).

There has been a trend of paradigm shift away from free provision to wards user's significant contribution to the cost, particularly to the operation and maintenance costs. The shift to this and the argument in favor of financial self reliance of rural water supply is mainly based on the believe that first the government allocates its scarce financial resources at hand among the competing needs of the populations and is therefore can not afford to continuing subsidizing the operation but it maintenance costs. Secondly, if the government continues to cover the cost, beneficiaries would expect help loosing the sense of responsibility and ownership feeling and develop a dependency syndrome. However, if communities pay for the costs for the running of schemes, they develop the feeling of belongingness and ownership sentiment and, consequently they would look after and take care of their scheme that lead to a reliable and sustainable provision of the service (Water and Sanitation Program, 2000).

3.5.2.6 Financial Management System

In order to cover O and M costs and other important expenses of a particular water scheme, the collected money from user communities should be managed properly and used for the intended purposes. Regarding this, (Brikke F.and Davis J., 1995) argued that necessary training should be given for water committee for prudent financial management.

3.5.2.7 Institutional Issues

According to (Brikke F., A and bredero M., 2003) policies and legislations, institutional capacity, availability of technical assistance to local communities, and capacity of technical staffs are among the important institutional factors that affect rural water supply programs.

3.5.2.7.1 Policies and Legislations

At national level, there must be clear and well-articulated policies and strategies that support rural water supply projects implementation and/or investment and managements. In addition, it should be practical at grass root levels. However, (Bahabdari B., Watnable S., and Manandhar D., 2000) stated that in rural areas the lack in the part of the government to set up an enabling environment for the development of a system and management of drinking water supply services through effective community participation is seen as the reasons for the poor progress of rural water supply. (Dessalegn, 1999) also argued that lack of comprehensive legislation as one reason for the slow pace of progress in water supply services in rural areas of Ethiopia.

3.5 .2 .7.2 Institutional Capacity and Support

The presence of strong responsible government institution is a crucial factor for any development activity particularly in RWS program. Being a critical factor in the water supply sector, institutional capacity is influenced 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 and 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 (Brikke F., 2000).

Another important element in institutional issues is allocation of adequate budget to carry out the mandate, including budget lines for staff salaries, administration, equipment, transportation and training. Unless the required technical, material and financial capacity of the responsible institution is fulfilled, the institution may not discharge its responsibility and the intended goal of adequate water provision on sustainable basis might be compromised. Furthermore, providing institutional support to community management bodies is another important institutional issue in rural water supply program. Regarding this, (Lock Wood H., 2003) argued that it is unrealistic to expect that government can leave rural communities to their own devices after a water project is completed, and that communities need some post- construction technical assistance. This implies rural water supply problems beyond the community level need to be addressed by supporting agencies like government and NGOs. However, studies conducted on the sector indicated that lack of institutional support to local community management body has been undermining the provision of adequate water to the rural community. In this case, technical staff capacity is a particular factor.

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3.5.2.8 Women's Participation

The central role played by women in the provision, management and husbandry of water, primarily in the domestic and household context, has gained widespread recognition in recent years; especially since the UN Decade (1980-1990). One of the main reasons for this is that usually women are the main collectors and users of water. The way to find out women and decision-making in water related matters might be too simply to ask how, by custom, women do contribute to community matters. Even though the division of labor

between men and women shows both cross-cultural (or cross-country) as well as cross-regional variations (within a country), it is a widely accepted fact that women, in most cultures, take the responsibility of collecting water from various sources and managing it at home. In fact, there exists wealth of evidences that show the existence of a high and close relationship between women and water. Nane Annan, wife of UN Secretary General, Kofi Annan, powerfully spelled out the importance of water to women and girls in Johannesburg, at the world summit on sustainable development, 2002. In a speech she argues that women bear the brunt of the burden of lack of safe water, and their involvement is key to achieving the aims of the Water, Sanitation and Hygiene for all (WASH) campaigns (Nane, 2002). Thus, in view of women's greater interest and influences on family decision regarding water, projects should evidently treat women as ' valued customers'. In spite of this, in most African countries, absence of women from decision-making in water resource management and service delivery is both inequitable, and severally hinders the possibility of realizing sustainability. When involvement of women in all components of a given project is realized, it makes projects and their endeavors so close to their goals of bearing fruit and there by benefit the community sustainability (IDRC, 1981).

3.5 .2 .9 Environmental Issues

Quantity and quality problems of water sources are the most commonly quoted environmental problems of water supply projects in the rural areas.

Regarding quantity problem of water sources, Davis et, al. (1993) said the continued functionality of water supply schemes depends on a reliable source and a reliable system of obtaining water from the source. The reliability of the source is often determined by seasonal changes. Some springs and wells may fail towards the end of the dry season owing to a drop in the water table. This is the time when water is needed most but supplies are least reliable. (Lock Wood H., 2003) also indicated one of the external factors for post-project sustainability is rather obvious, but one that nonetheless tends to be over locked is the sustainability of the water sources itself. Obviously, deterioration of source water quantity will be major concern in area of low rainfall or poor ground recharge whether

there is greater sensitivity to over extraction. However, even in relatively water abundant regions of the world, the source can fail to satisfy demand due to either population pressure expansion, or abuse of the supply for non-domestic purposes.

Regarding quality problems of water sources, (Dereje, 2007) said 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 and 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.

Furthermore, water quality problem can be easily understood and mitigated by routine testing and understanding the nature of geology and ground water resources .Otherwise, if minimum quality standard of drinking water were not fulfilled, sustainability of water supply schemes would be questioned.

3.6 Functionality Status of Water Supply Schemes in Ethiopia

One of the indicators of communities' managements of the scheme is the functional sustainability of the water supply schemes .However; considerable numbers of developed water supply schemes are not full functional in the country because of multifaceted factors. The scheme non-functionality is contributing to already existing low water supply coverage .According to (MoWRD, 2005/6) annual report in the proportions of non-functional schemes in the country is 25% on an average. However, the rate varies from region to region (Afar, Somali, Gambela, Dire Dawa .Hareri) all are 30% of there water supply schemes are non -functional to (see from the table3.1 below).In addition, 6950 existing non-functional or semi-functional water schemes were maintained and rehabilitated during the 2005. This has reduced the percentage of rural non-functional water schemes by 5% from 30% in 2005; to 25% in 2006 for the more it is possible

Table 3.1: Regional Distributions of Non-functional Water Supply Schemes in (2005/2006)

NO	Region	Rural coverage	Urban coverage	Total	Percentage of Non functional schemes in Ethiopia
1	Amhara	36.6	80	41.5	23
2	Oromia	40.2	87.6	46.5	25
3	SNNPR	53	64.5	54	17
4	Tigray	42.8	50.9	44.3	20
5	Afar	41.1	73	44	30
6	Somali	21.5	60	28	30
7	B/Gumuz	46.0	66.2	48	30
8	Hareri	29	21	24	30
9	Gambela	41.4	37	40.6	30
10	Addis Ababa	57	72	68.2	=
11	Dire Dawa	-	90.1	90.1	30
12	National level	42.2	78.8	47.3	25

Sources: MOWR (2005/6)

3.7 Water Supply and Sanitation Policies in Ethiopia

Before 1999, water resources development in general and provision of potable water supply in particular have been made without any policy frame work and was not well coordinated in the country .however since 1999 the Ethiopia ministry of water resources management policy (1999) water sector strategy 2002, and water sector development program (WSDP) (2002-20026) in the water sector to set a basis for sustainable development and management of country water resource (MoWR, Ethiopia Water Resources Mangement Policy, 1999).

The over all objective of Water supply and sanitation policy is

> *To enhance the well being and productivity of the Ethiopian people through the provision of adequate reliable and clean water supply and sanitation services and to foster its significant contribution to the economy by providing water services that meet the live stock industry and other water users (*MoWR, 1999)

3.8 .1 Drinking Water Supply Policy

The water resources management policy 1999 in the section of drinking water supply clearly elaborated detail plaices on institutional, financial, technical, and engineering issues

that should be considered in provision and sustainable management of drinking water supply schemes.

Some of the detailed objectives of water supply and sanitation policy include:

- provision of sustainable and sufficient water supply to all
- carry out operations and maintenances of water supply and sanitation services in sustainable and sufficient manner
- promote sustainable utilization of water resources through protection of water sources ,efficiency in use of water as well as control of waste water
- creating sustainable capacity building in terms of the enabling environment including institutions, human resources, development, land legislation and regular frame work for water supply and sanitation
- Creating conducive environment for promotion of appropriate sanitation services (MoWR**,** 1999)

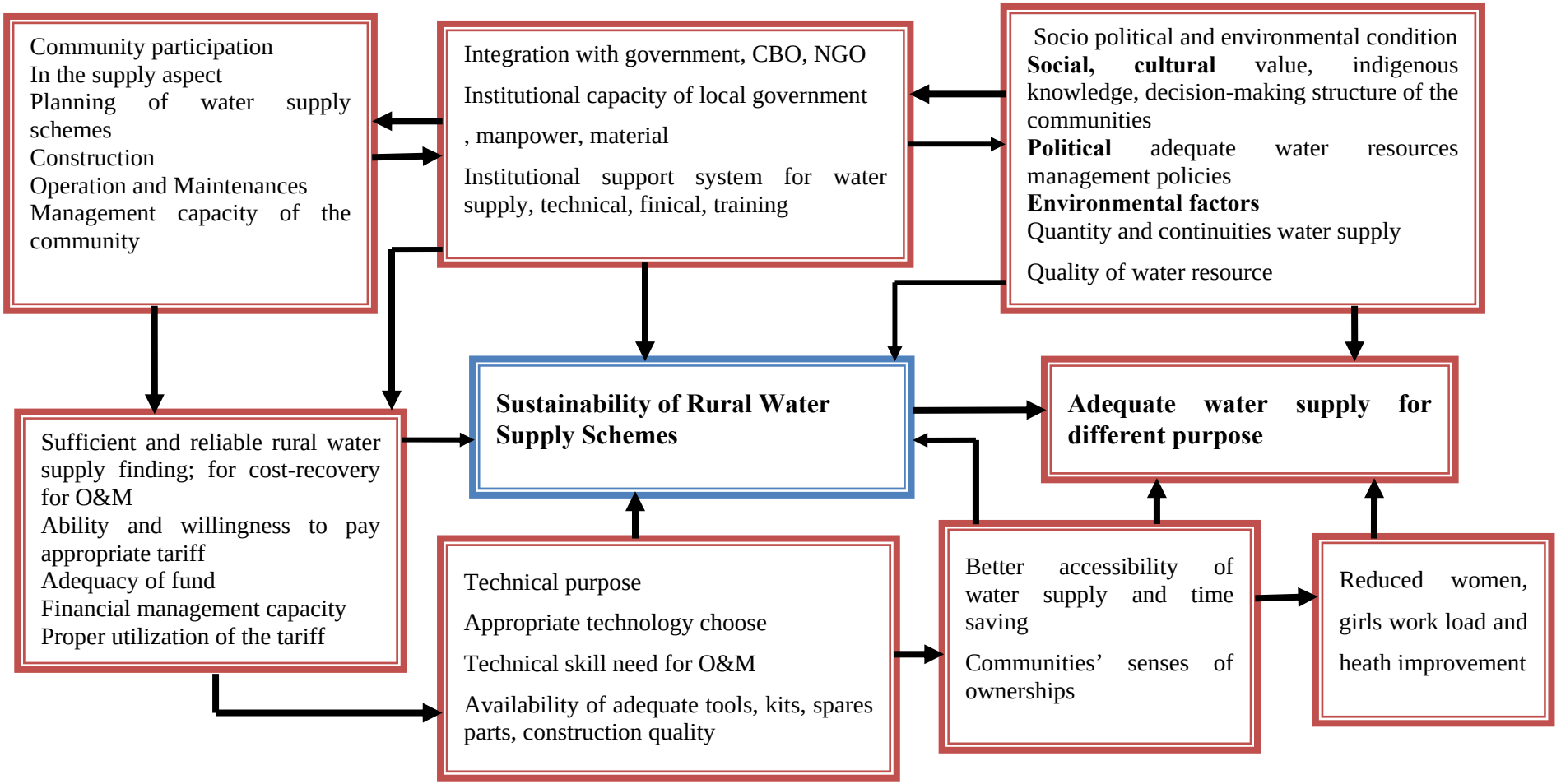
3.11Conceptual Framework

As the main objective of this research has been to assess the main problems of rural water supply and it progress, community participation in the provisions and management systems to achieve its sustainability the researcher has developed the following modified conceptual framework (fig3.1 below).

Wcwqerwvy

revgtr

Fig 3.1: conceptual framework of the study



Adapted from, IRC (2004), Aklilu Getinet, (2009), and modified by the researche

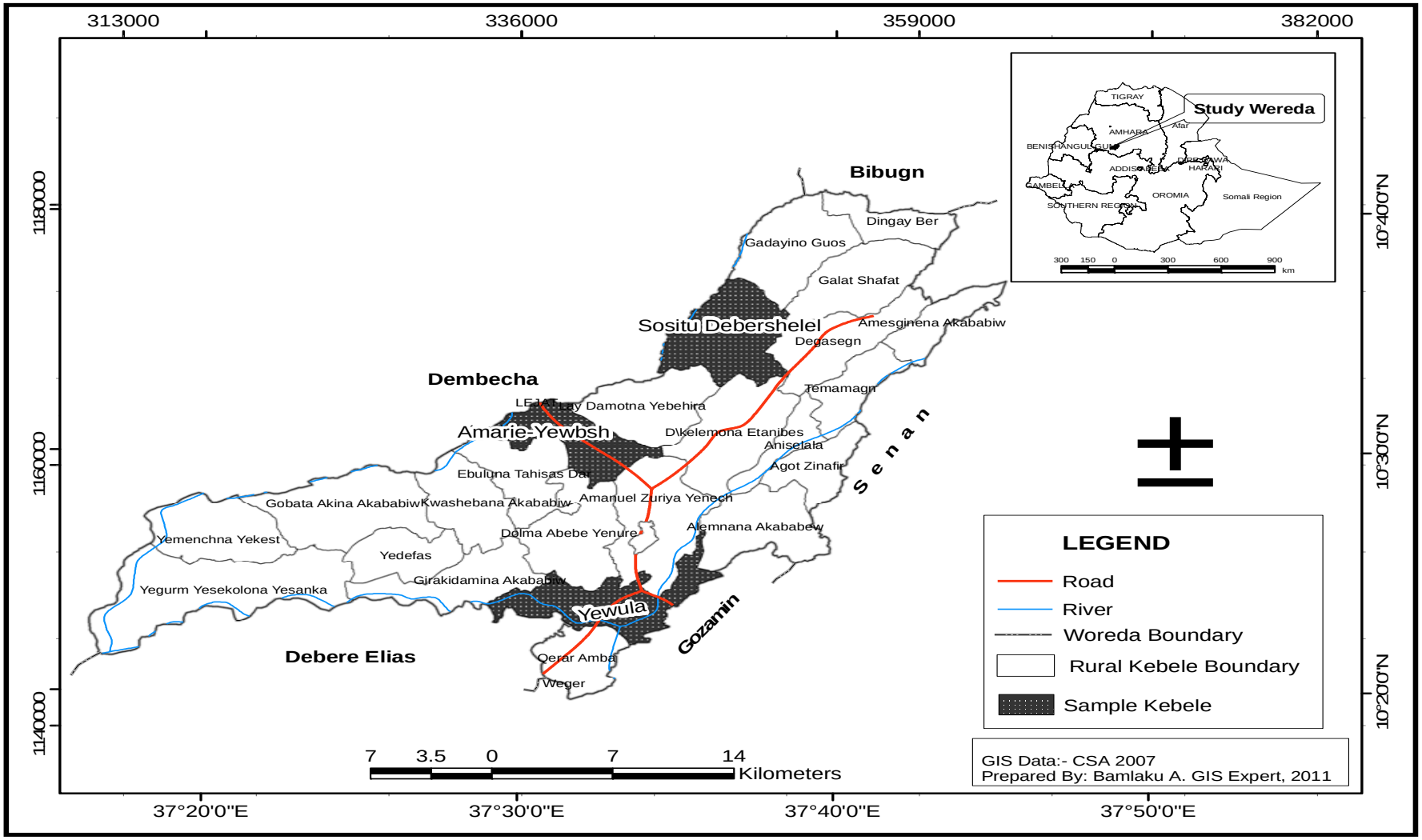
Chapter Four

4. Description of the Study Area

4.1 Location and Administrative Structure of Machakel Woreda

Machakel woreda is one of the 17 woredas of East-Gojjam Zone of Amhara Region it, is located between$10^0$19'75" to $10^0$41' 00'' North Latitude and37^0 16'46" to $37^0$45'42" East longitudes. It covers 79559 hectare or 795.59 square kilometer of area. As it can be observed from fig 4.1, the woreda shares boundaries with Debre Elias woreda on the South, West-Gojjam (Dembcha woreda) on the West, Bibugh woreda on the North, and Gozamin woreda on the East and Senan woreda on the North East. Amanuel is the Administrative center of the woreda and lies about 30 Kilo-meter west of the zonal capital Debre-Markos and 270 kms south to the Regional capital Bahir Dar (MWOSCA, 2009/10). There are 24 rural and one urban kebele administrations in the woreda. Each kebele Administrations has councils comprising elected members. There is also an executive body appointed by the council's body which runs the day-to-day administrative activities in the Kebele administrations (MWoSCA, 2009/10).

Fig 4.1: Administration maps of Machakel Woreda



4.2 Topography, Climate and water resources

Ethiopia adopts an agro-ecological classification. This is characteristically related to altitude and the corresponding climate. This Agro ecology is classified in five categories such as wurch, Dega, Woyna Dega, Kolla and Bereha. In light of this classification, the climatic features observed in the Machakel woreda correspond with altitude and associated vegetation coverage's. In this woreda 48% area is mountainous, 50% plains and 2% valleys. Climatically 50% of area falls in Dega agro-climatic zones, 39.1% in Woyna Dega, and 2.12% in wirch and 0.02%, in Kola (MWOSCA, 2009/10) .The mean annual temperatures vary between 20-24 degree Celsius at Gera kedamen kebele administration and eight degree Celsius in Gadaay kebele administration and the annual average rainfall range between 1500-1900 mm in the woreda (MWoSCA, 2009/10).

Machakel woreda office of Water Resources Development before 2005 was one of the parts of Agricultural and rural Development office at water Desk level. In 2006, this office has been restructured as a separate office which focuses on the water resources development issues. According to this office the woreda has relatively huge water potential, both surface and ground water, comprising 49 streams (Small River), 322 natural springs and 2 ponds (MWoWRD, 2009)

4.3 Potable Water Supply

Before 2005, water supply was very serious problem in the woreda, but since 2005, because of interventions of government, and non-governmental and international organizations water supply coverage of population increased from 29% in 2005 to 54.84 in the end of 2010

Available data from woreda office of water resources from 1993 -2010 concerning rural water supply schemes indicates that currently there are 126 water supply schemes ; out of these ,23 spring development(protect springs), 44 Shallow wells, and 59 Hand dug wells*(*Annex V).

4 .3 Socio-Economic Condition

4 .3.1 Demography

Based on figures published by (ANRSBOFED, 2008/9) this woreda has estimated total population of 148846 out of which 74548 (50.08%) are males and74298 (49.92%) are female. 51.11% of the population is found in the age range of 15-64 with 45.92% young age of less than 15 years. this shows there is high level of dependency ratio as is true to the county in general. In addition, the large share of the bottom age of the figure indicates there is higher fertility rate in the woreda (Table; 4.1).

Table 4.1: Total Populations in Machakel woreda

Age group	Urban and rural			Urban			Rural		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
0-4	29222	14813	14408	1436	737	698	27786	14076	13710
5-9	20399	10268	10131	1397	684	712	19002	9584	9419
10-14	18734	9435	9299	1683	802	881	17051	8633	8418
15-19	16220	8175	8045	1550	725	825	14670	7450	7220
20-24	13635	6834	6801	1151	511	639	12484	6322	6162
25-29	10721	5265	5456	889	380	509	9832	4885	4947
30-34	8722	4233	4489	759	323	436	7963	3909	4053
35-39	6956	3323	3633	603	257	346	6353	3066	3287
40-44	5713	2737	2976	469	216	253	5244	2521	2723
45-49	4704	2326	2378	376	176	200	4327	2150	2178
50-54	3866	1949	1917	298	125	173	3569	1824	1744
55-59	3102	1591	1511	248	100	148	2854	1491	1363
60-64	2438	1264	1174	229	90	138	2209	1174	1035
65-69	1853	967	886	182	71	111	1671	896	775
70-74	1284	677	607	126	50	76	1158	627	531
75-79	760	408	352	65	28	37	695	380	315
80+	518	283	235	57	24	33	461	259	202
Total	**148846**	**74548**	**74298**	**11518**	**5302**	**6216**	**137328**	**69246**	**68082**

Sources: BOFED (2008/9)

Distribution and Density; More than 92.26% of the population of woreda resides in rural areas. The level of urbanization lags behind not only the national and regional average but also the zonal one, (10.14 percent). The level of urbanization is only 7.74% .With a total area of 795.59 Km^2 and a population numbering 148846, the population density stands at 187.09 people per Km^2.

4.3.1 Social features

4.3.1.2 Religions: The Religions that are prevailing in the woreda are Orthodox Christianity and Islam a bout 98.7% of the total population is Orthodox Christianity while Muslims constitute 1.3 percent. The Muslims seems to be confined only to two kebele Administrations i.e. Gobata Aquna and Worqima (MWoSCA, 2009/10)

4.3.1.3. Education

As per the collected data from (MWoE, 2010)**,** currently there are 47 primary schools, one (9-10) secondary school, and one (11-12) preparatory school. The number of student in the woreda is 30719; among them 14876 are females and 15843 males.

Table 4.2: Number of Students from 1-12 Grades

Class level	M	F	Total
1-8	13791	13607	27398
9-10	1449	1036	2485
11-12	603	233	836
Total	15843	14876	30719

Source MWOE (2009/10) Annual report.

The gross enrollment ratio in primary school is 84.8%. There is no any significant difference between gender enrollments in primary school but the rates of dropouts and repeats are very high in the woreda as out of the total student 12.194% (3341) were dropouts and repeaters in the year under report. In addition to this, data obtained from the education offices show that there are 624 teachers among which 275 were females and 354 males' teachers (Table 4.3).

Table 4.3: Number of Teacher 1-12 Grades

Grade level	No of teacher			Teacher/ student ratio
	Male	Female	Total	
1-8	263	249	512	1/53.5
9-10	61	20	81	1/30.7
11-12	30	4	34	1/24.6
Total	354	273	624	1/49.2

Source MWOE (2009/10)

4.3.1.4 Health and health services

Health is one of the fundamental social development indicators of a country and without it economic development of a country becomes inconceivable. In the light of the above statement the government has planned prevention based health strategy to increase health services. This program is mainly focusing on the establishment of primary health care services and capacity building (ANRSBOFED, 2008/9) vailable data on the health coverage of the Machakel woreda shows that the first tope disease in order of importance are, Malaria, Intestinal parasite, vomiting, Respiratory infection, Gastric, Reateumatism, Pneumonia, Body fever are the main health problem in the woreda (MWoH, 2010).

To take core of minimizing the effects of the above mentioned health problems, currently six (6) health centers and 25 health posts in the woreda. On the average there is one-health post for every 5000 and one health center for 25,000 peoples. Concerning the health professionals, available data revealed that currently there are 6 BSC Nurses, 2 BSC lab technicians (technologies), 4 Diploma holder lab technicians, 10 pharmacists, 41 supporting staffer, 53 health extension workers, and 1 case manger, total living 117 health care services(MWoH, 2010).

4.4 Economic Aspects

Agriculture is the dominant economic activity and the base livelihood of the majority of residents of the study area .The agricultural activities are characterized by mixed farming

system. The most important crops produced in the woreda are cereal crops including teff, maize, barley wheat, and engido (*Tinctoria).* In additions to cereal crops pulses, oilseeds vegetables and fruits are also produced. Among pulses are horse beans, chick peas, piece, while oil seeds include lentils and Niger seeds, Vegetables such as onion, garlic, potato, tomato pepper and carrot are the major vegetables produced. Banana, mango, papaya, and oranges are the fruits common being produced where irrigation is possible.

Agricultural sector is characterized mostly by subsistence type of production mostly for household consumption and not geared to market conditions. In addition to various impediments such as high population pressure and land fragmentations, ecological and environmental imbalances resulting in drought and poor infrastructure development have hampered the development of the sector in the woreda (MWoWRD, 2009).

4.4.1 Farming System

The concept denoting the manner of human interaction with natural resources in rural areas, farming system is the fundamental manifestation of the pattern of livelihoods in a given agro-community. The farming practices heavily depend on the blessings of nature with a slight vicissitude (unexpected changes), in the climate having a disastrous effect on crop harvestings and live stock rearing. Thus, the erratic temporal and spatial distributions occurrences of rain falls have profound impacts on the magnitude of production. The farming cycle or the cropping calendar is largely confined to one season i.e. Meher which lasts from April to October. Further exacerbating the status of the farming practices is the fact that the cultivation techniques are obsolete and the utilization of modern farm inputs too weak (MWoWRD, 2009). As another crucial element of the farming system, the status of the live stock sector is too archaic not only the level of production the sources of animals' feeds are quantitatively insufficient and qualitatively poor. In short, the farming system in the woreda is under developed MWoWRD, 2009)

4.4.2 Land Use

As it might be observed from Table 4.4, 40.85 percent of the total land in the woreda is devoted to cultivation of virtually seasonal crops (MWoSCA, 2009/10).

Table 4.4: Land use in Machakel woreda

No	Land use	Area	
		Hectare	Percentage (%)
1	cultivated Land	32501	40.85
2	uncultivated land	8374.78	10.53
3	Grazing land	7648.59	59.61
4	Forest land	4654.05	5.8
5	Others	26379.58	33.16
6	Total	79558	100.00

Source: MWOSCA 2009/10

4.5.2 Irrigation

According to MWOWR reports the total size of irrigated land is 1191.25 hectares in the woreda, which is largely used for growing potato, fruit crops such as papaya and banana as well as cash crops. The practices of irrigated a farming are wide spread in eight Kebele administrations i.e. Yewula, Laydamot, Gadaay, Shelel, Galat Shafew, Tammamagne, Graa Qidamin, Ababa Dalmo. Some of the Kebele, administrations have functioning water users committees, an indispensable organizational instrument in the management of irrigation water (Annex VI)

Chapter Five

Data Analysis and Discussion

This chapter deals with the analysis interpretations and presentation of collected data. It focuses on (1) socio-economic profile of the respondents, (2) existing situation of rural water supply and (3) communities participation in the rural water supply and managements systems of the schemes (4) factors affecting the sustainability of rural water supply schemes in the Woreda and (5) institutional supports for local communities to the management of water supply schemes.

5.1 Background Information of the Respondents

Understanding the socio-economic and demographic background information about sample populations is very important to know their characteristics. As stated earlier the size of sample households for this study is 150, covered by 12 developed water points in the three sample kebeles. Each sample Kebele respondents were select based on proportional allocation method. From these sample population 87(58 %) are male and 63(42 %) female respondents.

With regard to age composition, 57(38.0%) recline in the age category of 36-45, 43(28.7%) in the group of 46-55 years, and 35(23.3%) category of 26-35 years, 9(6%) of the respondents in 56-65 years and 6(4%) in the 18-25 years (Table 5.1). The availability of economically active work force is particularly important in areas where capital is scarce and labor-intensive development activities, like small-scale water supply projects need to be encouraged. Thus, based on the result of the survey, it is safe to say that the community in the study area can share labor and involve in development and management of water supply projects.

Table: 5.1: Distributions of Respondents by Sex and Age.

Age group	**Sex**				Total	
	Male		Female			
	No	Percent (%)	No	Percent (%)	No	Percent (%)
18 - 35	4	2.67%	2	1.33%	6	4.0%
26 - 35	19	12.67%	16	10.67%	35	23.3%
36 - 45	31	20.66%	26	17.33%	57	38.0%
46 - 55	27	18%	16	10.67%	43	28.7%
>56	6	4%	3	2%	9	6.0%
Total	87	58%	63	42%	150	100.00

5.1.1 Marital Status and Family Size

Marital status has to do with family size and family heads which, in turn, has an impact on water consumption and participation in projects targeted to water supply. The organization of collected data (Table 5.2) reveals that that 138(92%) respondents were married, where as 7(4.7%), 3(2.0%), 2(1.3%) of the respondents is divorced, windowed and single respectively. Family size of households has to do with initial investment of water supply projects, water consumption and payment for its. With regard to the household family size, those respondents with family size less than 4 comprise about 42(28%), family size between 5- 7 constituted 80(53.3%), are 25(16.7%) of the respondents their family size between 8 -9 and only 3(2%) of household respondents indicate that their family size above 9. From this the mean and standard deviation of the family size is 5.64 -SD1.940. In principle, despite the differences in socio-economic status and other related factors, households having large family size consume large volume of water.

Thus, the flat payment principle applied in rural areas need to be revised. FGD made with water committees also revealed that almost all rural water supply institutions had not rejected the flat payment principle and they did not started to charge their beneficiaries based on water consumption/progressive payment (Table 5.2)

Table 5.2: Distributions of Respondents by Marital Status and Family Size

Marital status			family size		
Category	Frequency	Percent	Category	Frequency	Percent
Couple (Married)	138	92.0	0- 4	42	28.0
Divorced	7	4.7	5 -7	80	53.3
Widowed	3	2.0	8 -9	25	16.7
Single	2	1.3	Above 9	3	2.0
Total	150	100.0	Total	150	100.0
			Mean 5.64 -SD1.940		

Source: researcher's own survey results

5.1.2 Occupational profiles of Households

Sample households were also asked about their main sources of income the result survey households are presented in Table 5.3, almost 140(93.3%) of the respondents report that farming is the main sources of income, where as 6(4.0%) and 1(0.7%) of the respondents report that in addition to forming, commercial trade and daily labor were additional sources of income respectively. There is only 1(0.7%) of the respondent their main sources of income is government employees (Table 5.3).

Table 5.3: Distribution of Respondents by Occupational profiles

Current occupation	Frequency	Percent (%)
Farming	140	93.30
commercial /Trade	2	1.30
Government employee	1	0.70
farming and trade	6	4.00
farming and Daily labor	1	0.70
Total	150	100.00

5.1.3 Educational Level of the Respondents

Education is an instrument for socio-economic development of a nation. It is a basic parameter for any development activity particularly water supply programs. This is because literate citizen can be better participants and involve in projects targeted to water supply and management. Knowledge and technology transfer are also easier in a community that constitutes educated peoples .Educated individual demand for better

services and toward improvement of their living condition. As it is shown on Table 5.4 out of the total households 55(36.7%) were found to be unable to read and write (illiterate) and those who can only read and write were 65(43.3%),and 24(16%) of the respondents were having primary school (1-8) and only 6(4.11%) of the respondents have secondary school level of education (9-12). On the basis of the findings, we can conclude that the literacy level in the rural setting to the Woreda is very low. This is turn could be one main reason for poor management of rural water supply schemes.

Table 5.4: Distribution of Respondents by educational level in kebele wise

Kebele	Educational level					
	Count	unable to read and write	Can only read and write	some primary school (1-8) grade	9-12 Grade complete	Total
Yewula	Count	14	24	10	3	51
	% within Kebele	27.5%	47.1%	19.6%	5.9%	100.0 %
Amarie-Yewebesh	Count	15	26	3	0	44
	% within Kebele	34.1%	59.1%	6.8%	.0%	100.0 %
Sostu – Deber Shelel	Count	26	15	11	3	55
	% within Kebele	47.3%	27.3%	20.0%	5.5%	100.0 %
Total	Count	55	65	24	6	150
	% within Woreda	36.7%	43.3%	16.0%	4.0%	100.0 %

5.1.4 Demand for Social Services

The presence of community demand for social services calls for investment. It also shows the extent of community involvement in development and management of social services like water supply projects. Thus, concerning the need for social services 81(54%) of the respondents indicated potable water, 33(22%) of the respondents potable water and roads, 7(4.7%) asserted for health institutions, 6(4%) and 3(2%) indicated road, electricity; telephone and educational institution respectively (Fig 5.1). Form this we can conclude that potables water is still the main problem in the study area.

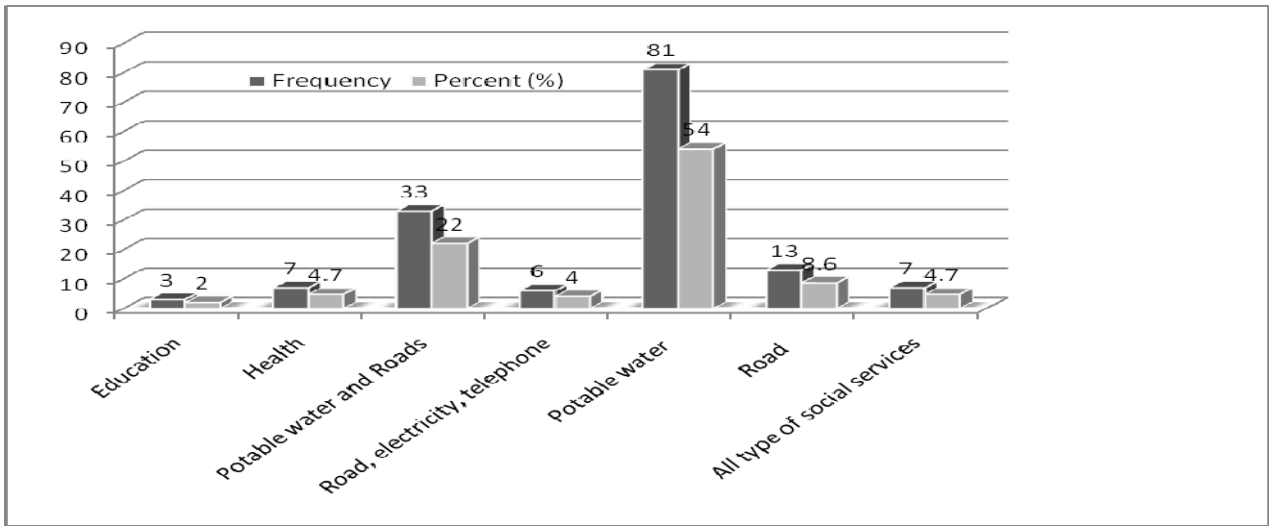


Fig 5.1: Distributions of Respondents by Demands for Social Services

5.2 Water Supply Related Issues

5.2.1 Water Supply Sources

Provision of potable water is all about access to safe and adequate quality of drinking water to the people within a reasonable distance. Assessing the current situation of rural water supply helps to know the supply level, factors against the provision and to set directions aimed at adequate water supply to the target community on sustainable basis. Accordingly, data on water supply projects` inventory, alternative water supply sources, and distances traveled and time required collecting water, means of water transportation, volume of water collected and consumed daily were gathered to look at the existing rural water supply in the study area.

In rural area, there are several sources of water such as unprotected well and protected Hand Dug wells, shallow wells, unprotected spring and protected (developed) springs etc. On the other hand, water supply is not only necessary for drinking and cooking but also for personal Hygiene and livestock watering. Concerning the sources of the domestic water during wet and dry seasons the result revealed that 34.9% and 15.6% had their main sources as unprotected springs and unprotected traditional wells, respectively, while

3.3.3% and 6.5% depended on rivers and unprotected open ponds the reaming respectively .46.7% of the respondents report that their sources of water is protected Hand Dug well, developed (protected) spring, and shallow wells (Table 5.5).

From this we can conclude that more than half 53.3% of the respondents report that traditional sources of water as their main sources of drinking water were due to inadequacy and frequently interruption of the developed water supply schemes and distances from the sources water points are the main reason forced the communities to use unprotected sources water.

The researcher also observed that in sample Kebeles and sample villages such as in Amarie -Yewebesh Kebele (Dega Amarie village), in Sostu –Deber Shelel (Chewamba -kalo) villages, in Yewula Kebele(Yacolt village) most of the residents use traditional sources of water points even if there is developed water supply schemes. Because most of the water supply schemes are non-function due to frequent break down of the protected water sources and extended longer period of time maintenances for the single water supply schemes are the main reason of that forced the villagers to use unprotected traditional sources.

During of focus group discussion with water committees in the Zibebeb village in Amarie - Yewebesh Kebele, the main cause of the frequent break down of the water points is large number of households using a single water points during dry season.

Table 5.5: Distributions of responses of sample Households by Sources during dry and Went Season

Source	Frequency of responses			
	Dry Season		Went Season	
	No	(%)	No	(%)
Rivers	6	3.3	3	1.6
Unprotected traditional wells	29	15.6	23	12.2
Unprotected ponds	12	6.5	2	1.1
`unprotect springs	65	34.9	83	43.9
Protect spring	24	12.9	31	16.4
Protected Hand Dug and shallow wells	50	26.9	39	20.6
Roof catchments	-	-	8	4.2
Total	186	100.00	189	100.00

Dichotomy group tabulated at value .1 Multiple Responses Method

As the Figure 5.2 depicts 67(44%) number of respondents make use of developed potable water to drinking and food making only, 44(29.33%) respondents use it for bath in addition of drinking and food preparation .But 39(26%) of respondents use for washing and watering animals also. The beneficiaries also expressed their views regarding protecting the hand pups from damage by frequent uses. Hence, they prefer the diverse sources as well.

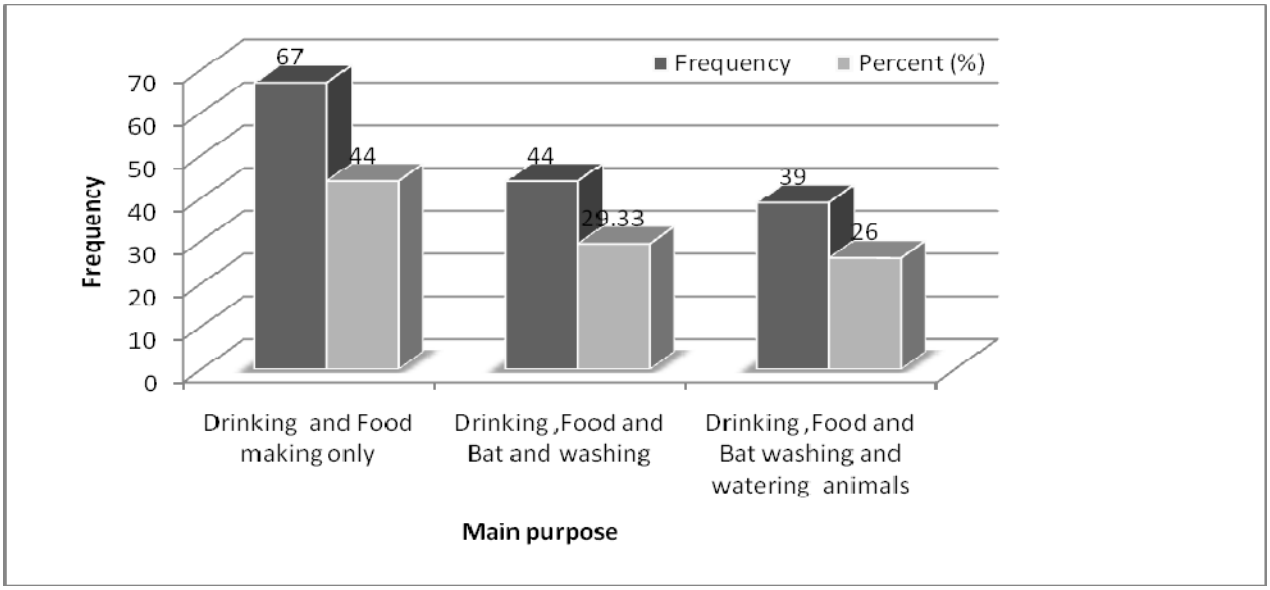


Fig 5.2: Distribution of Responses of sample households on the different Water uses.

5.2.2 Water Collection Tasks

As show in the Table 5.6 about of water supply 66% women and children were responsible for water collection in the family, while in 16.7% households' only children are major water collectors for home. Only 1(0.7%) in the households husband are involved in the fetching water. This survey shows that in the family, women and children are the main water collectors. As considerable number 21(44.0%) and 14(56%) of households also indicate that the age of children in participate in the water collection task is between the age 10-13 and 14-16 years respectively. What is more attention is that all respondents indicated that water was transported by human loads by using clay pot and plastic Jarricans.

The findings of this study are similar to the results of (WHO, 1995, Aklilu, 2009) who indicated that children and mothers are the common water collectors and spend much time in water collection in the rural settings of Ethiopia. It is believed to affect the spare times required for household affairs that may affect the health of the family as a whole. This, in turn, is a sign of the heavy work load on women at home.

Table 5.6: Distributions of responses of sample Households based Water Collection Task and Frequency of Collection

Water collectors	Frequency of responses	
	No	Percent (%)
Men	1	.7
Only Women	25	16.7
Children	25	16.7
Women & Children	99	66.0
Total	150	100.0
Ages of children's	No	Percent (%)
10 – 13	10	40.0
14 – 16	14	56.0
17	1	4.0
Total	25	100.0

The survey respondents in the study area most of the time in they fetch water every day except in Saturday, Sunday and other common religious holiday. As to the frequency of water collection per day, respondents 5.33% have been collecting water more than three time a day, while 36.67 % only three time 41.33% two times daily and the reaming 16.67%) only once ever day(table 5.8) . The mean frequency of water collection and standard deviation is 2.306667*and* -0.80785 respectively.

In additions to this the researcher has also seen amount of holding capacity of the container used to fetch in the single round. Here 62 (41.34%) of the responses 26-35 liters, 43 (28.67%) of the responses between 21-25 liters, 23(15.3%) respondents also report that the holding capacity of the container used to fetch in the single round to collected water between 15-20 liters, 17 (11.3%) of the respondent assert that between 36-45 litter. only

5(3.3%) of survey household respondents report that the capacity of their containers to fetch water is blow 10 liter. When we see the mean amount of water collected in a single round trip was found to 25.37 liters (Table 5.7).

Based on the two above finding when we calculate the per capita consumption of water, the researcher has developed this method;

"*The mean amount of holding capacity of the container used to fetch in the single round trip multiplied by the mean amount of frequency to collect water divided by the mean of surveyed household family sizes*."

$$\frac{25.37X2.3066}{5.64} = 10.22 \text{ liter}$$

The per capita consumption of water is 10.22 where liter is significantly different from WHO and MOWR guide line values of 15 liter per person per day and accessible with a range 0.5 – 1.5 km from a dwelling place. Unfortunately the current level of per capital water consumption is far below the adequate level. The survey results also showed that how the community is seriously suffering form shortages of developed water points in the study area.

Table 5.7: Distributions of responses of sample Households by water consumptions in liter

Size of the containers in liters		Frequency of fetching per day				Total	
		1	2	3	4	No	Percent
5-10		0	0	4	1	5	3.3%
15-20		11	7	5	0	23	15.3%
21-25		5	25	31	2	63	41.34%
26-35		8	22	8	3	43	28.67%
36-45		1	8	7	1	17	11.3%
total	No	25	62	55	8	150	100.00
	Percent	16.67%	41.33 %	36.67%	5.33%	100.00	

Interviews made with women in Yewula Kebele (Deber) water point they indicted that there is only two pots used from developed water supply because of the Hand Dug well has decrease its water table in the dry season due to this reason during dry season most of the residents collect water from traditional water pointes.

5.2.3 Distance Traveled and Time Taken to Collect Water

As indicated in the literature review, water supply has welfare benefits particularly when the time and energy on water collection is reduced. Hence, the primary objective of a water supply programs is to develop water sources closer to the point of use.

The surveyed households were asked about the distance between the water source and their home and the total time to fetch the water. As many as 51(34%) of the respondents mention the distance 1500-2000 meters, 39(26%) as 1000-1500meters and 8(5.33%) as less than 500 meters (see table 5.8). when we see the mean distance is 1913.33meter or 1.91333 kilo meter pertaining to time consumed in the fetching water in a single round trips 42 (28%) responded that they devote time between 41-50 minutes, while 63(42%) devoted 31-40 minutes. Only 11(7.3) have their water points with in 30 minutes round trip, which is as per the guide line of MOWR. The average time in the single round trip is 45.87munites (Table 5.8).

In the focuses group discussion with water committees of the sample kebeles, it was revealed that the problem queuing and waiting was more serious than that of the distance.
From this the researcher concluded that the mean time taken to fetch water from their water point is 45.87 minutes and 1913.33meters or (1.91333km) walking distance from a dwelling place. It exceeded the guide line value recommended by WHO and MOWR which is set adequate water supply accessible with arrange of 0.5 km to 1.5 km and 15 to 30 minutes of fetching time from a dwelling places.

Table 5.8: Distributions of Respondents Based on Distance Traveled and Time Taken to collect water

Distance (meters)	Frequency of responses				
	No	Percent (%)	Time (minutes)	Frequency	Percent
1-500m	8	5.33	Below 10min	1	.7
500-1000m	16	10.67	11-20 min	2	1.
1000-1500m	39	26	21-30 min	8	5.3
1500-2000m	51	34	31-40 min	63	42
2000-2500m	23	15.33	41-50 min	42	28.0
2500-3000m	13	8.67	51-60 min	32	21.3
Total	150	100	60-90 min	2	1.3
Mean 1913.33, SD664.908,			Total	150	100
			Mean 45.87, SD 9.619		

5.3 Status of RWS Projects and Functional Status of Rural Water Supply Schemes in Machakel Woreda

As data collected from Woreda water resources office and survey households indicate the existing water supply coverage in each Kebeles in the Woreda is very low although recently water supply intervention is better than any other time in the history of the Woreda. Available data from Woreda office of for 1993 -2010 concerning rural water supply schemes show that there were 126 water supply schemes; out of these were 59 Hand dug wells ,44 Shallow wells, and 23 spring developments .

Even if the Water supply intervention in Woreda was started in 1993, 101(80.15%) of the schemes were constructed after 2004 with the intervention of different organizations. In the recent years there had been increase in rural water supply coverage of the Woreda from 29% in 2005 to 54 % in 2010 (Fig 5.3). Even if there is also a progress in rural water supplies each year, all kebeles are not equally sharing the benefits of water supply.

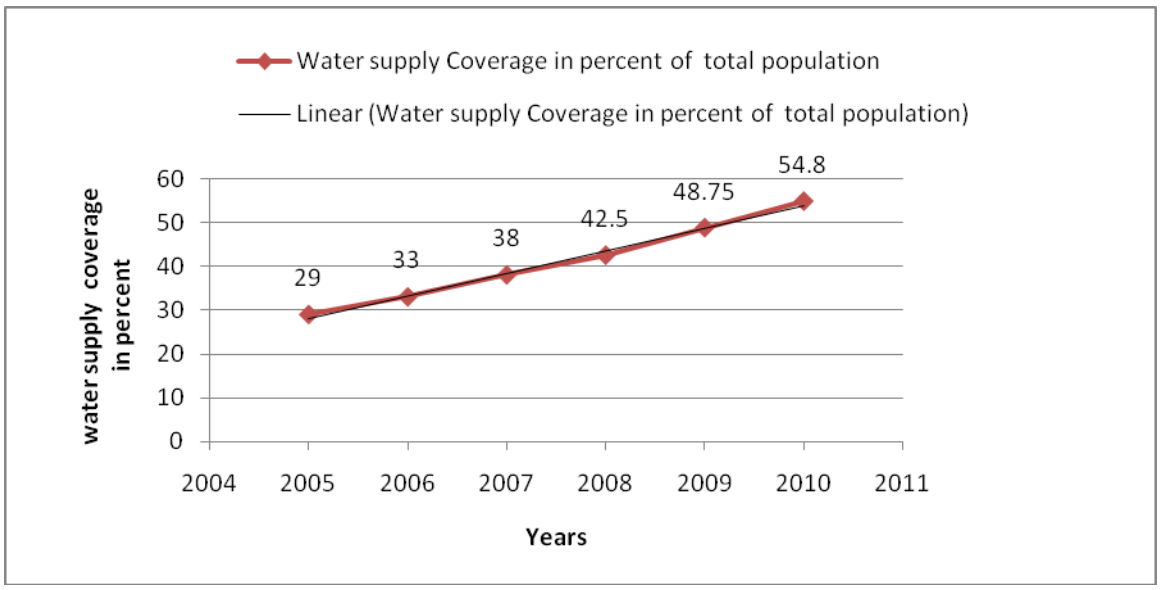


Fig 5.3: Trend of Rural Water Supply coverage between 2005 -2010 Years (MWOWRD, 2010)

As data obtained from East Gojjam Zone Water Resources Office, out of the total rural water supply projects in the area, 101(95%) are developed water schemes has been constructed by (SIDA). 4.2 % and 0.7% were implemented by UNICEF and World Bank, hunger project (an international NGO) and the rest projects were constructed by the government.

The KII respondents from the MWoWRD and EGoWRD concerning the low coverage status of potable supply, and improvement of the problem of sustainability rural water supply schemes the offices has plane to constrict number of different schemes and rehabilitation non-functional water supply schemes with in the next five years.

Both KII respondents and the participants of focus group discussions reported that about the unfair distribution of the schemes with kebeles of the Woreda because of inaccessibility of some kebeles to the Woreda center. Most of the water supply schemes are concentrating in the kebeles that were accessible to the roads, and Woreda centers. In addition to unfair distribution and low coverage of rural water supply schemes, there is the problem of sustainability of the schemes. This problem mainly arises out of several factors simultaneously financial, technical, institutional, and environmental.

The development and continuous service delivery of developed water supply projects are two important issues of adequate water supply to the target community on sustainable basis. Unless without properly managed; investing on water supply projects can not accomplish the aims.

As data collected from MWoWRD and field observation made by the researcher during the time of survey the physical status of rural water supply schemes in the sample area have been identified as functional, semi-functional and non-functional (Table 5.9). This non-functionality of the developed water supply projects not only lowers the water supply coverage of the Woreda but also forces the beneficiaries of these non-functional schemes to fetch water from traditional sources.

Table 5.9: Functional Status of Rules Water Supply Schemes in the Sample Kebeles.

Kebele	Village	Type of scheme	Year of construction (E.C)	Executed by	No of beneficiaries	Functional status	Remark
Deber Sostu shelel	Shelel-guilt	HDW	1991	SIDA	73	NF	Obs
	Mukite	SW	2001	UNICEF	96	F	Obs
	Chewamba – kalo	PS	1996	SIDA	91	SF	Obs
	Megej	SW	2001	UNICEF	97	F	Obs
	Clinic	SW	2001	UNICEF	100	F	Obs
Amarie Yewebesh	Zibebeb	SW	1997	SIDA	75	SF	Obs
	dega Amarie	SW	1998	SIDA	73	NF	Obs
	Yewebesh	SW	1996	Hanger project	90	S F	Obs
	Deber Yewebesh	HD	1992	SIDA	76	NF	Obs
	Deber 2	HDW	2001	SIDA	68	F	Obs
Yewula	Yewula	SP	1985	SIDA	73	SF	Obs
	Deber	SW	2001	UNICEF	92	F	Obs
	Yecholit	SW	1998	SIDA	81	NF	Obs
	Siso	HDW	2001	SIDA	90	F	Obs
	Addis Ameba	HDW	1997	SIDA	74	F	Obs

Obs, observed water supply schemes,

During field observation in sampling Kebeles, 15 water points were observed, out of which only 7(46.6%) are properly functional, the remaining were either non-functional or semi-functional. This result was matching with the opinions of the sample households where 84(56%) reported that their schemes were not functional year due to major break dawn during the time of survey. The remaining 66(44%) reported that their water supply

facilities were functioning but with frequent interruptions (Table 5.9) .Failure to provide proper service is a common feature of RWS projects, particularly in developing countries like Ethiopia. Such failures of projects not only compromise with the goal of potable water provisions to all on sustainable basis but also force the community to look for alternative water sources. Thus, assessing the status of the developed water supply schemes and the availability of alternative sources that can be used in case of systems failure and insufficiency is important in rural areas.

5.4 Factors Responsible for Rural water supply

Access to water supply is fundamental human rights. However, rural water supply is constrained by multiple factors related to socio-economic (community and financial), technical, institutional, environmental.

The effects of development activities like water supply programs particularly in rural areas of developing countries including Ethiopia may not reach the intended beneficiaries over night for many reasons. Some reports from Ethiopia, as well as other developing countries showed that insufficient and inappropriate technology accounts for the failures of some of the water schemes and projects, along with insufficient water sources (facilities) and poor physical structures (Mengesh et, al. ,2002) .

Each respondents of the KII from MWoWRD and EGoWRD also pointed out those main problems of rural water supply schemes are multidimensional. They under lined the main problems as; “Weak coordination between different services delivery such as Woreda, local NGO, water committees, weak capacity of the Woreda in financial ,logistics , and human power ,in appropriate use of the existing schemes by the committees, inappropriate technology, the water committees are weak and unable to operate the water points in sustainable ways, the woreda water offices are not equipped with adequate transportation equipments tool, spare part and official to provide and human resources the needed services and access majority of the population of rural area are very difficult due to weak infrastructure development such as road in the Woreda and Inappropriate & scatter

settlements patter are greatly in influencing the functionalities of rural water supply schemes."

Based on this the researcher conducted the survey to see the main problems that influence functionally of rural water supply schemes as follows.

5.4.1 Technical Problems

Technical issues are related to design and construction quality of schemes, technical skills needed for operations and maintenances, selection of appropriate technology, availability, accessibility and affordability of spare parts etc. Poor construction quality or the use of low-grade materials may lead to the failure of the water system before the end of its designed life span. Similarly, design flows including shallow well or spring developments, and overestimates or insufficient discharge (low yield) may cause a system to fail from the outset. In the study area 8.4% of the respondents indicated the main cause of non sustainability of water supply as poor construction, 11.2% of the respondents mentioned that in additions to poor construction there is insufficient water at the source, 12.6% added the poor technology which results in easy break down of parts, 16.6% responses referred to the lack of qualified local technicians among technical problems facing the non functionality of the schemes (Table 5.10).

5.4.2 Non- availability of Spare Parts

Non-availability of spare parts and tools for community is also an important factor that contributes to the non sustainability of rural water supply schemes, because the implication is a negative impact on sustainability of community water supply schemes. With regard to this **(**Komives *et, al.* 2006) stated that without a reliable supply of spare parts and some qualified persons to repair and maintain the water supply, schemes will not be sustainable. In assessing whether the local technicians were equipped with necessary toolkits to carryout repairs or not, 11.7% of the responses narrated that villager were unequipped with spare parts tool, Kits, to carryout repairs and maintenances (Table 5.10).

Many research findings show that large proportions of RWSS are non- functional at any time owing to the inaccessibility of proper toolkits and spare parts. The enquiries with the

water committee members confirmed the above results by saying that the spare parts are by no means accessible to the community. In addition to this concerning the participants of the committee mentioned the problems affordability of spare parts because of lack of regular payments of water charges by most of the villagers.

FGD member expressed their views as; “When our scheme breaks down and need repairs and maintenances that require spare parts, we have to walk many kilometers on foot to the Woreda or else the peoples fetch water from traditional sources because Most of the time the water committees’ did not get proper of spare parts, tools, for maintenance of the water schemes in sustainable way. Specifically focus group discussion with water committees in Zebebeb Village (Amarie- Yewebesh Kebele) revealed that most of the time the water committees bought spare parts from the market but they did not match with sizes main parts the schemes. This and other problem has created another unnecessary out put through out the time. They asserted that the woreda water office should extend to the villagers for supports such technical issues.”

This implies that accessibility to spare parts has time and energy implication in the study area in addition to the cost. Particularly, communities located far from the center suffer more. Likewise, information obtained from MWoWRD Key informants shows that;
“Local communities are not well equipped with spare parts, tools and other kits. To solve this problem, the office has planned to create a revolving fund policies in the future, which means the offices bought different spare parts based on the type of water supply schemes technology and sale to the local village. These improve in the future lack of spare part at the community level.”

The researcher also noticed during filed observation looking to the pipeline facets in Zebebeb villages (Amarie Yewebesh Kebele) and Chewamba-kalo spring development in Sostu Deber Shelel Kebele) that water supply schemes are non functional because of lack of local technicians, with necessary spare part and hand tools (Photo 5.1).

Photo 5.1: Non Functional and Semi Functional Water Supply Schemes in Amarie-Yewebesh and Yewula kebele Because of Technical Problems

5.4.3 Social Problems

Other problems of sustainability of rural water supply systems depends on the willingness of users to provide the necessary time, money and labor to keep the system functioning. This willingness may be affected by socio-economic factors such as willingness of villagers to work together, consumers satisfaction with the services, and the involvements and financial contributions of communities' for operation and maintenances. As per data collected from survey households 14.9% of the responses referred to the poor community participation in the water point management as responsible for the sustainability of rural water supply schemes, while 9.3% of the responses pointed to the larger pressures of consumers on a single water scheme and 11.2% of the responses mentioned the lack of finical for operation and maintenances (Table 5.10).

Table5.10: Distribution of responses of sample households by the main causes of failures of Rural Water Supply Schemes.

Main reason for failure of water supply	Targeted responses	
	No	Percent (%)
Insufficient water sources	4	0.9
Poor construction of schemes	36	8.4
Lack of communities participation in the water points management	64	14.9
Lack of provisions spare pats	50	11.7
lack of qualified local technician for give services for operation and maintenances	71	16.6
Lack of support and supervision from the water offices	62	14.5
Lack of finances for O& M services activities	48	11.2
Due to Large number of households using the single water point	40	9.3
Most of the water supply scheme technologies are easily breaking parts	54	12.6
Total	429	100.00

A Dichotomy group tabulated. (Multiple Response)

5.4.4 Availability and Selection of Technology

Use of appropriate technology that is readily available, accessible, affordable and easy to operate and maintain by the target community is a critical technical factor determining the continuity of rural water supply schemes. Selection of appropriate technology heavily depends on the availability of various technological options whereby the rural communities can choose. Thus, the investigation pointed to whether the community has a say in selecting appropriate technologies that can be easily operated and managed by the village level operation and management technicians.

The results of discussions with committee members revealed that the communities were not given the alternative technologies to choose from. Even they did not have any information about the technology options. As a result, the committee disclosed, that technology options were supplied by the implementing agencies without any consultation and/or participation of the community. Likewise, as can be seen from Fig 5.4 for an inquiry extended to the sample households to know “who selected their water supply

technology option", majority 114(76%) of the respondents confirmed that their water supply technology option was selected by the implementing agencies. Community together with implementing agencies and the community only were indicated by 26(17.33%) and 10 (6.67%) of the respondents respectively.

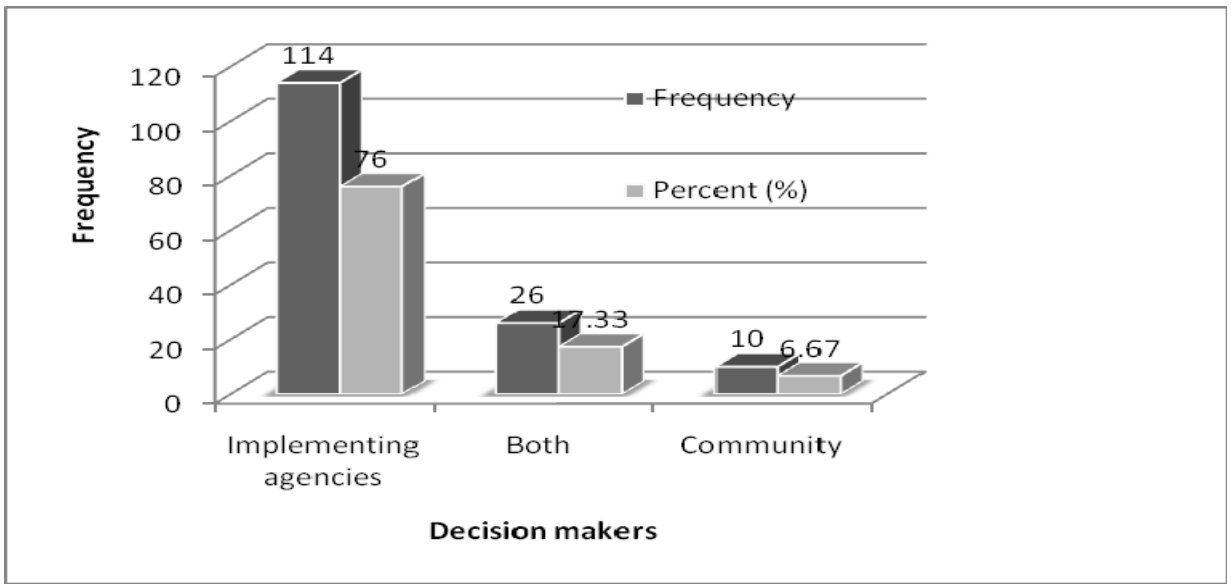


Fig 5.4: Distribution of Respondents' on decision makers of RWS Technologies selection

However, no matter as to who selected, the technology, it option should be simple in operation and easy maintenance. Concerning this aspect the responses revealed that majority 82 (54.67%) of the respondents reported that the operation and maintenances of the technology used is not easy while 29(19.33%) it is easy and the remaining 39(26%) showed indifference (Fig 5.5). The respondents further mentioned that the technology options are labor intensive (hard to move handles), susceptible to breaking down of parts and difficult to repaired by local technicians.

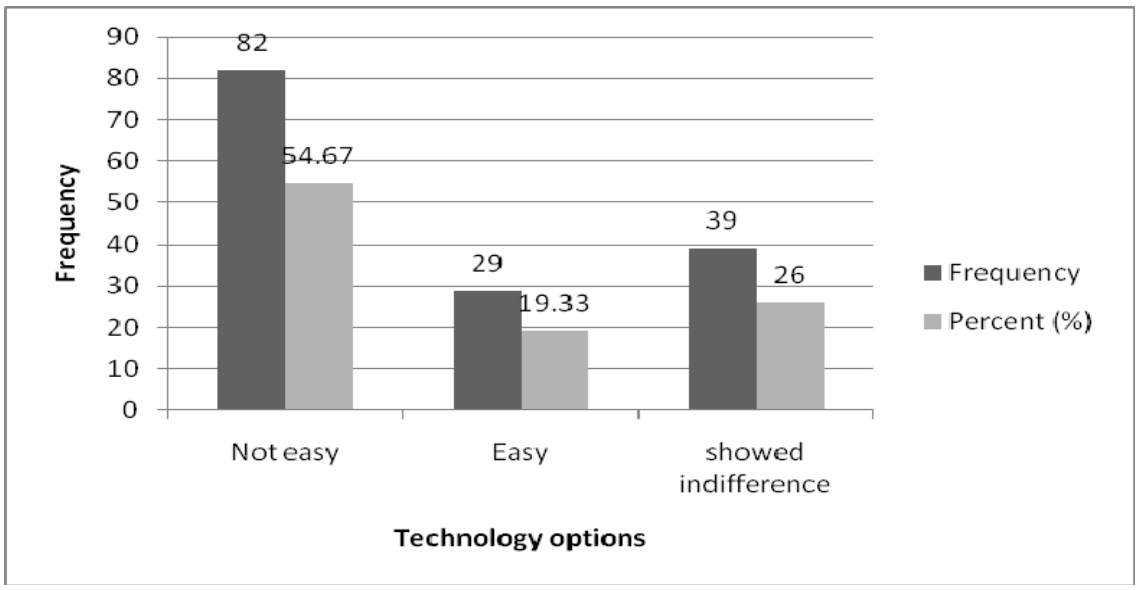


Fig 5.5: Distribution of Respondents' on the Easiness of the technology option for operation & maintenance

Based on the above discussions, one can conclude that water technology options were delivered and supplied without the technical capacities community to operated and managed by the village level which might have contributed to non functionality of systems rural water supply at large.

At the time of field visit, the major and common problems noted were

- Absence of drainage facilities
- Poor site selection
- Insufficient discharge (low yield) especially in the protected hand dug well
- Poor construction leading to leakage of spring boxes, pipes and reservoirs of the schemes.
- Lack of protection faces around the schemes especially in the developed springs
- Some of developed water supply schemes are completely covered by soil, vegetation and water which privies easy enter of frogs and insects to spring boxes in the schemes specially developed springs.
- Unplanned Locations of cattle trough and wash basins are very close to each other in some water schemes.
- At most of the spring points wash basins and cattle, troughs are nonfunctional

Participants of focus group discussion in Yewula Kebele (Yecholit village) and Sostu-Deber Shelel Kebele (Shelel- Guilt village) asserted that; “Rural water supply schemes were non-functional because of inappropriate site selection during construction, after constructions of the schemes gave service for not more than six months. Especially the respondents of Yecholit village were very happy when the system was installed and accessible to clean water nearer to their residences than traditional sources, most of them never expected to face problems or non functionality, with in with short period of time. After serving months , it started pumping low quality water with .After the matter banning reported to the MWoWRD the woreda water office experts visited the schemes surprisingly they, locked(closed) it in stead of repairing . As a result, the user reverted the sources the unprotected springs and traditional wells”.

Photo 5.2: Non Functional Water Supply Schemes in Yewula (Yecholit village) because of polluted with iron minerals

Concerning the above problem in the KII respondents with the Woreda Offices of Water Resources experts indicate that: at this the problems are beyond the capacities of the available experts at Woreda offices as was the case with the schemes in Yacolt villages where water polluted with iron mineral.

From this the researcher concludes that most of the rural water supply schemes have faced some technical problems a result some water supply schemes stayed for longer period without proper repairing and maintenances. This implies that the rural community in the study area did not get proper and regular water supply services.

5.4.5 Operation and Maintenance of Rural Water Supply Schemes

Operation and maintenance is a key component in any water supply sector. Sustainability can not be fully realized without maintaining their own water supply schemes on day to day basis insures that it continues to work for long time. Effective operation and maintenance of the schemes by the community is the continued running of the schemes. It requires availability of skilled technicians at community level.

But 65(43.3)% of the responses reported that there is no any concerned bodies to participate in the operation and maintenance activity, 35(23.3%) respondents accepted the presence but it doubt on the ability to operate the schemes sustainable way, 17(11.3%) of the respondents indicated that the operation and maintenance activities done by Woreda water offices only and the reaming 33(22%) of the respondents indicate all concerned bodies(local communities ,woreda water office) participate operation and maintenances activity collaborated each other (Table 5.11).

The water committees, who took training only once during schemes hand over to the community, are responsible to undertake maintenance works. However, they cannot carry out even minor operation and maintenance due to the absence of relevant training and tools. Concerning the time taken is maintenance of the scheme after failure, 30(20%) of the respondents indicated as one week to one month, 46(30.67%) of the respondents also indicated that three to six month while 58(38.67%)**,** of the respondents claimed that it may remain non-functional for more than one year (Table 5.11)

Table 5.11: Distribution of Respondents' on the Participants on the Operation and Maintenance activities and the time stay when the schemes get failures.

Participants on Operation and Maintenance activities	Frequency of responses				
Category	No	Percent (%)	Time of stay when the water supply schemes get failure	No	Percent (%)
local technicians'	35	23.3	For one week-one month	30	20
Woreda water offices only	17	11.3	From one month-three month	16	10.67
No one repaired	65	43.3	Three –six month Above one years	46 58	30.67 38.67
Both Local technicians & water desk	33	22	Total	150	100.00
Total	150	100.00			
Mean 2.85 ±SD 1.212100					

As respondents of KII problem related to operation and maintenance they assert that; "When Water committee or beneficiaries have to report whenever they face any failures of services, office technicians could not be able to repair as much faster as possible. Because there are only two diplomas holder mechanics in the office who were responsible for monitoring and regulations of water services to give necessary supports related the repairs and maintenances for all the 24 rural kebeles in the woreda. In addition to shortage of skilled manpower, there is lack of logistics and lack of sufficient budget for monitoring and follow up, operation and maintenance activities. Therefore, minor operations are done by the village themselves. The office participated in the operations and maintenances when the water schemes have been exposed have problems and beyond the capacity of the local village."

Based on the findings, it can be concluded that majority of the communities in selected villages do not have the ability to operate and maintain their water supply schemes properly because of absences of trained local technicians, unavailability of tools, spare parts either at woreda or the communities' level. These were the main factors that constrain sustainability of rural water supply schemes .Added to it is the limited capacity of the MWoWRD to provide support to the community in the development and

management of water supply, to shortage of skilled manpower, lack of logistics and lack of sufficient budget for monitoring and follow up are the major institutional threats to the continued functioning of rural water supply in the woreda and also there is a gap between the local village and the offices in the operation and maintenance of water supply schemes. Generally, the issue of repair and maintenance seems to start its first move from beneficiaries as far as beneficiaries are not able to report problems, the office does not have clear system for supervision and monitoring works.

5.4.6 Training to Households and Water Committees

Training is one factor for RWS sustainability. It includes not only trainings of the management bodies including community level but also that of the household level. This study reveals that the local communities have weak training exposure with regard to potable water use, personal hygiene and environmental sanitation practices. Although there is a comprehensive module that includes technical, financial, hygienic and environmental sanitation issues for training of water committees (WC), the way it was given to the committee members is out of the reach of the community at the grass root level. As Table; 5.12 depicts, more than three-quarter of beneficiaries did not have any kind of training related to repairing & maintenances of water supply schemes diversification of sources and sanitation uses of water . Only 21(14%) of them, which had access to training of such how water is properly mange water schemes, repairing & maintenances and sanitation. This shows there is lack of trained local technicians', education and awareness creating practices in water resources management in the Woreda.

Table 5.12: Distributions of Respondents on the Exposed to Trainings Related to Potable water, Hygiene and Sanitations

Respondents 'response	Frequency	
	No	Percent (%)
Yes	21	14
No	129	86
Total	150	100

Respondents of KII responding from water resources offices also mention that “although the offices has given training for some village water committees and local technicians but it is not adequate because of lack of trained trainers, budget and logistics. Also there seems to have weak coordination between the Woreda health office and water resource offices on the training and proper used water supply management and sanitation. The issue of potable water is not the responsibility of the MWoWRD office only but also the integration of different sectors.”

Based on the above discussions, response of households and field observation the researcher can conclude that many communities are not well equipped to operate and maintain their water supply schemes. Even if communities have system operator they are properly trained, they lacked the necessary tools to operate. There is a general agreement on training, operation and maintenance between the answered reclined from the respondents what was observed in the visits. The need for proper operation and maintenances is ignored. Schemes are constructed without any clear assessment of the manpower needed to keep them running, the logistical problems involved and soon. As a result, a high percent of water supply systems break down soon after having been brought into service. The office participates in the Maintenance and repairs are carried out only when major schemes break down. Whenever a break down occurs there is no an immediate measure taken**.**

5.4.7 Time and Construction Quality of RWSS

Time and construction quality of water supply projects are other important technical factors that can affect continuous service delivery of the schemes.

The time at which rural water supply projects are constructed has a significant effect on continuous service delivery of the schemes particularly on those that are not drilled well like HDWs. This is because the discharging potential of water points (ground water) is very high during rainy season and fails rapidly down at dry season. Many water points may fail and/ or dry out during dry season owing to a drop in the water table. Thus, water

supply projects particularly HDWs, have to be developed during dry season when ground water levels are near their seasonal low point.

In relation to this, 126(84 %) of the household respondents reported that the schemes were constructed at the end of dry season. Similarly, opinions key informants of MWoWRD and ZOWRD offices indifferent; “considerable number of water Schemes were developed during rainy season because of institutional linkage between local NGO and Woreda water office. It is one of the main reasons for the non-functionality of water schemes because in the water supply development process perched or digging in stopped before the right water label is reached. What ever the case, it implies serious flow in either the assigning process or the implementation modality. The respondents of the KII further explained that most of the time local NGO and other sources realized their funds around the end of dry season or the beginning of summer season. This resulted in stopping digging process at the raised water table rather than the dry season water table. This and other some problems has negatively influenced the rural communities’ access to potable water during dry season and high waiting time in the single round trip.”

Construction quality of schemes is too technical that comprise proper sitting for drilling/excavation, well completion and construction of top works. Thus, it was wise to explore the data from technical people and water committees.

To such enquiries the committees revealed that their respective schemes were constructed poorly, they get cracked frequently which has a significant cost implication to maintain.

The key informants from MWoWRD further approved the poor construction quality of the schemes due to the absence of monitoring during construction owing to shortage of skilled work force.

Photo 5.3: Non Functional Water Supply Schemes Because Of Poor Construction Quality in Sostu Deber Shelel in (Shelel- guilt) village)

5.5 **Community participation**

5.5.1 Demand for Improved Water Supply

Rural water supply can be sustainable if it is demand driven. Communities must, therefore, request for the improvement of the water supply facility before it is constructed and they share the initial cost of the projects. Conversely, unless communities show interest and essentially demand for safe water supply services there is danger that the schemes will not be properly used and managed. In view of the above principle of demand driven approach great majority of the respondents 85.33% confirmed that they had shown interest and demanded for improved water supply prior to the construction of the schemes (Table 5.13).

Table 5.13: Community Demand for Improved Water Supply

Issue	Frequency	
	No	Percent
Having demand prior construction	128	85.33
No demand prior construction	22	14.67
Total	150	100.00

Concerning to Community Demand for Improved Water Supply respondents of KII from the woreda water offices indicated that; “In the previous most of the time communities has low awareness of developed water supply schemes due to the existences of alternative traditional sources in the villages and low level of awareness about the health impacts of drinking unsafe water but in the recent time most of the communities has asked building water supply schemes with collection of petitions.”

5.5.2 Participation in Rural Water Supply

Concept of community participations in the rural water supply means that community plays an active role in its own affairs by sharing and exercising decision- making and implementation (IRC, 1987). Rural Water supply project activities are not likely to achieve their objectives without the active and continuous participation of the users. Users would have to be involved directly or indirectly in the development, planning implementation, operation and maintenance. It is a fundamental element of sustainability of water supply schemes. The water supply agencies have to initiate proactive measures like awareness building, community mobilization, constitution of community-based institutions like water user association and water committees, strengthening democratic process in them and broad basing involvement of community by transferring responsibility and authority to them in all aspects during water supply development, operation and maintenance of schemes (IRC, 1987).

In many countries one of the major causes for water system failure has been the lock of communities’ participation in the rural water supply development. In other worlds user’s involvement in every phase of local water supply development and contribution to their power in the construction, operation, and maintenances is very important for to sustainability of the schemes. With regard to participation of the community in the water supply development the findings revealed that 102(68%) of the sample households had participated in one way or another. Out of participants 59(57.8%) actively participated during the constriction phase while 7(6.9%) actively participated in addition to construction and management of the schemes, 21(20.6%) respondents actively participated in the post construction managements aspects of the schemes, only 3(2.94%), household

were evolved in the planning stage such as selection of the site and type of technology (Table 5.14).

Table 5.14: Distribution of participants by stage /phases

Phases	Frequency	
Stages	No of participants	Percent (%)
Planning(in site and schemes type selection)only	3	2.94
Construction	59	57.8
After construction in the management aspect only	21	20.6
In all phases	12	11.8
Construction & management	7	6.9
Total	102	100.00

From this conclude that there is high level of community participation during the constriction phase. But majority of the users did not participate adequately especially during planning phases, which is the more important phase .In other words local communities' knowledge through their experiences are not considered in the planning phases which can have impact on sustainability. Moreover, almost discussants and majority of key informants from government offices also confirmed the least involvement of communities during planning stage and their participation was limited only provisions of road and cleaning the sites of proposed water supply schemes. Most of the discussants accepted it as another critical problem for sustainability of their schemes.

Regarding the need of communities to participate in site selection of the schemes Davis et al., (1993) stated if improved water supplies are conventionally position with the participation of the intended users, it will be more used by communities and will have a better sustainability than water supplies that are not conventionally positioned with participation of communities. In support of this (IDRC, 1981) stated that if due consideration is not paid to social aspects while planning, the risk is high and the water supply system either will not be used or will be misused. (De Rege j., 2005) also, referring a recent review of World Bank water supply project by OED, stated that significant involvement of local stakeholders correlate better with sustainability in the out comes and

impacts. A lesser degree of participations for example only by providing materials and lobar is associated with lower likelihood of sustainability.

The process of participation, it is buy natural that some of the households must have contributed in more than one way. Thus survey results revealed that 19.35% contributed projects development through contribution of free labor, while 13.24% indicated contributions in the supply of local materials (such as stone, sand, wood), 14.46% contributions were though cost sharing by supply of cash (money). Only 7.13% referred to response to their participation in the site selections and 6.72% in election water committees' (Table 5.15).

Table 5.15: Types of Community Contribution in the rural water Development

nature Communities participation	Frequencies Responses	
	No	Percent (%)
In the supply of labor during the construction of water supply project	95	19.35
Money	48	9.78
local materials (stone, sand, wood)	65	13.24
Labor ,money and local material	71	14.46
information provision during in site selection	35	7.13
Labor ,money local material and information	59	12.01
Participation in concerning water supply problem meetings	85	17.31
In election of the water committees members	33	6.72
Total	491	100.00

A. Dichotomy group tabulated Multiple Responses

The participants of FGD also reported users contribution as unskilled labor, local malarial stone, wood, sand, from the beginning up to the end of the construction but almost all capital cost were covered by Woreda water offices and most of the time site is selected by the Woreda Water Office or any other organization such as NGO.

In additions to this the respondents of KII from Woreda Water Offices assert that "the site selection most of the time at woreda level, was simply based on trail and error methods ,even if it might had not been as satisfactory, the offices invited some local residences

during site selection. In addition to this, respondents of KII accepted that; the non availability of well trained geologists, engineers, and hydrologist to use scientific methods for site selection purposes. Concerning the distributions most of the time the offices focused on population density, demand, community participation in the supply, vulnerable groups in the kebele, and environmental conditions as the major determinates in the distribution of rural water supply."

Among the 48 non participants, 35(72.9%) asserted that the water supply schemes are fare from their residences, while 3(6.3%) expressed they unawareness and 8(16.7%) told that they were not asked to participate. The remaining said that any rural water supply activities done by the office and local NGO (Table 5.16).

Table 5.16: Distribution of Respondents on the Main hindering factors that communities Participation in the Rural Water Supply

Main reason	Frequency of responses	
	No	Percent (%)
the water supply schemes are fare from their residences,	35	72.90
They unawareness	3	6.30
They were asked to participate.	8	16.70
Total	48	100.00

From this the researcher concludes that most of the communities have actively participated in the construction and also the official has invited during the water development projects.

5.5.3 Participation in Rural Water Supply Schemes Management

Managing rural community water supply means operating and maintaining the system and supply of water as planned. Therefore, water supply schemes will be more sustainable if they are managed by users themselves than by external agencies because communities are closer to the schemes than external agencies. If the communities are not capable of managing the schemes there is need to strength their capacities and willingness to take ownership and responsibility of managing their water supply systems by taking adequate training on technical, financial and overall management of the systems as well as accessed

to external supports. Rural water supply schemes were managed by the communities through elected water management committees, whose members were mainly of which about two or more women. The water management committees include one chair person, one secretary, one cashier, two local technicians and two other members.

Concerning the ability of water committees to manage the schemes 113(75.3%) of the respondents had negative opinions while 21(14%) were affirmative and remaining 16(10.7) showed their indifference of the respondents believed that water committees has one of the means to manage the scheme in sustainable ways (Table 5.17).

Table 5.17: household's opinions on the ability of Water Committees to mange the schemes

Opinions	Frequency	
	No	Percent (%)
Yes	21	14
No	113	75.3
I don't know	16	10.7
Total	150	100.00

As focused group discussion with water committee in the selecting village participants of FGD confirmed that "water committee was established during the water supply development process and mobilize users to contribute labor and local material during constriction. Further it held of their water committee in carrying out their duties responsibilities and proper manage the schemes through collecting of users fee, carrying out operation and maintenances,, fixing time of fetching ,coordinating the user to fencing the schemes , keeping its satiations and report to the WOWRD if there is any problem beyond their capacities of the user.

We (water committee) did not work as hard as managing rural water supply properly, because of lack of power to enforce rule of the committees and hand no normal authority to act with to implement this rule, lack of adequate training and follow up from the office, absences of working manuals are identified as major problems that consternate the water committees for managing their schemes properly. In addition to this they indicate that most

of the local residents have actively participated during constriction but in the management of water point is very weak."

The above findings, so in the line with study by (Bahabdari *et, al.,* (2000) in Nepal indicated who that inefficient and less capable institutions like water users committees is a prime reason for non sustainability of drinking water supply schemes.

5.5.4 Senses of Ownership to Water Supply Schemes

Degree of sense of ownership to certain developed infrastructures service depends on the degree to which the local communities are involved in the whole processes and the level of satisfactions with the services. Concerning these (Bahabdari *et, al.,* (2000) stated most of drinking water supply schemes are malfunctioned due to lack of ownership on the schemes. Ownerships developed by the community's consider the schemes as their personal properties. Users' satisfaction in yields, its location, quality and regularity are taken as the major indicators to measure the level of ownership.

The involvement of local communities in the whole process rural water supply and management of the schemes is one of the channels to build the beneficiary sense of ownership, which is crucial for sustainable utilization of the projects. During households survey to assessed the sense of ownership of the community 56(37.33%) of the households believe that developed water points belongs to the villagers, 53(35.33%) reported that it belong to government and local NGO, while 30(20%) respondents indicated that the existing water supply schemes belongs to the government, local NGO and communities the remaining show indifferent (Fig 5.6)

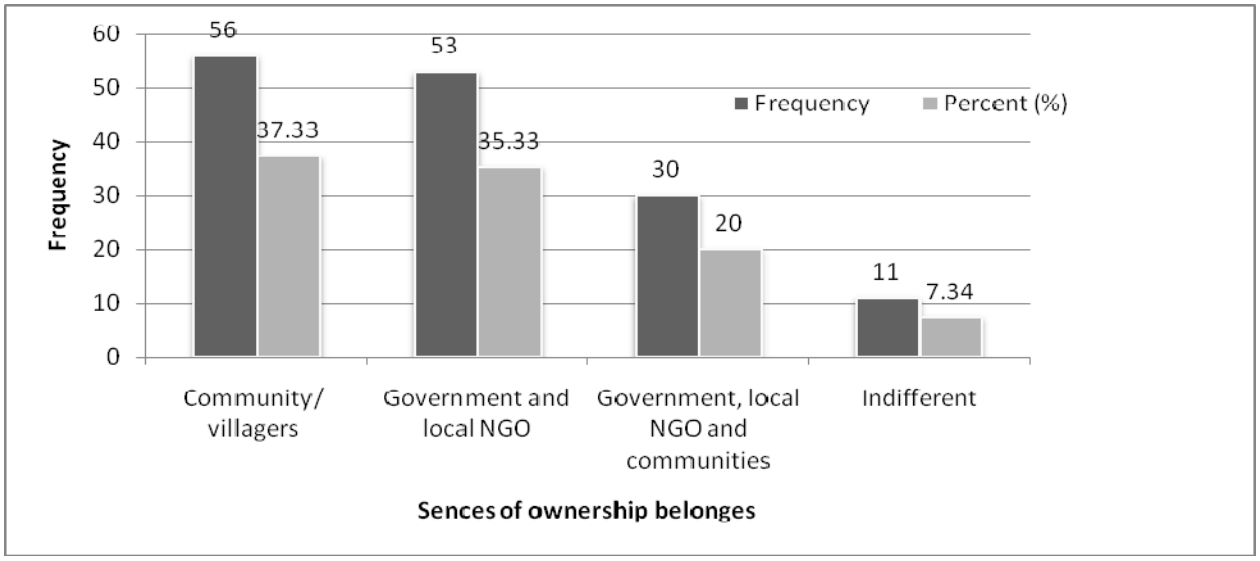


Fig 5.6 Distribution of Respondents' on the Senses of ownership of the schemes

Most of the interviewed respondents asserted that the main cause of communities' low senses of ownerships is the inconveniency (inappropriate**)** of the schemes site for some communities and partly lack of communities' full participation in their water supply projects and existences of an alternative traditional water sources.

As data collected from KII also indicated that "The office has encouraged the communities to develop the sense of ownership with different methods. The most common way that raised community ownership is that improving community's participation in the development of the project is very crucial. It could feel sense of ownership and responsibility will increase, if communities actively participate at any stage of water schemes development.

In addition to this Woreda Water Office also indicate that one of the problems related to sustainability of rural water supply is the absence of sense of possession by beneficiaries, they did not handle schemes properly and also refused to contribute finances to cover costs of operation and maintenances. To solve this problem the offices have prepared a plan, that committees(local villagers) has to contribute as cost sharing one thousand (1000) Ethiopia birr through Amhara Credit Association. This cost sharing contribution is used for

operation and maintenances in addition to developing the communities in the sense of ownership among the communities."

The data collected during personal observation also showed that out of the 15 observed water paints 9 have weak or no faces, 12 do not have appropriate drainage diversion ditches to protect from flood during the rainy season and poorly managed. In Amarie-Yewebesh Kebele (Dega Amarie) village one of the main causes of non-functionality of rural water supply schemes is inappropriate site nearly to the river, as the result during the rainy season the schemes are highly exposed for floods.

Thus based on the above findings, it can be concluded that rural committees in the study area do not developed well rooted sense of ownership in the developed water supply schemes. This result is non sustainability and poor functional status of the schemes.

Photo 5.4: Developed spring in Amarie Yewebesh kebele without any Protection by the local villagers

5.5.5 Contribution in the Cost Sharing and Financial Management

Many developing countries have considered water supply and social services as their priority. External support in water supply has concern related on constructing new schemes. This is an attractive option in May respects .But one, which needs attention is the deteriorating operation level of existing schemes.

Community contribution of fee (charge) or cost sharing and management of the existing resources is a key factor in the successful operation of water schemes. There is also a need to adopt system of cost accounting for operation and maintenance .It is absolutely essential for providing accurate and meaningful cost estimates and expenditure data. Water supply, whether large or small, requires funds for its management, operation and maintenances. It is impossible for a water utility to render satisfactory service and meet the requirements of future expansion without adequate funds. No matter how poor the community may be, some fee can and should be collected from the consumers. It has been said that when people start to receive water free of charge from a water system, it marks the beginning of the down fall of the system (Ayele ,1986).

If improved water supply schemes are to be managed properly and make the benefits sustainable, beneficiaries are expected to cover at least cost of operation ands maintenances. With regarded to this (MoWR, 1999) clearly indicates that provision of drinking water supply in urban areas are based on the principle of total cost recovery programs while rural water supplies are based on the principles of covering costs of operation and maintenances . In this regard it formed that 102 (68%) households did not pay any fee for the using water (Table 5.18). From among the pays 64.6% agreed that the existing water fee is cheap and the remaining reported that it as fair.

Table: 5. 18 Distribution of Respondents' on the perceive of water fee

How do you perceive the existing water	Frequency	
Category	No	Percent (%)
Expensive	8	16.7
Fair	17	35.4
Cheap	23	47.9
Total	48	100.00

Most of the respondents indicated that fee is collected by water committees. As far as the information obtained from the Woreda Water indicates the office water committees haven't made adequate efforts to collect the amount agreed upon by the community as payment to be saved to cover operation and maintenance costs.

The survey also shows that, there is no book keeping, and accounting system followed in the study areas by water committees. The water committees also lack of transparency i.e. the users do not know about the purpose for which the money spent. There is no regular reporting system to the Woreda water services and as a result many of the water committees are in poor status of finances. Basically the rural water supply fees are not designed to cover at least operation and maintenance costs because most of the users pay Fifty Ethiopia cents up to one Ethiopia birr per month. The operation and maintenance cost recovery objectives was simply to collect sufficient revenues from users of an ongoing basis to pay operation and maintenance costs.

Concerning the defaulters (102), 35 (34.31%) of believed that most of the time their is no any coordinator of water fee collectors, 18 (17.65%) assert that the water supply schemes are located far from their home and such there water supply sources is traditional points, 11(10.78%) showed lack of awareness about the water fee and 38(37.26%) their schemes are currently non functional (Fig 5.7).

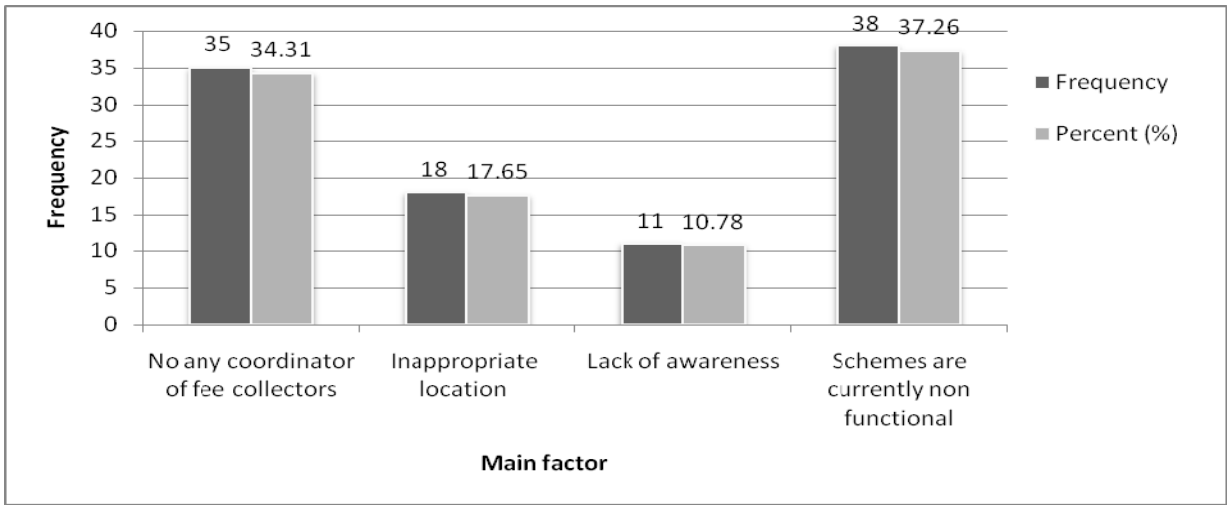


Fig 5.7: Distribution of Respondents on the main influencing factors to pay water fee

5.6 Institutional Supports Given to Communities in Managing Water Supply Schemes

Although communities can take up a substantial share of the responsibilities, external support series are still required. Because the community may play an active role in managing the system but still does not own repair jobs and decisions on the future of the system could also be beyond community capacity. Therefore, in addition to covering costs of the construction, the office should continue to provide support to the community. Such support may include adequate training on system administration, financial management, carrying out of operation and maintenances on major of technical procedures, ensuring availability and affordability of the spare parts, closely follow up the water committees and equipped with the necessary toolkits which are beyond the technical capacity of the beneficiaries. Besides, regular water supply system inventory, and water quality control needs to be carried out by the external agency or governmental agencies so as to properly and sustainably functioning of the schemes.

Similarly FGD participant's consensus expressed their complaint with regard to the question of support given to them on part of the implementing agencies. Almost all FGD participants's expressed their grievances (complaints) with regard to the issue of supports given to them after once the schemes were hand over to the communities; they were complaining the implementing agencies for their absences in providing supports. And place all the burdens on the shoulder of water committees to manage and maintain their water supply systems sustainably without giving adequate and practical trainings on financial and technical aspects, absence of working manual, ensuring availability and affordability of spare part storage at all level. Further more the water committee members criticized that the duration and content and method of training given to them were not satisfactory in acquitting them with the necessary knowledge and skill needed to mange water supply properly .That is why the training given to local technicians did not enable them to handle even minor operation and maintenances activities.

In addition to this, the interview carried out with local residents of Dega- Amarie Village (Amarie –Yewebesh kebele) indicated non functionality of water supply schemes explained that their frequent request for support of the schemes maintenances which were

beyond the technical and financial capacity were not reacted timely and positively on the part of the WOWRD.

Almost all participants of the FGD and KII respondents were complaining that the offices did not adequately organize water committees to properly manage and sustain water supply facilities and majority for the participants mentioned the above factors as one of the major limiting factors in sustaining of benefits from their developed water supply schemes.

Key informant interviewees from WOWRD and EGOWRD also acknowledged that absence of institutional supports provision services given to communities in managing rural water supply is mainly because of the resources limitation which include human, financial, material and transport facilities. They indicated that though it is not stated they provide support like provision of spare parts whenever available, carrying out major repairs, when it was beyond the technical capacity of the local technicians and provide trainings.

Based on the above findings it can be concluded that limited institutional capacity and support is one way of influencing the functionality of rural water supply schemes. In this case, the capacity of the technical staff at Woreda Water Office level is also very important. The more the staff is capable, trained and more professional; the better would be their effect on the water sector. As data obtained from the WOWRD, there are only two operators and maintenances workers to provide supports in 24 rural kebele administrations in the woreda and 126 water supply schemes.

5.6.1 Human Resources Capacity

It is obvious that skilled man power is the most important resource that coordinates all other resources towards the attainment of organizational objectives. In contrast, absence of the required personnel will threaten the realization of planned goals.

Data obtained from WOWRD revealed that on the existing office structure in the water supply sector at a minimum 21 employees are required to discharge the role and responsibilities properly. Out of these, staff members i.e. 3 civil 3, mechanical, 2

electronic engineers, 3 quality contrail, 3 water supply expert , 3 pipe operator, 2 water management experts, 1 socio-economic planner and program coordinator are indispensable. However the study found that in the MWOWRD there are only 7(33.34%) employees. Among these, there are 3 technical school 10+3 graduate mechanical technicians, electrical technicians', one civil engineer, one quality controller expert, one water supply expert, and one socio-economic planner and program coordinator. Because of scares resources of human power in the offices there are no longer subsidies for filed works of social services, such as follow-ups of water committees' activities, technical supports such as repairing and maintenance, training, and periodic technical supervisions in the rural water supply schemes. It is common to find defects beyond control of local communities and need external technical supports.

In addition to this, respondent of KII from EGOWRD explained that "one of the main problems facing in the Woreda water office has lack of required personnel due to budget constraint, access to labor in the market, and lack of interest professionals to work in rural areas."

From this findings one can concluded that weak human resources capacity of institutional factors that hinders sustainability of rural water supply schemes in the study area.

5.6.2 Material and Financial Resources Capacity

In addition to human resources; material and financial resources are also critically important to discharge roles and responsibility of certain organization properly. Hence WOWRD is responsible for leading and coordinating of the over all development and management of the water supply at which needs sufficient budget to be allocated. As data obtained from KII asserted that despite the offices has restructured in to Woreda Offices of Water Resources Development and Agricultures and the Rural Development Offices since 2005 the budget has allocated until 2008 under Agricultures and the Rural Development Offices. After 2008 the WOWRD office allocated its own recurrent budget including salary of the workers, operation, maintenances and rehabilitations of the schemes. And the capital cost (budget) has been covered by NGO, local and international organizations with minor share of government budgets. As can be seen from Table 5.20 the allocation of

budget between 2008-2011 even though the trend positively increases recurrent budgets was mostly inadequate to cover compulsory salary expenses which was the great challenges in providing support to the community for the operating and maintaining of developed schemes. The researcher has also observed during the time of survey that the office was very narrow not equipped with minimum required material.

Table 5.20: Allocated Budgets between 2008/9-2010/11in MWOWRD

Year	Allocated budget in the MWOWRD		
	Capital	Recurrent	
		Salary and Others	Total
2008/9	500000,	100000	600000
2009/10	800000	114000	914000
2010/11	920000	132000	1052000

Source: MWOWRD, 2010

5.6.3 Natures of the Coordination among Stakeholders Involved in Water Sector

There are different stakeholders dealing with the water sector in the region in general and Machakel woreda in particular. This includes Regional Water Bureau, Zonal Water Resources Development Offices and Woreda Offices Water Resources Development, Local and International Organization. Once the water supply schemes are developed by implementing agencies, it is handed over to the users who are the sole responsible body to manage their water supply schemes. There is the need for coordinated effort that should be between the users and the implementing agency to mange the schemes in sustainable way. As it is obtained from KII from the zone water office, as the result of the decentralizations of the water offices, the water supply responsibilities and power to develop and manage of rural water schemes have been given to the WOWRD. The role of the regional bureau and the zonal offices is to provide support to the WOWRD in terms of finance and technical including like inventory works, water quality analysis, carrying out operation and maintenances, rehabilitation of the schemes which beyond their capacities, capacity building through giving training, to assign experts to the office for rehabilitation of the schemes which beyond their capacities.

In the present decentralizations of the water sector, the WOWRD is closer to provide support for rural communities in managing their water supply than the zonal office of water resources developments. The woreda office of water resources developments is responsible for development rural schemes mainly hand dug wells and protect springs ,carry out maintenances works, which are beyond the technical and financial capacities of the community ensuring availability of spare parts at woreda level, fallow-up activities of water committees. Generally it is true that institutional and administrative capacity of local government is the case of MWoWRD can influence the water supply sectors either positively or negatively.

KII interviewees from the MWoWRD explained that even if there is given to support from the zone water resources offices through different methods in the capacity building , it is not adequate in both financial and technical issues from zonal and regional offices . Both the respondents of KII from the zonal and woreda water offices indicate there is a relation between NGO, local and international organization to provide technical supports through evaluations of mid term and terminal report of the organizations activities as well as during hand over of the schemes to the communities. Generally from the discussion above one can understood existences of weak coordination among stakeholders mainly from the government offices has significantly hindered the sustainability of water supply schemes.

Chapter Six
Conclusion and Recommendation

6.1 Conclusion

Even though efforts made so far to improve the existing water supply situation adequate and sustainable water supply in rural areas of Machakel Woreda is very low.

The average frequency of water collection was 2.3867 times per day with the mean per capita water consumption of 10.22 liter per person per day and the mean amounts of time taken to fetch water from the sources in single trip is 45 minutes and also there is large queuing time .

When we have we consider the guide line of WHO and MOWR define at a minimums adequate water supply to mean 15 liter of water per person per day and accessible with the range of 0.5 km to 1.5 km from their dwelling places. But Majority of the communities especially women and children fetch water from the water points by going approximately 1.933 km distances from there the dwelling places.

This study revealed that traditional sources are the main sources of drinking water and the developed water supply schemes are providing services with frequent interruptions which clearly show poor functioning of water supply schemes which in turn affect the sustainability.

In the study area three technologies (shallow well, Hand dug well and protected springs) were the major technology options that give services for potable water in the rural area. But Lack of community skill to operating and maintain the schemes, because of absences of trained local technicians, unavailability of tools, spare parts either at Woreda or at the communities' level, poor construction of the schemes, are the problems they have faced.

There is substantial contribution of local communities in project implementation (construction) phase. Beneficiaries contribute money, labor, and raw material.

In this case, contribution in labor takes the largest percentage followed by local materials, but weak community participation during the planning stage and site selection, low level of

women involvement, limited water committee's capacity, and weak sense of ownership, are problems that exacerbate on the sustainability issue of rural water supply schemes.

Currently Machakel Woreda office of water resources has established polices cost sharing practices, which impose on the community to contribute one thousand (1000) Ethiopia Birr to developed water supply schemes in their village. The study, however, fund that the capital costs for rural water supply are fully covered by external agencies which brings the absence of sense of ownership among the community which indirectly affects the sustainability of the water supply schemes.

Even if the communities are willing to pay water fee; lack of well organized collectors, lack of proper book keeping and saving by water committees, lack of well arranged training for water committees on the financial management which faces problems on financial shortage to support operation and maintenances, of infrastructural facilities which in turn, threats the sustainability of rural water supply in the study area.

Failure to considering the communities abilities to operation and maintaining technology types, poor community skill to operate and maintain the systems properly due to absence of relevant training and technical experts at Kebele and /or community level, in accessibility and unaffordability of tools, spare parts at community level and poor construction quality of systems were technological related rural water supply schemes problems in the study area.

Beside lack of adequate training and follow up from the office, lack of power to enforce roles of the water committees, absences of working manuals are identified as major problems that consternate the communities to managing their schemes properly.

Limited capacity of the MWoWRD to provide support to the community in the development and management of water supply; shortage of skilled manpower, lack of logistics and lack of sufficient budget for monitoring and follow up, operation and maintenance, lack of post construction external support are the major institutional threats to the sustainability of rural water supply in the study area.

The study also found that unavailability of adequate and reliable sources, poor qualities of water sources, drown water table, going for distance to fetch water, and the large number of households using on single schemes, scattered settlement pattern of the community, unsuitable and/or inaccessible natural topography of the area were environmental factors militating against potable water provision in the rural areas of Machakel Woreda.

6.2 Recommendation

Based on the finding of the study, the following practical suggestions are forwarded to improve problems of rural ware supply in the study area.

- Community related factor; the researcher recommends strengthening community participation and capacity building of the community to manage water supply schemes properly. Water supply schemes will be more sustainable if they are managed by users themselves because communities are closer to the schemes than external agencies and to take ownership and responsibility of managing the water supply schemes. Therefore, Woreda Office Water Resources Development should create conducive environment and capacity building for rural water supply management local institution (water committee) through legalizing the water committees, clearly defining their roles and responsibilities and providing them with adequate and practical training on financial ,technical and the offices should be also develop working manual, provide incentives for water committee member like as refresher training, experiences sharing .
- Adopting demand responsive approach (DRA); This approach is tested feasible practically in different countries as having a merit of minimizing most problems created by supply driven approach, capital cost sharing, and information people the various technological options with their respective cost and benefits, so as to enable them, grasp the level of services to which they are willing and able to pay and enhances sense of ownership.
- The office's has strength the current cost sharing of during the construction phases through cash and usually in kind. However, most of rural communities are either

not organized collector of fee or the use fee collected is inadequate. Water supply offices should, therefore, ensure that effective user fee collection system and regular financial utilizations and audit systems, should put in places forever water supply facility is to be achieved.

- Woreda Office Water resources should ensure that whether communities are aware of their roles and responsibilities in the development and management of rural water supply systems from the very beginning of the project.
- Water supplying agencies should ensure that women are actively involved in all phase of the project management.
- Selecting water committees member who have capacity and skill to manage and administer the shames.
- The woreda water resources offices or any other organization that participated in the supplying activity should include in their project plan to provide communities with enough spar parts at the time of installation particularly easily brittle (breakable), like valves, facets and elbows, this could give some time for the communities to fully get prepared themselves for longer responsibility.
- Woreda water resources offices assessing mechanisms of establishing revolving funds for purchasing spare parts at woreda level is another ways of solving the problems.
- In the long terms, WOWRD shall place at least one technical expert at Kebele level like health and agricultural extension agents.
- Poor construction quality and inappropriate site selection is threat for sustainable rural water supply in the study area; hence, improving construction quality should be seriously explored by water supplying agencies. In these sense selections appropriate designs, appropriate technology, quality of building and construction material employing competent contractors, assigning qualified supervisors helps to minimize the problems.
- Communities are to manage their water system; the technology should simple, cheap and easily maintainable by the benefices.

- In order to strengthen the managerial and technical capacity at Woreda level attention should be given to capacity building in terms of manpower, logistics and budget. The capacity of the WOWRD should be strengthened so as to provide the necessary support to the community to manage their water supply in a sustainable way. To achieve these stakeholders who are involved in rural water supply should be consulted on how to reinforce institutional capacity of the leading office.
- The government should not only depend on capital resources from NGO and other organizations in building the capacity of the water sector at woreda level.
- At present the operation and maintenance of rural water supply are in the lowest performance margin due to various reasons among which technical and financial short comings are the major one in the study area. In order to keep a water supply system sustainable, both governmental and non-governmental organizations should give greater emphasis on institutional support to solve problems that are beyond the capacity of the community such as re-training and resources allocation (material resources, financial and human resources) after the construction of water schemes. This support should encourage long-term management strategies built on clear relationships between institutions and communities to utilize and mange the water supply schemes sustainable basis.

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Annex I

Questionnaire for household survey

Addis Ababa University School of graduate studies

General objectives

The purpose of the questionnaire is to generate relevant information on problems and prospects of rural water supply and community participation in the provisions and management in Machakel Woreda. The research is going to be conducted for the partial fulfillment of MA degree in Geography and Environmental Studies at the Colleges of Social Sciences. It is only for the academic purpose be sure that the information you provide will be used for this research only. Your full support and willingness' to respond to the question is very essential for the success of the study. Therefore, you are kindly requested to answer all questions and give reliable information on the issues.

Background Information

1. Date of interview _____
2. Age _____
3. Sex M _____ F _____
4. Current marital status A. Single B. Divorced C. Married

   D. Widowed

5. Household family size

   A. Below, 4 B. 4-6 C. 7-9 D. Above 9

6. Educational level?

   A. unable to read and write

   B. Can only read and write

   C. some primary school (1-8) grade

   D. 9-12 Grade complete

   E. 12 above

   F. If other, please specify_____

7. Current occupation?

A. farming B commercial /Trade C. Government employee D. Daily labor E. farming and trade F. farming and Daily labor G. If other, please specify_____

_____

8. The most common essential services you need?

A. health B. Education C. Roads D. electricity E Telephone F. potable water G. Roads and potable water

G. If other, please specify_____

Water related issues

1 .where from you gets water supplies? Choices can be more than one.

***1**, Cooking and drinking **2**, washing **3,** livestock **4,** washing and livestock

2.

No	Sources	In Winter	In summer	Purpose for used			
				1	2	3	4
A	River						
B	Unprotect traditional well						
C	protect individual traditional well						
D	Unprotected pond						
E	Unprotect spring						
F	protect spring						
G	Hand Dug and shallow well						
H	Roof catchments						
I	If other, please specify						

How far is/are the water source from the house in Km or (meters) and what is the approximate time consumed in fetching _____

_____

3. How long is the average waiting time to fetch at the water sources?

_____

4. Who collects water mostly in your home?

A. The men B. women C. Children D. Both men and women F. women and Children

5. From question No “5” if the answer is children, how old are they?

A. 10-13 B. 14-16 C. above 17 years.

6. How do you transport water form the source to home?

A. Human load B. Donkey C. Animal pulled cart D. If other, please specify

_____

7. What is/are the containers you use fetch water mainly and most frequently for colleting water?

No	Liter						
7.1	Clay pot	Below 10	15-20	21-35	26-35	36-45	Above 46
7.2	Jerrican						
7.3	Both						
7.4	If other						

8. How many times water collection in each day? A. only one time

B. Two times C. Three times D. Above three times

9. Are you the beneficiary of potable water supply project?

A. yes B. No

10. If your response to question "10" is yes who came up with the idea of developing improved water supply? A. Committees B. Woreda water offices C. local NGO D. if other specify _____
11. Do you get any benefits from the water supply? A. Yes B. No
12. If your response to question number "13" is yes what benefit do you get from the water supply project?

A. It reduce the burdens of fetching water

B. It increases my awareness in development project

C. health's of the family member has improved

D .if other if other specify _____

13. Is there any problem in the existing water supply schemes?

A. yes B. No.

14. If your response to question "14" is yes what area the main problems face in the existing water supply schemes?_____

_____

15. Are the existing water supply schemes functional through out the year? A. Yes B. No C. functional with some problems

D. Non- functional long period of time

15. If your response to question number "15" is "**b", "C" and "D"** how frequently the sachems get failure? A. frequently B. rarely

C. some time with some problems D. Automatically non-functional failure

17. How long they stayed when the water supply schemes get failure?

A .For one week-one month B. more than two month C. three-six month D. above one year E. If other, please specify_____

18. Who under takes the operation and maintenance activities when the schemes get failures?

A. local technicians' B. Woreda water desk

C. both D. No one repaired

19. What do you think the main reasons for the failure of water supply schemes?

No	Possible reason	Alternatives	
		Yes	No
19.1	Insufficient water sources		
19.2	Poor construction of schemes		
19.1	Lack of communities participation in the water points management		
19.3	Lack of provisions spare pats		
19.4	lack of qualified local technician		
19.5	Lack of support and supervision from the water offices		
19.6	Lack of finances for O& M services activities		
19.7	Due to Large number of households using the single water point		
19.8	Most of the water supply scheme technologies are easily breaking parts		
19.9	Poor Design problem of schemes		
	If other, please specify		

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

_____

21.Is the technology option easily operational and manageable by the beneficiaries?

1. Yes 2. No

22.If no, what do you think are the difficulties? _____

_____

23. At what season did the schemes construct? 1. wet ('kiremt') season 2. Dry (Bega) season 3. If other, please specify_____

24. What do you recommend to alleviate the technical problems of water supply schemes?

_____

25. Do you think that the present water supply scheme is enough to your villages and surrounding area? A. Yes B. No

26. What are the main problems faces in the rural water supply in your village and surrounding area?

No	Cause	Alternative	
		Yes	No
26.1	No support from regional and Woreda water bureau (financial, material, human power)		
26.2	Absences of community participation in the provision of water supply and management aspect		
26.3	Up-down/rugged topography of the kebeles		
26.4	Throughout the time broken-down of water supply schemes		
26.5	Lack of giving services in the operation and maintenances activities		
26.6	Lack of information in the accessibility of spears parts of water supply schemes		
26.7	Drown /decreasing in water table		
26.8	Low level of NGO in participation in the provision of rural water supply		
26.9	Inappropriate use of the existing schemes		
26.10	Scattered settlement pattern		
26.11	Weak coordination between different service delivery actors		

26.12	Access majority of the population of rural area are very difficult due to weak infra structure development such as road		
26.13	The woreda water offices are not equipped with adequate transportation equipments tool, spare part and official to provide the needed services		
26.14	The water committees are weak and unable to operate the water paints in sustainable ways		
26.15	Water committees and poor communication with woreda water offices		
26.16	The accessibility of fresh water resources, in most cases, is not easy because of the physical and climatic condition of the woreda		
26.17	If other, please specify		

27. What do you recommend to alleviate the problems of water supply in your villages? _____

_____

28. Did the WWRO provide support to household and community based water supply system in your community? 1. Yes 2. No

29. If yes, what are the supports the community/ water committee received from the office? _____

_____

30. What supports did the community get from NGOs in relation to water points management? _____

_____

31. What types of supports does the community need to make the water points functional for a long period? _____

_____

How do you see the adequacy of water sources?

1. Adequate 2. Inadequate 3. Do not know

32. At what time season did the scheme construct? 1. Wet 2. Dry

33. Did you face water quality problems while using existing water supply schemes?

1. Yes 2. No

34. If yes, what are the quality problems? _____

Community participation

1. Have you bee involved in the provision of the water supply schemes?

   A. Yes B. No

2. If your response to question number "1" is yes at what stage of the development process did you participate?

   A. planning B. Construction C. After construction in the management aspect

   D. In all phases E. If other specify_____

3. What was your contribution in development of the water supply schemes?

No	Participation	Participation indicator			
		High	Moderate	Rarely	Not at all
3.1	Labor				
3.2	Money				
3.3	local materials (stone, sand, wood)				
3.4	information provision, in site selection				
3.5	Labor ,money and local material				
3.6	information provision, in site selection and money contribution				
3.7	Labor ,money local material and information provision, in site selection				
3.8	If other, please specify				

4. Who have participated in the development of water supply schemes?

A. husbands B. adult males C. women's D. Adult females E. all with the collaboration F. If other, please specify _____

5. How do you evaluate your over all participation in water supply activities?

No	Participation	Yes	No	Not at all
5.1	Participation in concerning water supply problem meetings			
5.2	Participate in the Rural water supply technologies and selection site selection of water scheme			
5.3	In election of the water committees members			
5.4	In the planning of water supply technology building design			
5.5	In the supply of labor during the construction of water supply project			
5.6	In the Operation and maintain aces of water supply			
5.7	In the management of water supply scheme such as protection from flood			
5.8	In the decision on water tariff			
5.9	If other, please specify			

6. Do you think that women are given fair opportunity to participate in all the processes of rural water supply and management activities?

A. Yes B .No

7. If your response to question number "6" is yes what is its main benefit from other participation? _____

8. If your response to question number "6" is No what may be the reason?

No	Main reasons	Alternative	
		Yes	No
8.1	Her husband does not allow to participate		
8.2	They not willing to participate in such projects		
8.3	most of them they do not time due to household responsibilities		
8.4	Most of the time female participation is not conmen in such activities due to it heaviness nature the work		
8.5	If other, please specify		

9. If your response to question number "1"is No what did you think can be the reason for not participating?

A. I haven't asked B. Lack of awareness C. every thing is done by government and local NGO D. There is no any water supply activity in our village E. If other, please specify _____

10. To whom do you think the water point belongs?

A. Government B. Communities (villager) C. local NGOs

11. Do the management bodies adequately reform their duties and responsibilities? A. Yes B. No

12. Did you get any kind of training related with water resources management including operation, maintenances, diversification and sanitation? A. Yes B. No

13. What do you think should be done by the community to improve the problems relate in the provisions of water supply and managements of the exciting schemes? _____

_____

_____

Issues related with water supply and management

1 .Who is responsible for management of the any water supply pointes scheme?

A. communities B. Woreda water offices C. water committees' D .only local NGO E. collaborations of all F. If other, please specify___

2. Are water committees the best to organize the community management of water supplies? A. Yes B. No

3. If your answer to question No"2" is yes have the members under one any water resources management? A. Yes B. No

4. Do you have good awareness on water resources management? _____

_____

5. Can water supplies be kept working in the long term under the present management system? A. Yes B. No

If no haw to improve this problem

6 Are there any informal committees like committee based organization participated on rural water supply and management aspect?

A. Yes B. No, If your answer is yes what the unique contribution of this organization?

7. What are the common practices of protection you made to sustain the rural water supply?

A. Paid guard/care takers

B. Fencing

C. Fencing and Planting on the sources

D. Continuous protection and control by the User

E. Paid guard/ Continuous protection and control by the User

F. No protection

D. If other, please specify

Issues related with Water tariff management

1 .Do you pay any fee for using the water A. Yes B. No

2. If your answer to question No "1" is yes how much do you pay for water per Clay pots /jerrican/ month?_____

_____

3. How do you perceive the existing water fees?

A. expensive B. Fair C. Cheap

4. If the answer to question No “3 “is expensive, what is the reasonable price you propose per Clay pot/ jerry can? _____

5. Is there is additional payment for operation and maintenances?

6. Who collects water fee/tariff? _____

7. If you answer to question number “1” is yes, why? For what purposes you pay?

A. It could enable to develop new water points
B. It will cover operation and maintenances of cost
C. For the salary of guard /protector
D. C. if other _____

9. If you answer to question number “1” Above if the answer is no why? Because,

A. water is considered as a gift of nature and should be provided for free
B. No any coordinators in the water tariff collection
C. because of our water supply schemes has non functional so our sources is traditional point
D. lack of awareness about the purposes of water fee
E. the villagers are poor and they can not afford

10. If you answer to question number “1” Above if the answer is yes when do you pay water fee?

A. every time when water fetches B. at the end of month C. once or two times every year

11. What type of penalty you have suffered, if you fail to pay the fee?

12. Generally what is the awareness of the committees in the payment of water fee? ____

_____

Annex II

Checklist for Focus group Discussion with Water Committees and Kebele Representatives

1. When was the scheme constructed?
2. How do you describe the overall situation of the scheme?
3. Who initiated the project?
4. Had the local community a demand of the project
5. When did the project construct and handed over to the committee
6. How and when WC came into effect.
7. Who elected the members of the committee?
8. Does it have formal recognition?
9. Who provide legal recognition?
10. To whom the committee is accountable
11. How long a committee can serve?
12. Did the participation of women consider? (Gender composition of the committee
13. How and by whom was the scheme established?
14. What were your involvement and contribution?
15. How many households are using the scheme?
16. Do you think the households using the existing scheme are very high or fair?
17. How do you collect and manage user fees from the community?
18. Do you have revenue collection and expenditure receipts?
19. How personnel and material and equipments costs are controlled?
20. Where and/or how do you save the money collected?
21. Is there financial and material and equipments auditing?
22. Who audits you? How frequent?
23. Does the committee capable enough to manage the scheme properly?
24. Who gave you the training?
25. Can you handle the minor operation and maintenance of the scheme?
26. Was the training adequate and relevant?

27. How the committees were established, who decided about the members the committees? How many of them are women?
28. What is the status of the scheme? /functional/ non-functional
29. How often the scheme breaks down
30. At what season the scheme frequently breakdown
31. What do you think are the main reasons for the breakdown of the scheme?
    - Source problems
    - Design problem
    - Water quality problem
    - Incapability of committee
32. How many members of the water committee are supposed to be women?
33. Do you think representation of more women in the water committee is good for the society?
34. Are the water committees equipped with necessary materials, manuals, working guidelines? A. Yes B. No
35. Are the committee member well trained on water resources management, operation and maintenances? How many times did they get training?
36. What kind of support is provided by the bureau to committee members?
    - technical support
    - training
    - no support
    - if other mention

37. Who design the water tariff rate?

38. Did the users pay the fee regularly? A. Yes B. No

If your answer question No“11” is No what do you think can be the reasons and what measures have been taken to alleviate the problems

39. What do you think the main reasons for the failures water supply schemes?

40. Are there local care takers who are supported with the necessary material for repairs when the scheme is broken down?

41. What are the major problems that have been seen on the existing water schemes?

42. Are spare parts, tool, kits, etc. readily available at community level Yes/No if no, where do you get?

43. What are the common practices of protection you made to sustain the rural water supply?

44.How is the level of community participation in rural water supply development program (starting from site selection to construction up to in the management of the existing water supply schemes) in general and women participation in particular in the water supply project management?

45. What solution do you recommend in order to alleviate the problems associated with the problem of sustainability of water schemes?

Annex III

Check lists for Interviewing Key Informants (KII)

- Date of interview _____
- Name of the organization represented _____
- Position of the respondent _____

1. What are the major goals and objectives of the establishment of your organization in relation to rural water supply?
2. What is the existing rural water situation of the Woreda?
3. How many improved water supply schemes are there in the Woreda?
4. How many (which) Kebeles of the Woreda have improved water supply?
5. What number of people uses protected water source?
6. Which Kebeles of the Woreda have no improved water supply schemes and why?
7. What is the number and status of existing water schemes in the Woreda?
8. Do you have properly compiled and regularly up dated inventory data of water supply schemes?
9. What number of people use protected water sources in the Woreda?

10. What are the main unprotected water sources in the Woreda?
11. Do you have compiled and regularly up dated water sources potential assessment data?
12. How do you see the use and reliability of both protected and unprotected water sources (during wet and dry season) in the Woreda?
13. What kinds of conditions do you consider when you prepare the plan of rural water supply.
14. What is the main problem you face in the provision of rural water supply?
15. How is the level of community participation in rural water supply development program (starting from site selection to construction up to in the management of the existing water supply schemes) in general and women participation in particular in the water supply project management?
16. Did the government agents adequately prepared the community to manage and sustain their water supply schemes (Yes/No), if the answer is no what are the reasons?
17. When, where and by whom the water supply project have been decided and the sites were selected?
18. What are the policies stipulates about costs of water supply, cost recovery of operation and maintenances as will as recurrent expenses?
19. Do you give training to households and water committee in the rural water supply management, operation and maintenances?
20. Are spare parts, tool, kits, etc. readily available at community level? Yes/No if yes, where do you get? If the answer is no how do you mange it?
21. What types of institutional supports are given to community in the functionality sustaining of the schemes? And how frequent are you supports.
22. What limiting factors could contribute to the continuous use of rural water supply schemes?
23. Do you think the staff is enough and capable to monitoring in the rural water supply?
24. What are your recommendations for the better project management and continued use of the schemes?

Annex IV

Personal Observation Checklist

Kebele and village name_____

1. The current situation of the water source
   - Type of water source
   - What/ how is the vegetation cover around the water source
   - Reliability of the source
   - What is the physical condition (quality) of the water sources?
   - How the water sources are managed (nearby sanitation, fencing, retaining wall, guarding etc)?
   - Topographic setting nearby water sources
   - Settlement Pattern
2. Water fetching for domestic purpose
   - Who fetches water for domestic purpose?
   - How it is collected?
   -]What types of containers used to fetch water
   - How it is transported?
   - Distance of the source from user community
   - What is the peak time for water collection
3. The existing situation of water schemes
   - What is the type of the scheme?
   - What is current status of the scheme?
   - Where does the community get water when the schemes failed?
   - Who manages the scheme?
   - What is the composition of the committee and women participation
   - Schemes protection/ fencing, retaining wall, guarding etc)
   - Maintenance and operation
4. How is water fetching for domestic purpose
   - Who fetches water?

- Duration of opening time of schemes for users?
- What types of containers are used to fetch water?
- How transported?
- Physical state (quality) of the scheme water?
- Settlement pattern of the community
- Topographic setting and vegetation cover around the water schemes

5. How is the coordination between communities, water committee and other stakeholders?

Annex V

The numbers of Water Supply Schemes Built and households benefited between 1993-2010 in Machakel woreda

Year of construction E.C	Number of schemes constructed	Numbers additional households benefited
1993	1	=
1994	1	95
1995	=	=
1996	=	=
1997	3	290
1998	2	212
1999	5	379
2000	5	361
2001	3	239
2002	3	214
2003	2	176

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2004	11	764
2005	26	2084
2006	28	2484
2007	=	=
2008	7	1473
2009	27	2457
2010	2	170
Total	126	11398

Annex VI

Irrigated Land distributions of in the Woreda (2009)

No	Kebele	Irrigated land in hectares
1	Embuli	19.5
2	Kuashila	3.75
3	Galat	106
4	Ababa Dalmo	75
5	Jamaamagn	113
6	Talazaam K/mihirat	20
7	Amanuel Zuria	29
8	Warqima	2
9	Gadaay	225
10	giraaQidamin	61

11	Shenel	113
12	Amsig	45
13	Balmna	14
14	Ansliala	21
15	Lay Damot	109
16	Qorar	25
17	Yawula	189
18	Gobaw Agina	21
20	Total	1191.25

ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

COLLAGE OF SOCIAL SCIENCES AND HUMANITY

ASSESSMENT OF PROBLEMS TO SUSTAINABILITY OF RURAL WATER SUPPLY AND MANAGEMENT SYSTEMS IN MACHAKEL WOREDA, AMHARA REGION.

I, the undersigned, declare that this research is my original work and not been for a degree in any other university and that all sources of material used for the purpose of it have been duly acknowledged

Declared by

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