# CHAPTER ONE
# INTRODUCTION

## 1.1 Background

Drinking water supply and sanitation are the basic necessities of life. Drinking water has been perceived as a social right and every individual has the right to adequate and clean water facilities. As 80% of the common diseases are caused by unsafe drinking water, it has also hazardous effect on health and economy of the nation.

In rural areas of Ethiopia sustainable safe water and sanitation coverage is not still at satisfactory status. During the previous years, the implementation approach was top-down, supply driven, that is, without full participation of the beneficiary communities. This approach has been identified to be a great problem for the sustainability of rural water supply and sanitation projects.

The Amhara National Regional State (ANRS) is extended from north western to some part of north eastern Ethiopia with a total area of about 152, 559.48 square kilometers, and has a projected population of 21,184, 252 of which more than 18, 434, 483 (above 85 percent) live in rural areas (BoFED, 2010). The region has common boundaries with Tigray in north west, with Benshangul and Sudan in west, with Oromia in south, and with Afar in east. The region is divided in to 10 Administrative zones and one special zone, 151 Administrative woredas (districts) and 3418 Administrative kebeles.

The total rural water supply coverage, both rural and urban, of the region is 64%; and the rural water supply coverage of the region is 60%. (WRDB, 2010). Therefore, accelerated and sustainable implementation of rural water supply and sanitation projects is a vital issue of the region. The issue of developing sustainable rural water supply and sanitation projects is complex, and depends up on many interrelated factors, such as, policy context, institutional arrangements, financial and economic issues, spare part supply, the participation and ownership filling by the user community, and empowerment of women. Anyhow the region is trying its best with its partners of governmental, NGOs, bilateral, and multilateral organizations and agencies.

The Government of Ethiopia has been launching very crucial policies and strategies for accelerated and sustainable development of water supply and sanitation at the national level. Among these strategies Universal Access Plan (UAP) has been implemented since 2006 to improve water supply, sanitation and hygiene (WASH). UAP has objectives of achieving access to safe water for 98% of the country's population by 2012. As far as sanitation is concerned UAP targeted latrine coverage to be 100% by 2012. The targets of these plans are more stringent than the targets of the Millennium Development Goal (MDG), which is 66% rural water supply coverage by 2015 (MoWR, 2009).

The Rural Water Supply and Environmental Programme (RWSEP) is a bilateral programme which has been supported by the government of Finland and Ethiopia since 1994, and implementing rural water supply and sanitation projects. In phase I (1994-1998) the programme focus was on capacity building at the regional level and on

constructions of rural water supply and sanitation projects, phase II (1998-2002), it shifted its focus to of capacity building to zones and woreda levels and continued also constructions, phase III (2003-2006) continued decentralization trend down to the community level with Community Development Fund (CDF) approach, phase IV started in 2007 and it is a phase on truck. The evolving of CDF approach was first in two pilot woredas (districts) and it has been expanding year by year to the whole programe 14 woredas (districts) to contribute significantly for the Universal Access Plan (UAP).

RWSEP with its CDF approach is pragmatically practicing a bottom-up, participatory planning and management approach in to implement rural water supply and sanitation schemes. The programme areas are located in four Administrative zones of Amhara National Regional State: South Gondar, West Gojjam, East Gojjam and Awi zones. The targeted Woredas (Districts) by the CDF approach are Farta, Fogera, Dera, East Estie, and West Estie from South Gondar; Bahir Dar zuria, Yilmana Densa, Quarit, Dega Damot, and Gonje Kollela from West Gojjam; Bibugn and Enebesie from East Gojjam; Ankesha and Guangua from Awi zone.

This study is intended to address some of the vital achievements by community financial management system, CDF approach of RWSEP on functionality rate, implementation rate, and rural water supply coverage improvements; and by this to show the importance of evolving CDF approach for sustainable rural water supply and sanitation projects implementation.

## 1.2 Statement of the Problem

The Amhara National Regional State has low rural water supply coverage, and the number of rural people which have an access to safe water supply is about 60% (WRDB, 2010). This implies, the low implementation rate and functionality rates that lead to low water coverage status which are not going hand in hand with the fast growth rate of population.

In many rural areas the constructed water and sanitation systems broke down soon after construction as a result of poor maintenance and management. Although the coverage of RWSS increased, the sustainability is often questionable. The underlying reasons for the poor O&M of rural water supply schemes as identified by international communities are not only hardware issues, rather software aspects of water (Schouten and Moriarty, 2003; cited in Berehanu, 2007).

Low sustainability rates are related to community issues such as limited demand, luck of ownership filling, limited community education, and limited sustainability of community management structures, such as water use committees (WUCs).(Reed, 2006; cited in Aschalew, 2009). Besides, water supply projects have been strongly criticized for their planning approach, which have focused excessively on physical construction and increasing coverage targets, but largely ignored what happens at the water sources after construction (Lockwood, 2002; cited in Aschalew, 2009).

The common problem of poor and developing countries, low rural water supply and sanitation coverage and unsatisfactory operational functionality of the existing schemes are also continues to be a major problems of Amhara National Regional State. Therefore, defining this kind of problem and proposing a solution in terms of community based implementation, CDF approach for Accelerated and Sustainable development of Rural Water Supply and Sanitation projects is very vital.

## 1.3 Objectives of the study

This study has the following general and specific objectives.

### 1.3.1 General objective

The main objective of the study is to examine the significant role of the Community Development Fund approach for the implementation of sustainable rural water supply and sanitation projects.

### 1.3.2 Specific objective

The specific objective consist the following:

- To assess the role of government, private sector, and user communities in the Community Development Fund approach.
- To analyze the Community Development Fund approach effects on the sustainability of rural water supply and sanitation projects by improving the functionality rate of water points.

- To examine the condition of community financing mechanism, CDF approach to improve implementation rate for faster growth of rural water supply and sanitation coverage.
- To outline future prospects for scaling up Community Development Fund approach into a financing mechanism for implementing communities development initiations.

## 1.4 Significance of the study

The research is:

- Helpful for decision makers, planners, donors, implementers to have alternative approach for implementation of sustainable Rural Water Supply and sanitation schemes.
- Useful to propose the methods of obtaining maximum benefits from water supply and sanitation schemes without affecting the environment.
- Enable to propose a fast clean Water Supply and Sanitation coverage with pragmatic Operation Maintenance Management system.
- Useful to propose a community based and managed Rural Water Supply and Sanitation and other related Rural Development projects.

## 1.5 Expected Output and Beneficiaries

This research will provide information of the practices used by the Community Development Fund approach in Amhara national Regional state Rural water Supply and Environmental programme.

Moreover the research will make recommendation for Sustainable Rural Water Supply and sanitation practices as a priority for improvement of coverage and better Operation and Maintenance Management by developing ownership feeling among the beneficiary communities through community based approach. Specifically the expected outcomes of the study will

- Review the condition of study area Rural Water Supply and Sanitation activities.
- Observe the Accelerated and Sustainable Rural Water Supply and Sanitation practices that have been adopted by programme woredas (districts).
- Make recommendations for sustainable practices to Rural Water Supply and sanitation and other related sectors.

As far as beneficiaries are concerned the following parties benefit directly or indirectly from the research work

- The community living in the study area and those living in other rural areas.
- Amhara National Regional State Water Resources Development Bureau, Zone Water Resources Development Offices, Woreda Water Resources Development

offices, Bilateral, Multilateral organizations who are dealing with Water Supply and Sanitation activities and other related activities.

- Students and researchers in the area of rural development, rural water supply and sanitation can gain from the research work.

## 1.6 Hypothesis

1. There is statistically significant difference between the average functionality rate of all water points constructed in Rural Water Supply and Environmental Programme woredas and Community Development Fund approach constructed water points in the same woredas (districts).
2. There is statistically significant difference between functionality rate of water points when grouped by implemented by Community Development Fund approach and non Community Development Fund approach.
3. There is statistically significant difference between implementation rate of water points when grouped by implemented by Community Development Fund and non Community Development Fund approach.
4. There is statistically significant difference between the average rural water supply coverage of Amhara National Regional State and Rural Water Supply and Environmental Programme woredas rural water supply coverage.

## 1.7 Geographical coverage

This study was conducted in Amhara National Regional State where Rural Water Supply and Environmental Programme (RWSEP) is operating rural water supply and sanitation projects for above15 years. These woredas (districts) are, Farta, Fogera, Dera, East and West Estie Woredas of south Gondar Zone; Yilmana Densa, Bahir Dar zuria, Quarit, Dega Damot, and Gonj kolela woredas of West Gojjam zone; Guangua and Ankesha woredas of Awi zone; Bibugn and Enebesie woreda of East Gojjam Zone. In these woredas (districts) there are also governmental and NGOs interventions other than RWSEP for rural water supply and sanitation projects implementation.

Among the woredas (districts), in Farta woreda, the proportion of NGOs' intervention is relatively highest. CARE, international NGO is implementing rural water supply and sanitation projects potentially in 22 kebeles from the total 37 kebeles in the woreda with non CDF approach. But in parallel RWSEP is implementing in the rest 15 kebeles with CDF approach. Therefore this woreda was considered separately from other woredas for comparison of functionality rate difference between CDF and non CDF approach constructed water points in the same woreda during the same periods and with the same type of technology.

# CHAPTER TWO

# LITERATURE REVIEW

## 2.1 Rural water supply, Sanitation, Hygiene and Health

Water is the essential item for any living thing and free gift of the nature to human race. It is not possible to survive without water for much of the time. It is believed that an adult person need to drink at least 2.5 liter per day and ¾th of human body weight is water.

In rural areas the amount of water required for an individual or for a family is small. But when individuals or families live together, they form Villages (Gotes) and the water requirement increased by many fold. As a matter of fact, community life developed in the beginning only at places where there was enough water to sustain life. Otherwise, people living in rural areas have to struggle in search of natural springs or dig water wells. The majority of the people living in poverty survive with less than 10 liters of water per day, per person, compared to modern western style consumption of 350 liters per day per person (Roark, 1984; cited in Berehanu, 2007).

Though the services are not yet fully provided in the rural areas, almost everyone have to understand the importance of having pure drinking water, waste disposal, and washing facilities, because poor drinking water and sanitation and hygiene practice are directly related to human health. Especially in rural areas most of the communicable diseases such as diarrhea, eye and skin infections are due to environmental health arising from unsafe and inadequate water supply, poor sanitation, and hygiene practice.

As it is noted in IGNOU (2005), Health care programmes and performance, “sanitation is now being replaced by environmental health. Environmental sanitary measures will reduce incidence of those diseases which are commonly acquired or transmitted through excreta, or conveyed to man by contaminated water supplies, food or drink, or transmitted by vector diseases. The general improvement of environment will lead to economic gain and improve the way of living by controlling morbidity, with improvements in environmental sanitation; the expectation life will progressively increase. The improvement of hygiene condition will influence favorably the attitude of the people in better pattern of living which is so conducive to social development. And hygiene is the science concerned with maintenance health and embraces all factors which contribute to healthful living. Hygiene aims not only at preserving health, but also improving it. The purpose of hygiene is to allow man to live in healthy relationship with the environment. Health is related deeply to the life style which includes ways of living, personal hygiene, habits and behavior. The personal hygiene includes all the personal factors which influence the health and wellbeing of an individual.”

Yimenu (2005) in his paper entitled: Is there possibility to have open defecation fee environment? Experience of RWSEP on WASH in rural settings of Amhara Region stated, “The health status of the population of Ethiopia is among the lowest in the world. More than 250,000 children die before they reach 5 years of age due to diarrheal diseases associated with poor hygiene, sanitation and unsafe water and nutreation problems; from this one third of the case in Ahmara Region (WEDC, 2009).

An Excreta, human faeces and urine, is the major contaminator of food and water. The faeces of sick person or animals contain disease causing agents (pathogens) such as viruses, protozoa and worms. The pathogens travel from the faeces of the sick person to the mouth of another person by a variety of routes known as fecal-oral transmission.

Drinking water need to satisfy at least the minimum water quality standards. As it is described by WHO guide, the water quality should satisfy the requirements for human consumption and for all usual domestic purpose including personal hygiene (Raghunath, 1987).

In rural areas, not all water is fit for human consumption. The potential sources of drinking water in rural areas are ground water from natural springs, hand dug wells, and machine drilled wells; surface water from streams, rivers, lakes; rain water from roofs, paved areas or from large natural or artificial catchment areas.

Ground water is naturally free from contaminating organisms. Many harmful organisms are retained and filtered by the soil. However, ground water may become un-potable as result of contact with minerals in the soil formations. Certain minerals, such as fluoride when present in excess, cause debilitating illness. Ground water can also become contaminated from deep waste pits and latrines located close to the wells or springs. Other contaminants such as dust, dirt, animal droppings, dead animals may enter in an uncovered water and contaminate the water in the well or spring.

Clean water from protected springs and wells is often contaminated during transport from source to home and during storage. Water stored in open containers is easily

contaminated. Water also can be contaminated when drawing from the household storage with unclean utensils. It is important to improve on water handling so as to be able to maintain the water quality at point of drinking. An improved hygiene practice is an essential element to be communicated to achieve safe water chain that leads to improved health.

For example, it is common in rural areas to store household drinking water in a communal Water Jar typically made of clay or occasionally plastic. It is also common to have water served from the same uncovered Jar by plastic or metal Drinking Cup. This type of management on drinking water leads to continuous contamination of water in the Jar.

Gleitsmann (2005) in his master thesis paper entitled: the importance of community involvement in the planning and design phases of rural water supply development projects in Koro regioin of Mali, West Africa, noted that, there are of traditions of storing water especially in large families in bigger Jars. These big Jars mostly not cleaned frequently by assuming to do not use water from these Jars for direct consumptions, but practically in rural areas, it is common to have family members who used to drink from these Jars.

Research and experience continuously confirm that a safe water supply is not sufficient and that adequate sanitation facilities and hygiene practice are essential to improving health of the local population (Brikke and Bredero, 2003; cited in Gleistmann, 2005). In brief, water supply development projects need to extend their scope beyond simply the

provision of sustainable water supply infrastructure and need to follow community based multidisciplinary approach.

The recent researches shows that improvements in water quality alone are not sufficient, and that ready access to water and the resulting increases in the quantity used for hygiene can have a greater impact on health than water quality improvements. (Nyong and Kanaroglou, 2001; Cairncross, 2003; cited in Gleistmann, 2005). Hygiene improvement and the construction of adequate sanitation facilities have been shown to play a more essential role in improving the health of the local population than source water quality improvements alone (Gasana *et al,* 2002; Brikke and Bredro 2003; cited in Gleistmann, 2005).

From these various descriptions on relationships of rural water supply, sanitation, and hygiene, it can be deduced that to enjoy good environmental sanitation, what we perhaps need are the facilities for safe drinking water supply, sanitation disposal of refuse, vector control, food sanitation, housing, control of diseases of animals communication to man, and control of indoor pollution of smoke.

Therefore, integrated approach by combining water supply and sanitation with hygiene ,WASH approach, is one of the best remedy and need more attention and sound integration among partners of governmental, NGOs, bilateral, and multilateral agencies and user communities. Also the participations of the beneficiary communities should be strengthened to achieve sustainable development.

## 2.2 Community management of rural water supply and sanitation

The community management approach did not appear spontaneously, but emerged gradually from the first view of many states which was handling the issue of rural water supply to be supply driven and the responsibility of the national state. It was by 1977, at the world water conference in Mar del plata, Argentina, the community involvement paradigm was officially adopted by the international community. The conference adapted a declaration in which it announced the International Drinking Water and Sanitation Decade (IDWSD), the slogan of which was to be " Water and Sanitation for all'' (Schouten and Moriarty, 2003).

By 1987, the donor community assembled in the External Support Collaborative Council, which officially identified community participation should be mandatory, that is, involving communities in hand dug well digging, trench excavation for pipe laying, system maintenance, and giving service by being nominated to be water committee. These identified to be the basic prerequisites for improved performance of water and sanitation sector (Appleton, 1994 cited in Schouten and Moriarty, 2003).

It also became evident that sustainable water and sanitation could not be achieved without involving people in planning of programmes and in the selection of appropriate technologies. It was by 1990s, for the first time at a global conference of New Delhi, community management was endorsed in the guiding principles. Other guiding principles on the basis of community management are institutional reforms, change in

procedures, the full participation of women at all levels in sector institutions, and financial management (Schouten and Moriarty, 2003).

As Schouten and Moriarty (2003) stated, “the Earth summit, the United Nation Conference on Environment and Development (UNCED), Rio de janeiro, Brazil, 1992, world leaders committed themselves to a comprehensive programme to provide sustainable water supply and sanitation services to the hundreds of millions of the world’s population who currently lack them. At the summit, all states and support agencies were urged to implement activities aiming for universal coverage outlined in the conference agenda, a strategy for sustainable development in the twenty-first century” (Schouten and Moriarty, 2003).

The Global Forums of Water Supply and Sanitation Collaborative Council (WSSCC) held by November, 1995 in Barbardos; by 1997 in Manila; by 2000 in Brazil was strengthening the code of ethics on community management and partnerships with civil society to facilitate on adoption of people-centered approaches (Schouten and Moriarty 2003). Passing through all these processes, the community management has become the leading concept globally by developing owner ship filling of communities and their involvement at all levels from identification of the programmes or project to the stages of construction by participation in supervision, in cash and in kind contribution of labor and naturally available local construction materials, and to the stages of Operation and Maintenance for sustainable management of assets.

The major component of sustainable management is having sustainable financial source for new constructions, major rehabilitation or maintenance, and relocation or reconstruction. Therefore, finding way to work with micro finance institutions is indispensable. Alubbe (2009) in his paper entitled: In the cause of improving community water management, has indicated the innovative water credit initiative to the water sanitation sector by following micro credit principles. As per the guidelines, communities apply for credit facilities from partner organizations, International NGOs, that works with local partners in country to provide the needy access to water, sanitation and hygiene education by funding them using grants and the innovative water credit way. The Water Users Associations entering in to service agreement with Water Service Boards (WSBs) to manage and operate water supplies with clear guide lines (WEDC, 2009).

Allubbe (2009) also noted, “Those who qualify use the facility to build their own water supplies, with contractual commitment to pay back the capital from their water sales proceeds on agreed monthly installment for a given period. The money becomes as a revolving fund for onward lending to the next community. Seven projects were initiated three years back are currently under recovery stage with over 20 % of the $250,000 lent recovered. These were water supplies that were dilapidated and couldn’t break even in their operations, as a result of mismanagement and luck of adequate water to effectively serve their beneficiaries” (WEDC, 2009).

Fernando and Gunapala (2009) in their paper entitled: sustainability of community-managed water supply schemes towards achieving the MDG in water supply in Sri Lanka, has indicated the existence of 3000 small scale Rural Water Supply Schemes

(RWSS) constructed by government or non government organization with and without contribution of users. These schemes are predominantly managed by user communities through CBOs (WEDC, 2009).

Fernando and Gunapala (2009) also stated "as many Community Based Organizations (CBOs) charge their consumers mainly to cover their operation and maintenance cost, they do not have sufficient fund to face an emergency. As the assets are also not owned by them, they cannot get financial assistance from banking sector. In order to address this issue the National Water Supply and Drainage Board (NWSDB) has taken steps to establish a Community Development Fund (CDF) in each province. A methodology to raise the initial capital for the fund has also been worked out. Then CBOs can get loan at any concessionary rates in an emergency" (WEDC, 2009).

As far as sanitation facilities are concerned, except institutional and communal latrines, the hose hold latrines are mostly constructed using locally available natural construction materials and their initial investment cost and maintenance cost is very small that can be managed by the individual households without requiring grant fund or loan. The major point is creating awareness among rural communities the importance of having household latrines, and hand wash facilities to use after defecation, and how to use the facilities properly by all members of the family.

Harvey and Mukosha (2005) in their paper entitled: Community-led Total Sanitation: Triggering sustainable development in Zambia, indicated that the Community-led Total Sanitation (CLTS) is an approach which facilitates to stop open defecation. Through this

approach and its processes the communities will bring change on attitude to build and use their latrines voluntarily without any external support for construction (Kar and Pasteur, 2005 cited in WEDC, 2009).

Harvey and Mukusha (2009) also noted the results “in the six month between April and October 2008, 517 villages were triggered across 19 wards in the district. For the triggered areas overall sanitation coverage increased from 38% to 93%. In 14 wards coverage increased by more than 40 percentage points, in 11 by more than 50 percentage points and in 7 by more than 60 percent points; 14 out of the 19 wards had final coverage above 90%. Across the entire district, coverage increased from 27% to 51%, with still over 300 of the 824 villages yet to be triggered. A total of 402 villages were verified as ODF, although the district officials are yet to certify many of these. The only ward which saw no change at all was Maambo in Hamaundu Chiefdom in which coverage remained at 77%, probably because a previous subsidized sanitation project had occurred here” (WEDC, 2009).

From the above paragraphs it can be understood that, in international conferences on sustainable water supply and sanitation, increasing attention is being paid to community management of rural water supply and sanitation. Also the current emphasis and concern not only to the extent of community participation in the planning, management, and contributions of in cash and kind but also to the stages of initiations in utilization of micro credit institutions for loans so as to cover investment construction costs and emergency and major rehabilitations and maintenance costs.

## 2.3 Gender and Rural water supply and Sanitation

It may be important to forward some basic concepts about Sex and Gender in the issues that are related with gender perspective. As it is noted in IGNOU (2005), Development of Rural Women "Sex identifies the biological differences between women and men and is genetically determined. Only a very small proportion of the differences in roles assigned to men and women can be attributed to biological and physical differences based on sex. For example, pregnancy, child birth, and differences in physiology can be attributed to sex related characteristics. But Gender refers to the socially determined differences between women and men, such as, roles, attitudes, behavior, and values. Gender roles are learned and vary across cultures and overtime; they are, thus, amenable to change. Gender is a relational term that includes both women and men. Gender equality focuses on change for both women and men".

It is not easy to change and violet the masculinity and femininity characteristics of men and women, which are acquired through long term socialization, started almost at birth and continue well into adulthood. But identities as man and woman are socially constructed, not fixed biologically. Women are intensively socialized to acquire feminine characteristic such as being attractive, passive, submissive, dependent, shy and quite; whereas men are socialized to acquire masculine characteristic like self-reliant, competitive, aggressive, and strong body.

Gender relations which are the product of masculine and feminine characteristics are socially constituted relations between women and men. Violation of these relation are

sanctioned by norms and values held by members of a given community (Young, 1993; sited in Berehanu, 2007).

It was by 1975, at the conference of UN in Mexico, research findings on women in the context of development were presented with points: women had been marginalized in all context of development and had been neglected in early development plans. At the conference, the year 1975 was declared the year of women, and years from 1975 to 1985 the woman's Decade. The issues discussed and the decisions made had laid the foundation for Women in Development (WID) which is an approach of women oriented development. By 1985, Gender and Development (GAD) approach was developed at the conference held in Nairobi, to give more emphasis for the empowerment of women and awareness creation among men. Based on the assessments made on various governments' activities at the conference held in China, Beijing by 1995, it was identified that much has been achieved, but the women's participation in development was not at satisfactory level (IGNOU, 2005).

Although both men and women play a role in the sphere of productive work and community life, they have an unequal resources and responsibilities. The roles that women play are different in any given society, and their situation is determined by the religious norms, economic status or class, cultural values, ethnicity, and type of productive activity of their country. Mostly while men's agricultural work may result in a cash income, women contribution may be less formal like that of they are usually responsible for domestic work, such as, care of children, family health, food cooking, and water fetching. In most households cleaning the bathrooms and toilets usually

considered as the task of women. It is common also women assist children, the aged, and the sick in their water, sanitation, and hygiene need.

Based on the study  by face to face interviews among 231 household respondents using a semi structured questioner, Mugure and Mutua (2008) in their paper entitled: Norms, attitudes, and gender perspectives in ecological sanitation, reported “women has sanitation(46%) and water supply (61%) aas their priorities while their men counter parts have shelter (34%) and water supply (16%)” (WEDC, 2009).  But even in the existence of community managed schemes of water supply and sanitation, it is common to have decision making about almost everything seen as men’s work.

Schouten and Moriarty (2003) stated “In Hoto, Pakistan, women collect water for drinking washing and bathing from community-managed irrigation channels. But in winter the channel freeze. The women then have to fetch water from a far away river. This is a precarious job because in the winter the paths become covered with ice and snow. One of the women from Hoto says: water collection is our biggest problem. We have to carry jerry cans on our shoulder to fetch water from a distant river, which take more than two hours for one trip, and sometimes we are injured while walking over dangerous tracks packed with ice”.

These responsibilities of women are making women to achieve more knowledge on water and sanitation related problems. Therefore, participation of women is not only to give them place in the development activities, but also to utilize them as a potential human resources and development partner. Schouten and Moriarty (2003) noted very

important initiative in La Sirena, Colombia that the women play an active role in the leadership of all community activities. The interviewed women noted, “truly speaking, at the beginning it was tough since all organizations were mastered by the men, and women wanted to participate they had to impose themselves with force. It was a hard task, but we showed them that we were capable enough, and we did better than them and were never discouraged”.

It can observed that, due to persisting traditional occupations at family level, women are responsible for both water collection from the source, and for water management to use at home. Also they are more responsible for sanitation and hygiene activities of most of the households. In different socio-economic classes and societies demand for water differ between men and women. For example, considering agricultural families, women are most of the time more sensitive for domestic water supply where as men are more sensitive for irrigation and live stock water supply. With exception of few cultures, men are in a better position to decide on household income, and it is evident that those who have no benefit out of the projects will have a low demand and will not easily contribute. (Wijik, 1998; cited in Berehanu, 2007).

Berehanu (2007) in his master thesis entitled: the role of gender in the provision of rural water supply and sanitation services, has indicated that, women were found to believe that they stand to benefit from improved water supply because it gives them opportunities for washing and showering any time, whereas the men in the villages could take bath in the river after the day work in the field. Because of their need for privacy, women had to wait until becomes dark before they could wash and shower.

The new water facilities helped women in the villages to improve their personal hygiene. In Ethiopia also women and men need clean water for daily life, but for women the needs is more urgent and differ than men.

Therefore, the initiative of the international community, national and local governments and all related governmental and nongovernmental partners is very vital in advancing gender mainstreaming. As long as the sustainability of rural water supply system and community's sense of ownership is determined by the community participation and involvement, it is very crucial to give more emphasis to women's participation and involvement. Washing and bathing locations, and sites of public stands need to be decide with women. Generally women need to be empowered to have a leader position at all stages of Project identification, Construction, and Operation and Maintenance for sustainable use of the schemes.

## 2.4 Private sector and rural water supply and sanitation

The development endeavors of any country need to focus on private sector development so as to avail human resources with skill of entrepreneurship for employment generations as private manufacturers, traders and service providers. The involvement of private sectors is also very important in the sector of rural water supply and sanitation to have local contractors and shop owners or suppliers of pump, pipe and spare parts.

Local micro contractors (Artisans) are service providers who are skilled man power and capable of performing constructions and Operation and Maintenances of schemes by making contract agreement with beneficiary community representatives. As much as possible the contract agreement should clearly outline the responsibilities of contractor and employer to avoid any disputes. But mostly in rural areas local contractors are with little capacity, and rural communities do not have experience in contract administration.

When there is a need of involvement of local contractors in community management, technical assistance of the government or non governmental agencies is very crucial to help both the employers, and the employee. The objective of the assistance is to ensure if the tasks are performed as per agreement and at the required level to avoid exploitation from dishonest contractors (Schouten and Moriarty, 2003).

Koestler (2009) in his paper entitled: Private sector involvement in rural water supply, case study from Uganda, concluded that as rural communities move upward in the ladder of development, the spirit of voluntarism diminishes. This calls for new approaches that do not assume a high amount of voluntary work which is most commonly through private sector. But it is important to adapt the nature of private sector involvement to local conditions and needs of the community. And it is important to arrange a compatible relation between private sector and traditional community management to get sustainable benefits from private sector involvement (WEDC, 2009).

The other important parts of private sectors in rural water supply and sanitation activities are shop owners or suppliers of pumps and spare parts. These are traders who are buying the products from distant source and selling in the local markets. These suppliers create an access of getting the materials such as spare parts locally at the beneficiaries' disposal.

Desalegn (2009) in his paper entitled: Piloting private spare parts supply shops for Afridev hand pump in Amhara to scale-up in country and beyond noted, "At the end of 2004, the RWSEP, through the Water Resources Development Bureau sponsored a one-time spare part distribution to the woredas (districts). The RWSEP made this distribution after ensuring that woreda (district) level experts are trained on O&MM, spare parts sale, how to conduct annual needs assessment of spare parts and how to prepare annual budgets for spare parts. The RWSEP also trained district level Artisans to carry out corrective maintenance and community level pump attendants for preventive maintenance.

The Ultimate objective of the RWSEP was to test the government supply chain, which among other options was selected by stakeholders and the Regional Coordinating Committee. According to this supply chain, woreda (district) level water offices agreed to conduct spare parts needs assessment and to allocate budget annually and transfer the allocated budget to the Water Resources Development Bureau (WRDB) at the end of each budget year requesting it to procure the required spare parts. In relation to this, the WRDB also agreed to handle the requests from the woreda (districts), i.e. import the

spare parts in bulk from abroad and distribute them to the respective woreda (districts)" (WEDC, 2009).

Although RWSEP's initiative to have a spare part supply chain through government office at woreda (district) level seems a tangible alternative, it was found that as it could not be exercised practically. Desalegn (2007) in his study that was sponsored by RWSEP identified that, "in spite of the increasing demand, none of the visited woredas (districts) exercised follow up on the spare part stock, carried out need assessment and allocated budget to at least replace those ones, which are out of the stock. But all user communities in the visited districts were willing and able to pay for O&MM of their water supply services. As a result, they have been and still continue raising funds and saving for O&MM (WEDC, 2009).

As per the results of assessment, Desalegn concluded that, even though the communities in the studied woredas (districts) have acquired willingness to pay and deposited reasonable amount of money for the intended purpose, the spare parts out of the stock were not replaced. This implies the the government supply chain could not be sustainable and finding an alternative through private sectors suppliers is very vital.

Desalegn (2009) recommended, "As a result of RWSEP's intervention, on the average, more than 200 Afridev hand pumps were installed in each studied 18 districts of Amhara region. In addition to this communities in these districts have shown their commitment by saving funds for O&MM. Some community representatives have even gone to the extent of travelling long distances to buy spare parts to repair their pump.

On top of solving the existing chronic shortage, piloting Afridev hand pump spare parts shops in the capitals of these woredas (districts) would facilitate the testing of private spare parts channel to scale-up in the country and beyond" (WEDC, 2009).

From the out lined points in the above paragraphs, it can be understood that, the community managed water points should go hand in hand with private sector development, therefore, the intervention of private sector suppliers and service givers, local micro contractors are mandatory for sustainable utilization of water supply and sanitation schemes.

## 2.5 Operation and Maintenance of RWS schemes

### 2.5.1 Willingness and ability to pay for improved water

Willingness and ability to pay are two of the hottest topics in the sector of water supply and sanitation. They are a core issues in relation to sustainability and cost recovery of schemes. Sustainability of water supply system is dependent upon the degree to which the technology corresponds to the needs of the users and the users' ability and willingness to pay for O&M (Gleistmann, 2005; cited in Aschalew, 2009).

Sometimes it is difficult to distinguish the difference between the two, but practically they have different grounds.

**1- Willingness to pay**

The willingness to pay has been affected by some factors such as the existence of alternative sources of water. For example, if there is unprotected spring with enough discharge or river which is passing through the community village and they are not recognizing health problems related to their unsafe and not treated traditional drinking water supply source, it is difficult and sometimes time taking to convince the rural communities about the importance of developing and protecting a spring or digging well to have clean water source. In these types of cases participating communities during construction and collecting water fee for operation and maintenance need considerable efforts.

Schouten and Moriarty (2003) noted that the existence of multiple water sources is a problem for sustaining water supply systems. This was the case for the Department of Water Affairs and Forestry (DWAF) Rotterdam project in South Africa, where the existence water in a nearby hand pump sites undermined the implementation of a household network (Rall 2000, cited in Schouten and Moriarty 2003) .

Also the willingness to pay has been undermined in that, many rural communities, community leaders, and local administrators perceive water is a free gift and should come from outside agencies of government or NGOs. If the existing schemes also break down, they turn to the closest government officials or agency to get help of maintenance.

Willingness to pay in cash, materials, labor, and upkeep can be taken as a useful indicator of the demand for improved and sustained water services. If people are willing to pay for a specific service, then it is possible to conclude that they value the service. Likewise, if households are willing to contribute cash and labor useful for management of water sources, it is clear that the service that they obtain from a source is valued; and, they have a positive attitude towards promoting its sustainability (Mbta, 2006; cited in Aschalew, 2009).

Willingness to pay for improved water services increases along with increases in wealth, family size, and the educational level of user households. (Bohm *et al*., 1993; cited in Aschalew, 2009). Also WTP for water highly correlated withsource reliability, trustworthiness of Water Users Committees, convenience of location, and water quality; on the other hand, there is significant relationship between the gender, age or economic status of respondents (Bhandari *et al*., 2007; cited in Aschalew, 2009).

Therefore, it is very important to give emphasis for effective trainings or awareness rising of the communities about the consequence of unprotected water source and water-borne diseases such as diarrhea and morbidity and mortality causes by the diseases. The trainings should cover topics about the saving of time for productive activities by fetching water from protected source, the amount money which has been spent for medication compared to payment for safe water or water fee, and time not utilized for productive activity due to illness especially during harvesting time.

Schouten and Moriarty noted, “Willingness to pay, except a few special cases, cannot be taken for granted. Rather it must be created, by working with communities to raise their expectations of what can be delivered, to raise awareness of improved health, and to raise their understanding that the service for which they are asked to pay will make an impact in their broader livelihoods. What is more, the concept of willingness to pay may need to be unbundled. First there is the principle of willingness to pay, which is closely tied to ownership. If a community feels that it owns and is responsible for a single system, then it is commonly willing to undertake repairs on an ad hoc basis” (Schouten and Moriarty 2003).

Berehanu in his masters paper entitled, “the role of Gender in the provision of Rural Water Supply and Sanitation Services”, has indicated that, during the course of his study as he learned that the communities’ willingness to pay for water fee is high shows peoples’ involvement d in labor , material and cash contribution that ultimately develop their sense of ownership. In his study focus group discussions also revealed that in both cases communities perceived the water supply projects as their own assets and property (Berehanu 2007).

**2- Ability to pay**

In analyzing the issue of ability to pay it is very important to distinguish between claiming to be poor and unable to pay and being poor and unable to pay. Being at the status of ability of paying, but claiming to be poor and unable to pay mostly emanates

from lack of ownership filling that has great contribution for the sustainability of the scheme.

If people are thinking water supply as a public good to be given freely they will not going to be responsible for the Operation and Maintenance of their scheme. During the promotional and appraisal stage of the project cycle management, it is very important to convince communities so that they can change their mind from grouping themselves in inability to pay thinking the payment amount may be beyond their scope of ability to pay.

It is after Noordwijk conference water is recognized as an economic good and one that use it should pay for the services. Yet, water is also a fundamental need and has to remain affordable for everyone (Wijik, 1998; cited in Berehanu, 2007). The Ethiopian Water Resources Management Policy recognizes the establishment of social tariff in order to enable poor communities to cover O&M costs. The policy recognizes water is the basic human needs and disadvantaged rural communities who cannot afford to pay for development of water systems shall be borne by the government. (WRMP, nd; cited in Berehanu, 2007).

To identify those who are poor and unable to pay among the communities, it is very essential to conduct community participatory study with the local community representatives. These are mostly poor and old age people, widows without helpers, and poor handicapped parts of the communities.

Sometimes there can be a case of not having cash money at remote rural community areas; therefore, it is very vital to adjust the modality of payment with the local condition and to fit the fee to the lifestyle of the communities. A fee for water supply service is mostly in cash. But cash in scarce; especially in communities that depend on subsistence agriculture, in such cases, it may be important examine alternative strategies, such as a fee through barter. Also it is necessary proposing methods of fee collection that depends on installments within a year, linked with the marketing of crops and/or livestock instead of fixed monthly collections. For example, the communities can decide to collect O&M funds on seasonal basis twice a year. The collected water fee for the O&M shall be deposited in separate bank account (Schouten and Moriarty, 2003).

To sum up, willingness and ability to pay are very dependent issues in that mostly willingness to pay is a basis to do not claim being poor but with ability of paying for water. The cases of having willing to pay but inability to pay with convincing reasons should be treated in the context of fulfilling social basic services of the communities with severe problems.

### 2.5.2 Rural Water Supply sources and technology options

Development of rural water supply schemes remains too costly for poor countries relative to their available sources (Lockwood, 2002; Biswas, 2005; cited in Aschalew, 2009). The frailer of many water sources developed through large scale projects or investments is the worst case scenario (Kleemeier, 2002; cited in Aschalew, 2009).

In the decision processes of technology options, the participation of the beneficiary communities need to have a leading role. Studies have shown that sustainability of water supply projects improves when communities are allowed to take a central role during all stages of the project, including design and planning (Margin, 1991; Bah, 1992; Williams, 1998; cited in Gleistmann, 2005).

If communities are to be considered as managers of their water supply sources, then we should know what attitudes and potentials they have, and how they should be organized and supported. Adequate protection and routine maintenance by communities enhance the sustainability of water supply systems, and improve the quality of the water from the sources Ainsworth and Jehn, 2005; cited in Aschalew, 2009). But if choice-of-technology decisions are made by an outside agency, community demands cannot be met, even if such demands have been dually assessed (Narayan, 1995; cited in Gleistmann, 2005).

On top of interest of the beneficiary communities, type of available alternative sources of water is very vital. Other important factors for technology choice are quantity and quality of water from the source, location of the source with community, water demand of design population, cost of construction, and ease of O&M to respect to the location of the village of the have a Village Level Operation and Maintenance schemes.

VLOM refers to the technologies which can be maintained by spring care takers and pump attendants, who are members of the beneficiary communities and voluntarily trained to give service of maintenance. The role of private sectors, Artesian in

maintenance of water points by making contract agreement with WATSANCOs. But WATSANCOs should give an emphasis for water fee collection and saving in local micro finance institution so as to have money that can be utilized for spare part procurement and artesian payment.

Sources of water may be classified in to two categories surface and ground water sources. Surface water sources are: Lakes, Streams, Rivers, Impended reservoirs, Stored rain water Cisterns, Waste water reclamation, and Sea water. These water sources can be utilized for domestic water supply, but need extensive treatment processes compared to ground water sources. The possible alternative technology options with surface and ground water sources are roof water collection or ground catchment with storage tanks; springs on spot or with gravity or motorized scheme with collection chamber; hand dug wells with hand pump or rope pump; subsurface dam with hand pump; drilled well with hand pump or with submersible pump or with surface mounted centrifugal pumps or with helical rotor (mono) or with solar or wind pump or bucket pump (Davis and Lambert, 1995.)

The most common and practical potable rural water supply sources and technologies are ground water sources which are springs on spot or with gravity or motorized schemes with collection chamber, hand dug wells with hand pump, and machine drilled wells with hand pump or submersible pump (Singh, 1999).

**1. Springs**

Springs are the most conspicuous forms of natural return of ground water to the surface. They come in all sizes from trickles to large streams. Depending up on the natural conditions their mode of occurrence is different. They emerge at the contact of the interbreeding of pervious and impervious layers; in fractured rock, fissures can fill with rain water, which then flows within the same fissures system to form springs at lower points. They also form where discontinuities like faults or dikes present hydraulic barriers and force ground water to flow upward. They usually occur where down gradient parts of aquifers or other water-carrying materials are exposed to the surface, as in outcrops of aquifers at mountain sides ( Raghunath, 1987).

Springs are numerous in the highlands of the region, but much less in number in the lowlands. When ground water comes to the surface or any natural surface discharge of water large enough to flow in a small rivulet (small stream) can be also used for micro irrigation by diverting through open canals. Most rural villages use springs as their water supply sources. But very small discharges are called surface seepages.

Springs are classified in a number of ways. The classification can be based on magnitude or discharge, type of aquifer, chemical characteristics, water temperature, direction of water migration, relation of topography and geologic structure (Davis and De weist, 1996).

But for practical purposes, springs may be classified as artesian springs, gravity springs, and surface springs. In the case of artesian springs, the underground water comes to the surface, under hydraulic pressure. These types of spring may also be

formed if impervious layer lying over aquifer under pressure is fissured or somehow gets punctured. The fissures in the impervious layer should be continued up to the ground surface. Such springs give water for the whole of the year, but quantity of water available may vary. Gravity spring develops, when ground water table exposed somewhere due to ups and downs in the ground surface. Since the water table keeps fluctuating season to season, flow through these springs also keeps on varying. But surface springs are developed when an impervious stratum which is supporting the ground water reservoir is out cropped (Singh, 1999).

Spring water is usually of high and potable quality and whenever there is a spring occurring within the vicinity a community, priority of using it should be investigated before opting to other alternative sources. But, even though developing springs is the first priority for rural water supply than digging wells, as far as water quality is concerned, spring water is generally much more easily contaminated than water from properly constructed wells. Therefore developing springs need careful design, construction, and maintenance to utilize for water supplies.

The following points need to be considered during study and construction stages of spring development (Ragunath, 1987; Singh, 1996).

- The acceptability of spring by the beneficiary communities (men and women) in relation to any traditional cultural or religious conditions to use as a source of drinking water need to be verified. Also check the water quality is acceptable.

- Prior to confirming a spring for protection after community acceptance it should be determined whether the spring is perennial and whether the yield can serve the design population.
- Measurement of the spring flow is carried out at the peak of the dry season. If possible two years of flow or discharge data should be collected. Otherwise at least there need to be one year data. The minimum dry weather flow should be able to serve the design population.
- Maximum flow also need to be estimated for the design of overflow to carry the maximum flow from the spring.
- Carry out site clearing work removing only minimum necessary items such as vegetation, bushes, trees and roots to minimize environmental damage yet ensure that the spring eyes clearly identified and the direction of flow is clearly seen. Any obstruction of flow should be avoided
- The capping structure should be designed in such a way that it should not prevent natural flow of the spring. All structures have to be located at least few centimeters away and below the eyes of spring
- The topographical location of the spring with respect to the village, that is, whether it is downstream or upstream of the village and possible problems which may occur therefore should be investigated.

Springs can be constructed with alternatives, as spring on spot, gravity spring with collection chamber, and motorized spring with collection chamber.

**A. Spring development- on spot**: To use on spot developed spring, the quantity of water required for the design population of the community should be able to be supplied from the spring without constructing storage tank. Thus the minimum flow of the spring during the driest season should be more than the community water demand.

**B. Gravity spring development with collection chamber**: when there are springs with a lower minimum flow than the community water demand may, springs can be developed by incorporating a storage tank to collect the night flow to satisfy the demand during the pick consumption periods. Storage tank may be required to collect the night flow to balance the daily water demand of the community. In these circumstances the storage tank should be designed to store a maximum of 16 hours flow from the spring depending of the yield of the spring and the daily water demand of the community. In this case the water has to be distributed through one or more public fountains.

**C. Motorized spring development with collection chamber**: Location of a spring site at far distance and lower elevation position with respect to the location of beneficiaries' settlement is one of the major criteria to construct gravity scheme or motorized scheme. Especially when there are no alternative sources for water supply, it is a must to construct motorized spring development scheme to boost water to the upper elevation positioned storage tank than the communities' settlement and distribute by gravity.

In motorized scheme, pipe laying length commonly becomes longer, and the laying of pipe should be carried out after spring development work completed. The pipe should be checked for leakage by charging water so that so that all air expelled from the pipes

from before back filling the pipe trench. The system should be cleaned and disinfected with chlorine before operation commences. Chlorine is economical, unobjectionable and harmless to human health (Singh, 1999).

The common spare parts for all types of spring development technologies are Pipes, Faucet, Union, Gate valve, Nipples, Tee, and Elbow, but motorized spring development schemes need additional electromechanical spare parts which are not commonly available in the local construction materials shops. This implies spring on spot and gravity schemes are VLOM schemes; whereas motorized schemes are not VLOM schemes.

**2. Hand dug wells**

The most recommendable water supply source for the rural communities, next to springs, is tapping ground water by constructing hand dug wells. The tradition of constructing hand dug wells exists in some rural areas and it is common to have individual households with their own hand dug wells, especially in areas where there are no perennial springs. Hand dug wells at household levels usually constructed by traditional diggers who use their own experience of sitting and constructing of wells. Where there is no tradition of constructing sulf supply traditional dug wells or there is no possibility of reaching the underground water with hand tools digging, it is common that the rural communities either use unprotected spring or surface water sources.

In recent years a number of Hand dug wells have been constructed in the rural villages of the whole country and of the region by government water sector offices, NGOs, bilateral and multilateral programmes. Dug wells are constructed in areas where the

geologic and hydro geological features are mainly, valleys of alluvial deposits of sand and gravel, river banks, lake shores with lacustrine deposits, deposits of sandy and silty clay materials, and thick layer of completely weathered or fractured and jointed rock as well as gently sloping terrain (flat catchment). Sites where outcrops of rock occur and ridges should be avoided.

Contamination of shallow groundwater is the main problem in rural areas due to lack of regular well disinfection and well management, such as percolation of wastewater due to poor workmanship of the well heads (WEDC, 1999; cited in Getaneh, 2009).

The major points should be considered during the study and construction of hand dug wells are the following (Raghunath, 1987; Garg, 1989; Singh, 1996).

- The beneficiary communities (women and men) must be involved in the choice of technology and sitting of the water source to ensure sustainability.
- The hand dug wells which do not have sufficient depth will going to dry during particularly dry years. Also very shallow hand dug wells are susceptible to contamination.
- The final depth of hand dug wells should be decided based on the findings of geological and hydrogeological conditions of the area. However, 10-15 meter is mostly an average depth.
- In soft formation caving or collapse, and in hard rocks, problem of digging with hand tools are common problems. Both these problems extend project time and increase cost of construction.

- The surrounding areas of hand dug wells, at least 20-30meters radius, depending on the permeability of the formation, must be kept clean in order to protect the well water from contamination. Toilets must be constructed on down slope side of the well.
- The nearby areas, especially the up slope side of dug wells should be free from phreatophytes (deep root trees). Ground water up take by this type of trees is a water loss that can be particularly significant in water- short areas.
- The diameter of the dug well is commonly 1.5 meter; however, if digging goes deeper telescopic digging (decreasing of the diameter down ward) can be applied.
- The recovery condition of the well during atleast within 12 hours should be determined by fetching with bucket or by dewatering pump.
- Concrete cylinders should be prepared with appropriate mix of gravel, sand and cement and with properly spaced 6mm reinforcement bar.
- The annular space between concrete ring and dug well need to be packed with clean gravel, and cobble materials.
- Dug wells need to have appropriate well head commonly constructed with masonry capped with reinforced concrete slab and manhole cover.

Common technologies to lift water from hand dug wells are hand pumps. Hand pumps are used for pumping water from hand dug wells which are generally varying from a few meters to not more than maximum 45 meters. From existing type of hand pumps different studiers are revealing that Afridev hand pump has been utilized mostly for

hand dug wells as a Village Level Operation and Maintenance (VLOM) water lifting technology.

Getaneh (2009) in his master thesis entitled: Aquifer characterization and well performance evaluation in a volcanic rock terrain: A case study of Debre Tabor area, north western Ethiopia, identified that, in his study area hand dug wells are equipped with a Villlage Level Operation and Maintenance (VLOM) technology, Afridev hand pumps of Indian origin. The beneficiary community is entirely responsible for the Operation and Maintenance of hand dug well schemes.

The most common hand pump during this days is Afridev hand pump, and its spare parts which are known by fast wearing items are Rod centralizers, Valve Bobbin, Bush bearings (outer and inner), Plunger seal (U-seal), and O-ring (SKAT, 1995).Although, the spare parts for these types of hand pumps are hand pumps are becoming available in private spare part suppliers' shops, and these hand pumps have been grouped in the VLOM schemes.

**3. Machine drilled wells**

A well is defined as a hole or vertical shaft excavated in the earth for bringing groundwater to the surface (Bangar, 1997; cited in Getaneh, 2009). Although machine drilled wells are costly and need advanced technology, this option need to be utilized where there are no other alternatives to satisfy the demand of the design population.

By participating communities (men and women) in all social aspects to ensure true ownership and sustainability, and discussing and convincing them why the option is

choosen, the next step shall be site selection for machine drilled wells based on hydrogeological studies which mainly focusing on the following points (Raghunath, 1987; Lioyd, 1999; cited in Getaneh, 2009).

- Geological investigation for identification of rock type, structural condition, stratigraphic correlation and classification, storage and movement of ground water and geomorphology of the area.
- Hydrogeological investigation to know the type, classification, lithological variations and characterstics of the aquifer.
- Hydrogeological investigation such as variation and distribution of rainfall in an area, run-off, evaporation and evapotranspiration to evaluate the amount of recharge and productivity of a particular water shade.
- Water quality studies to check if the water of a particular source could meet the required standards in physical, chemical, and bacteriological water quality.
- Remote sensing techniques are commonly used for indirect water source identification using Aerial photographs and Satellite imageries.
- Geophysical investigations can be used to obtain especially sub-surface additional information with close observation and correlation between the geological and hydrogeological results. Ground surveys commonly followed by geophysical surveys at identified sites before passing to drilling. The most common geophysical method for ground water investigation is electrical method. This method can be employed in large alluvial plains, sedimentary basins, volcanic plateau, and lime stone terrains.

Selecting appropriate well site is not an end by itself; therefore, appropriate drilling or well construction should be employed. The common points for consideration during drillings are the following (Ragunath, 1987; Raghunath, 1987, cited in Getaneh 2009; Lioyd, 1999; cited in Getaneh, 2009).

- Appropriate well diameter in that, the upper section is commonly greater in order to accommodate the sanitary seal and surface casing which is lowered in to the well to protect the collapse of the over-burden.
- Appropriate casing arrangement in that, the depth of surface casing depends up on the geological condition. The diameter of these casings has to be wider than the well casings and screens which allow the drilling bit to pass through it to continue further drilling.
- Gravel pack has to consist of well rounded and washed river gravel which will be packed between the borehole wall and the outer portion of casings and screens. The gravel has to be washed and free from soluble materials and be of appropriate size to that of the screens and the geological formation. The common grain size of gravel varies from 4 to 8 mm.
- The top part of annular space between the borehole wall and the wall of the casing need to be grouted with a mixture of cement and water for sanitary purpose. Before grouting a bridging medium of sand and puddle clay should be placed on the gravel pack in order to avoid any cement infiltration into the gravel.
- Wells have to be developed after completion of drilling works prior to test pumping. The objective of development work is to improve well performance, to

improve well capacity, and to minimize unacceptable levels of sediment contained in the water that will be yielded by the well. The well face and the fractures are often clogged by the fine rock material produced during drilling. Removal of this material improves the well yield. On the other hand after a well is completed, it has to be developed to increase its yield and efficiency.

- Pumping test should be conducted with the appropriate procedures of step draw down and continuous test to determine the safe yield or discharge from the bore hole. A careful selection of the most appropriate analytical method to use for interpreting the pumping test data is of key importance.
- For motorized scheme, the discharge value with other important factors, such as inside diameter of the well and total pumping head also vital to determine the will be installed power of the pump and generator and the diameter of pressure main pipe.
- Bore holes must be disinfected to ensure that no bacteria, virus or any other pollutants are remaining which may have entered into the well during the course of the construction works.

There are two alternatives of lifting water from boreholes which are hand pumps and motorized pumps. The O&MM aspect of bore holes with hand pumps are similar to that of hand pumps with hand dug wells. Conventionally boreholes fitted with hand pump and with depths up to 60 meter are named shallow wells in Ethiopia. The submersible types of pump, is the most commonly used type of motorized pump. The motor of the submersible pump as well as the impeller unit is placed within the borehole below water

level. The water is then pumped to the surface through a riser pipe from which the pump assembly is suspended.

Singh (1999) stated, “Deep wells are not always deeper than shallow wells. It is not the depth of the well which tells about deep and shallow wells but it is the criteria of getting their supplies. Shallow wells getting water from top most layers which is always pervious but deep wells get their supplies from pervious water bearing layers, lying below the impervious layers” (Singh, 1996).

Schouten and Moriarty (2003) noted, “When designing a system that will be managed by the community, the technology and service level should match the needs of the community, its management capacities, the likely level of long-term sustainable financing, and the water resource being used. A crucial assumption is that such a technology option exists. If it does not, then it has either to be developed or adapted from existing technologies. The mismatch between technology and the other three critical factors lies at the heart of many failures of community management”.

For the last few decades, literature in the water supply sector has shown that sustainability of rural water supply structure has become positively associated with small-scale initiatives, which maintains public participation (Aschalew, 2009). Even though it is common to have motorized schemes in rural areas, in most cases the maintenance aspect could not be friendly to the capacity of rural communities, and the electro mechanical spare parts are not commonly available in local suppliers’ shop. Therefore, these schemes cannot be grouped in the VLOM schemes.

# CHAPTER THREE
# METHOD OF THE STUDY

## 3.1 Description of the study area

Geology and Hydrology of the area are the governing physical parameters for the occurrence of ground water which is a common potable source of rural water supply using dug or drilled wells or naturally emanating springs. Hydrology of the area is dependent on climatic factors of the area which determines hydro meteorological parameters such as precipitation, evaporation, and temperature (Raghunath, 1987).

Ethiopia has five climatic zones which are named desert, tropical, sub-tropical, temprate, and alphine. These are locally called Bereha, Kola, Woina dega, Dega, and Wurch (kur) respectively with order of high to low temperature. The Amhara National Regional State has a share of Kola, Woina Dega, Dega, and Wurch from these climatic zones, and has elevations between 700m and 4622m, above sea level. The average temperature of the region also varies between 20-25$^0$C maximum and 10$^0$C minimum, and the annual rainfall varies between from 2000mm, maximum rain fall getting areas to below 500mm, low rain fall getting areas.

Considering Farta woreda (district), Getaneh (2009) in his master stated, “The monthly mean maximum temperature in the high lands is 23.9$^0$c in the month of April at Debre Tabor, capital city of Farta woreda (district), where as mean monthly minimum temperature in the same area is about 8.3$^0$C in December, and the area has an average annual rainfall of about 1540mm. The rain fall exhibits a unimodal distribution

which has only one pick period of `rainfall (June to September) and one lowest period of rainfall (December to February)" (Mola, 2004; cited in Getaneh, 2009).

As far as geology of the area is concerned, geologically, the north western parts of Ethiopia, where ANRS, and RWSEP woredas (districts) situated dominantly covered by volcanic rocks of tertiary era, known as trap serious. These rocks covered the greater portion of the region, and they are mostly Basalts with some Tuffs. Also there are quaternary sediments and volcanics at the surrounding of lake Tana. The quaternary volcanices are in general vesicular and fractured (Merla et al, 1973; cited in Getaneh, 2009). The ground water occurrence and movement in these volcanic rocks mainly depends on the degree of weathering and fracturing, faulting, and jointing. These rocks are grouped in moderate permeability and productivity rocks.

## 3.2 Sampling technique and Sample size determination

In this study the non probability, purposive sampling method was employed to select 14 RWSEP-CDF approach woredas (districts) where RWSEP is implementing RWSS projects with CDF approach from the total 48 woredas (districts) in the 4 of ANRS Administrative zones.

The functionality rate analysis is based on the functionality rate data collected from all 14 woredas during 2010. This analysis is to make comparisons between the average functionality rate of all RWSEP water points' and RWSEP- CDF approach water points' functionality rate. For additional analysis on functionality rate, Farta woreda was selected purposively. This is because, unlike other woredas (districts), in Farta woreda

(district) there is NGO, CARE Debre Tabor, which is implementing RWSS projects potentially with non CDF approach in parallel with RWSEP which is implementing with CDF approach and with the same type of technology. In this woreda (district) there are 312 water points constructed both by CDF and not CDF approach in the years 2004/2005-2007/2008 that is, after the start of CDF approach. All 312 water points were considered purposively for the study by excluding water points constructed during 2008/9. This is due to the reason that, it is too early and not practical to evaluate the functionality rate of water points which does not give service at least for one year time.

The implementation rate comparison of this study was dependent on the woredas (districts) which were constructing water points during both pre CDF and post CDF periods. The number of this woredas (districts) are 12 excluding Gonj Kolela and West Estie woredas from the existing 14 programme woredas. Gonj kolela and West Estie woreda were parts of Yilmana Densa and East Estie woredas respectively before it becomes independent woredas (districts) during post CDF approach period. From 12 woredas (districts), Enebesie do not has complete data ; therefore, this study purposively utilized 11 woredas two years' average implementation rate data for comparison of pre and post CDF approach.

The rural water supply coverage study utilized 14 woredas' (districts') rural water supply coverage data purposively for the comparison with the regional water supply coverage. Table- 1 below shows the name of woredas (districts) and number of water points sample frame by purposive sampling method for functionality rate, implementation rate, and rural water supply coverage comparisons.

Table- 1

The name of woredas (districts) and number of water points sample frame

| Administrative Zones | Woredas (districts) | Total number of WPs | All RWSEP WPs | RWSP-CDF WPs | Average Number of WPs construction per year before CDF | Average Number of WPs construction per year after CDF | WPs constructed in 4 years (2004/5-2007/8) both by CDF& non CDF approach |
|---|---|---|---|---|---|---|---|
| West Gojam | Bahir Dar zuria | 432 | 325 | 279 | 29 | 49 | - |
| | Yilmana Densa | 619 | 579 | 471 | 20 | 99 | - |
| | Gonj kolela | 442 | 409 | 395 | - | - | - |
| | Quarit | 334 | 317 | 233 | 55 | 64 | - |
| | Dega Damot | 462 | 451 | 356 | 19 | 63 | - |
| South Gondar | Dera | 474 | 368 | 213 | 23 | 40 | - |
| | Fogera | 483 | 438 | 297 | 36 | 44 | - |
| | Farta | 715 | 324 | 238 | 12 | 29 | 312 |
| | East Estie | 548 | 293 | 215 | 16 | 32 | - |
| | West Estie | 242 | 175 | 175 | - | - | - |
| Awi | Ankesha | 426 | 341 | 296 | 20 | 65 | - |
| | Guangua | 528 | 418 | 400 | 10 | 59 | - |
| East Gojam | Enebesie | 410 | 355 | 267 | - | - | - |
| | Bibugn | 281 | 262 | 150 | 45 | 44 | - |
| Total | | 6396 | 5055 | 3985 | 285 | 588 | 312 |

## 3.3 Data type and Statistical tools used

In this study secondary data of both hard copy and soft copy existing at RWSEP office, WRDB, and Farta woreda (district) WRDO were collected and analyzed to achieve the objective of the study.

These materials are data collected and documented with questionnaire formats, tabular data, inventory of schemes data, and evaluation reports data. In addition, all important documents and programme litratures, such as CDF guide lines, programme documents,

training materials were referred. The collected data the budget utilization in each phase, the functionality rates of water points, rural water supply coverage, and number of water points constructed in each woreda (district) before and after the start of CDF approach.

After data collection data analysis and interpretation was conducted by using Statistical Package for Social Science (SPSS) and parametric and non parametric tools were utilized for statistical analysis, and testing of hypothesis.

The parametric test, the one-sample t-test, was utilized to compare the CDF water point's functionality rate with the average value of functionality rate of the whole water points in 14 programme woredas. The same type of test was also employed to analyze and compare the status of rural water supply coverage of RWSEP intervention woredas with the whole ANRS rural water supply coverage (regional average).

The parametric test, the paired sample t-test, was employed to compare the means of the 2 years' average number of water points constructed in each woreda before and after start of CDF approach. This is within a single group of woredas which have been implementing water points water points both during pre and post CDF approach.

The non-parametric, Chi square ($x^2$) test, was utilized for determining the presence of association between two categorical qualitative variables. These are CDF or non CDF implementation approach to construct water points with their respective functionality status, functional or not functional cross tabulated.

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# CHAPTER FOUR
# RESULTS AND DISCUSSION

## 4.1 Discussion

The results of this study shall be discussed with points of fund flow, procurements, and operational management; functionality rate, implementation rate, water coverage, and the adaptability for scaling up CDF approach.

### 1. Fund flow, procurements and operational management

The ANRS-RWSEP has been guided by the programme documents of each phases and CDF approach guide lines. But through the experience of using the guide lines there are minor modifications for more flexibility of programme implementations. Table 2 below shows financial and operational responsibilities during phase I &II, phase III, and phase IV.

Table-2

Financial and operational responsibilities at regional, woreda and community level

| Management level | Financial responsibility and accountability | | | Operational responsibility for successful implementation | | |
|---|---|---|---|---|---|---|
| | Phase I&II | Phase III | Phase IV | Phase I&II | Phase III | Phase IV |
| Regional level | Consultant/PFO | Consultant/PFO | BoFED | Consultant/PFO | Programme/RCC | PMC |
| Woreda level | WCC | CDF board | CDF board | WCC | WCC/CDF board | WCC/CDF board |
| Community level | - | WATSANCO | WATSANCO | - | WATSANCO | WATSANCO |

The financing mechanism at the regional level during phase I, phase II, and phase III was through the consultant/PFO, but during phase IV it is through BoFED. WCC was responsible at the woreda (destrict) level for financial management and some procurements during phase I & II but but the major procurements such as pump was handled by the programme office. There was no involvement of communities in the financial management during these phases. During phase III and phase IV, WCC and CDF board are active in both financial and operational responsibilities. The core part of CDF approach, community financing mechanism was started during phase III and continued to phase IV, so as the communities can have the responsibility of participation in both financial management and operational management.

As far as the fund flow pattern during post CDF approach is concerned, it was the consultant transferring budget during phase III, but during phase IV, BoFED is transferring fund through financial intermediaries, which are commercial bank and Amhara Credit and Saving Institution ( ACSI), micro finance institution. Finance offices can withdraw the budget from commercial banks for capacity building activities such as trainings, publications of promotional and training materials, and procurements of equipments. These capacity buildings are for respective regional, zonal, and woreda level, finance, water, health, and women affairs offices as per the allocated budget during annual work planning.

ACSI has 185 effective sub branches with staff numbers of 10 to 12. Therefore, ACSI has a great role for the successful achievements of CDF approach by facilitating the financial flow mechanism, which enables financial resources of investment budget to be

channeled directly to communities. The head quarter ACSI has 3% commission to transfer money from consultant during phase III and BoFED during phase IV. ACSI transfers money to sub branches at woreda (district) level via through its branches at zone level. The sub branches are the nearest financial institution to CDF boards and WATSANCOs.

Sub branch ACSI has a responsibility to open CDF board account and WATSANCOs account and transfers the sent budget to the CDF board account from which it transfers to the WATSANCOs account. These accounts are in the form of ledger and are not saving accounts and shall be closed after retention payments to artisans. The transfer of budget to WATSANCOs account need to be by the ordered of CDF board signatories so that the WATSANCOs can withdraw the budget with 3 to 4 installments after settling 80% of the previously received amount by WATSANCOs. CDF accounts are managed in woreda WRDOs by CDF supervisor who is the staff of WRDO and secretary of woreda CDF board.

WATSANCOs are responsible for the procurements of construction materials and services which are directly related with their water point construction using the transferred GoF budget to their account. These materials are construction materials such as cement, reinforcement bars, pipes and fittings, nylon ropes, timber for form work, and sand and gravel if cannot be availed by community contribution . These materials are available in the local building material shops and at the disposal of natural construction material suppliers at the woreda (district) level. The WRDO staffs are assisting WATSANCOs by availing market study data mostly on daily basis and by

identifying the quality of materials. Procurement of services is mainly the procurement of artisans' services for water point construction.

Alternatively, as per the CDF guide line of the programme there is possibility of giving full contract including the procurement of construction materials and labor services to artesian or artisan association, but there are no cases until now this has been practiced. This is due to the reason that there are no cases to make procurements of materials to be beyond the capacity of the communities. Also there are no artesian or artesian associations which are capable financially to receive this responsibility. Therefore, the contract between WATSANCOs and artesian is continuing to be labor contract.

Although hand pumps are parts for water point construction that need to be procured by communities as other construction materials, its procurement still has been handled by woreda WRDOs except Bahir Dar zuria woreda where communities have an access of contacting hand pump suppliers in Bahir Dar town. Communities or Artisans can borrow moulds and other tools such as pipe wrenches, and pipe traders until the completion of construction from WRDOs. Also the programme office is planning to assist the Woredas to invest on additional molds and tools and making them available for Artisan associations on credit basis for the private sector development.

The pre CDF approach of RWSEP shows lower implementation rate that leads to not fast growth of water coverage. All procurements were to be centralized and had been handled by the woreda and regional levels. Woredas were procuring cement sand, and gravel and regional RWSEP office was procuring hand pump, molds, and reinforcement

bar. Before the start of CDF approach although there was WATSANCOs who are representing beneficiary communities and there was a 10% community contribution by labor and material during construction, communities were not strictly responsible for O&M by paying water fee for their own schemes.

The operational management of the programme have been managed by programme office and partners at regional, zonal, and woreda government office levels, and community levels. The programme office has a consultant team for technical assistant with staffs of one international team leader, two regional advisor, and three zonal advisors.

The CDF approach is a demand driven community- centered development approach by which communities can have an opportunity of initiating, planning, constructing and managing their water supply and sanitation projects. For further analysis, the efficiency of CDF implementation management can be identified by its three major project cycle stages, which are pre construction stage, construction stage and post construction stages.

i. **Pre construction stage**: The finalization of annual work plans and the trainings such as CDF board training, promotion, application preparation, appraisal, site selection trainings, and WATSANCOs training of tanners have been performed at this stage. The promotional activities which have been conducted by kebele and woreda governmental office staffs who have been trained on promotion, application preparation, and appraisal of CDF rural water supply and sanitation projects by the programme office advisors

during phase III and have been decentralized to zonal WRDO staffs during phase IV. This training has also well organized training material which was prepared by the programme office, and the training during the third phase was given by programme office advisors at the region level. The promotions have a vital role in imparting knowledge among rural communities about community managed RWSS project benefits, and addresses the gender sensitization and mainstreaming so that both men and women aware the approach and the women's participation encouraged right from the beginning of the project. This has brought a great change in women's involvement in WATSANCOs democratic election and to be elected both as a member and to have leadership positions.

Information, Educatiion, and education activity to change the attitude of rural communities about unsafe rural water supply, sanitation, and hygiene has a considerable part in promotional activities of the programme. This has contributed a lot in increasing the participation of the communities to increase the rural water supply and house hold latrine coverage, and hygiene practices in the programme woredas (districts).

When communities are preparing their project application, the kepele development agents are assisting them in cost estimation and in the sitting of water points. The application should have the attached receipt of upfront contribution deposited in their saving account opened in micro finance institution for further O&M. The woreda (district) WRDO shall verify the completeness of applications during desk and field appraisal to

decide on the rejection or acceptance as per the social, technical and environmental feasibility criteria before transferring for the approval of the CDF board.

ii. **Construction stage**: This stage includes construction and supervision activities. After the signing of contract agreement between WATSANCO and Artisans, WATSANCOs are responsible for the final result of their water point construction and supervision with the assistance of woreda WRDOs staffs to take useful measures during construction. At least 15% community contribution by labor and material need to be followed up, regulated and appropriately recorded and reported by WATSANCOs during construction.

The woreda (district) WRDOs staffs have a role of assisting the communities in the selection of appropriate artesian, contract administration, and technical supervision of constructions. The technologies of RWSS projects which have been financed through CDF approach are community managed not complex schemes. For the integration of rural water supply, sanitation and hygiene, RWSEP during its third phase was financing school latrine construction using the CDF approach through the teacher-parent committees who have the same role with WATSANCOs for community water points.

During phase IV the programme office focus to sanitation activities is towards capacity building through training and publications by the budget of RWSEP to health offices at the region, zone, and woreda levels. Also during this phase, CDF approach has been employed only for the rehabilitation of school latrines which was constructed during phase I and phase II.

iii. **Post construction stages**: At this stage there is no handover of water supply and sanitation schemes between WRDO and communities after completion of construction as approaches other than CDF. This is due to the reason that communities are owners of water points since from identification stage. Rather the communities are preparing the inauguration ceremony for their schemes and invited its partners at woreda level.

At this stage WRDOs need to perform post construction monitoring visits at least in each 6 months so as to check the functionality status of water points, the fencing and the greenery conditions, and environmental sanitation conditions around water points. In addition, water fee collection and saving condition, the appropriate functioning of especially female WATSANCOs, pump attendants, and the appropriate utilization of house hold latrines have been checked. Also the need for shall be identified through post construction monitoring.

Operation and Maintenance Management is the main part of post construction stage. In the CDF approach WATSANCOs should open saving account at ACSI and deposit upfront contribution. This upfront contribution is a mandatory for CDF water point and an indicator of willingness to pay for potable water.In the CDF approach O&M is the responsibility of the beneficiary communities. The communities expected to pay water fee for O&M and cumulate on top of the upfront contribution.

The discussed typical nature of the CDF project cycle management in the above paragraphs indicate that CDF approach has contributed significantly for the successful implementation management of the programme by creating a sound ground for the

relatively in time and high rate of implementation, appropriate utilization of the allocated budget, and in raising the function rate which is an indicator of sustainability of the RWS schemes.

To conclude, the pre CDF approach of RWSEP can be said more of supply driven approach. But the CDF approach is developing best practices of community based demand driven approach through its process of community project identification, procurement, supervision, post construction implementation with gender mainstreaming and integration of WASH. Especially it has been proved that the procurement by communities is empowering the rural poor communities, and developing ownership filling and leading to the sustainability of RWSS schemes.

**2. Budget utilization status**

RWSEP in its first to fourth phases has an increasing pattern of budget allocation and budget utilization. Table 3 below shows budget utilization pattern of RWSEP is high, that is, more than 98% of the allocated budget which is uncommon for other bilateral programmes in the region. But it is very important to consider the budget utilization of pre CDF, phase I & II, and post CDF, phase III&IV separately to analyze the impact of CDF approach for budget utilization.

In phase I & II, there were no community procurements and supervisions, and except minor procurements at the woreda (district) level major procurements were handled by the programme office, and construction supervisions by woreda (district) water offices with supports also from the programme office. Phase-I has small portion of

constructions and it is a phase mainly for capacity building. The capacity buildings focus was procurement of goods which is not much complex and lengthy process as that of construction of water points in rural environment. Therefore, the phase I cannot be considered for comparison of budget utilization due to CDF interventions.

In phase II, the allocated budget could not be utilized timely and the phase was extended in six months time so as to utilize the allocated budget for the phase. But in phase III, post CDF phase, high utilization more than 98% recorded without extending the time. Phase IV is an ongoing phase and its budget utilization can be analyzed at the end of the phase, but from the existing trend it seems to achieve the best budget utilization status.

This implies CDF approach is contributing significantly in improving budget utilization due to its special arrangements of community financing and procurements and community construction supervisions.

Table-3

Budget Utilization pattern of RWSEP. (RWSEP, 2010).

| Phase | Year | Planned Budget (Euros) | Actual Budget (Euros) | % Utilization | Comments |
|---|---|---|---|---|---|
| I | 1994-1998 | 4,416,667 | 4,358,579 | 98.7 | Capacity building phase |
| II | 1998-2002 | 6,162,574 | 6,044,328 | 98.1 | Six months extended phase |
| III | 2003-2006 | 8,110,000 | 7,965,861 | 98.2 | Not extended phase |
| IV | 2007-2011 | 11,270,000 | | | Phase on track |

### 3. Functionality rate of water points

The impact of CDF approach on functionality rate has been analyzed from the responses of 14 programme woreda (district) WRDOs with the questionnaire format. The data was summarized and tabulated, table 4.

Table 4

RWSEP woredas rural water points functionality rate and O&M management fund status

| No. | Woreda | Total WPs & functionality | | | RWSEP WPs & functionality | | | RWSEP CDF WPS & functionality | | | O&M fund status | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total WPs in the woreda | Functional WPs | % of functional | RWSEP WPs | Functional WPs | % functional | CDF WPS | Functional WPs | % functional | All WPs have ACSI account | Birr deposited |
| 1 | Bahir Dar zuria | 432 | 422 | 97.7 | 325 | 325 | 100 | 279 | 279 | 100 | 262 | 90,700 |
| 2 | Yilmana Densa | 619 | 616 | 99.5 | 579 | 576 | 99.5 | 471 | 470 | 99.8 | 471 | 1,413,271 |
| 3 | Gonj kolela | 442 | 435 | 98.4 | 409 | 408 | 99.8 | 395 | 394 | 99.8 | 404 | 456,520 |
| 4 | Quarit | 334 | 329 | 98.5 | 317 | 312 | 98.4 | 233 | 232 | 99.6 | 245 | 126,451 |
| 5 | Dega Damot | 462 | 458 | 99.1 | 451 | 447 | 99.1 | 356 | 356 | 100 | 431 | 527,979 |
| 6 | Dera | 474 | 474 | 100 | 368 | 368 | 100 | 213 | 213 | 100 | 358 | 122,400 |
| 7 | Fogera | 483 | 415 | 85.9 | 438 | 417 | 95.2 | 297 | 289 | 97.3 | 297 | 161,355 |
| 8 | Farta | 715 | 680 | 95.1 | 324 | 311 | 96 | 238 | 235 | 98.7 | 239 | 117,520 |
| 9 | East Estie | 548 | 461 | 84.1 | 293 | 269 | 91.8 | 215 | 211 | 98.1 | 268 | 162,603 |
| 10 | West Estie | 242 | 216 | 89.3 | 175 | 156 | 89.1 | 175 | 156 | 89.1 | 175 | 87,500 |
| 11 | Ankesha | 426 | 401 | 94.1 | 341 | 326 | 95.6 | 296 | 289 | 97.6 | 387 | 252,831 |
| 12 | Guangua | 528 | 511 | 96.8 | 418 | 408 | 97.6 | 400 | 396 | 98.3 | 422 | 262,839 |
| 13 | Enebesie | 410 | 396 | 96.6 | 355 | 347 | 97.7 | 267 | 261 | 97.8 | 385 | 308,230 |
| 14 | Bibugn | 281 | 265 | 93.3 | 262 | 249 | 95 | 150 | 150 | 100 | 200 | 100,320 |
| Total | | 6396 | 6079 | | 5055 | 4919 | | 3985 | 3931 | | 4544 | 4,190,519 |
| Average | | | | 95.4 | | | 97.3 | | | 98.6 | | |

In the table 4 above the difference between 6396, all number of water points in the 14 woredas and 5050, water pointed financed by RWSEP, equals to be 1341 indicates the existence of water points which was financed by government budget, by funds like the previous ESRDF which was utilizing world bank budget by NGO, such as, CARE international, ORDA, Agri Service, World Vision; and any other bilateral and multi lateral organizations. The difference between the number of RWSEP financed water points, 5055, and CDF approach water points, 3985, which is equal to 1070 indicates the number of water points constructed by RWSEP during pre CDF approach.

From table it can be observed that from all 6396 water points existing in 14 woredas 6079 or 95% are functional. The minimum functionality is 84.1 in East Estie woreda (district). The functionality rate has an increasing trend when it comes from all water points to RWSEP water points and, then to CDF approach RWSEP financed water points, which is from 95% to 97.3% and 98.6% respectively.

Comparing the number of CDF approach water points in each woreda and the number of water points which have an account at ACSI, micro finance institution, it can be observed that in Yilmana Densa, Fogera and West Estie woredas (districts) this numbers are equal to 471,297, and 175 respectively. This indicates that at least CDF water points uphold to have an account due to the appraisal criteria of CDF water points which dictates opening of O&M account at ACCSI before water point gets approval. But there is exceptional case in Bahir Dar zuria woreda where CDF approach water points' number greater than that of water points' number have O&M account. This is due to

approval of water points to be constructed with not fulfilled promise of the WATSANCOs to open an account for O&M savings which is against CDF guide line procedure.

In addition, the contribution of CDF approach on the functionality rate was also analyzed by taking the inventory study of O&M status of water points during 2009/10 by Farta woreda. The functionality status of only 312 water points constructed within 4 years (2004/5- 2007/8) both by CDF and not CDF approach, tabulated by table 5 below.

Table 5

Functionality status of 312 water points implemented within four years (2004/5-2007/8) both by CDF and not CDF approach in Farta Woreda

| No | Implementation approach | Functionality status by water points number | | Total |
|---|---|---|---|---|
| | | Functional | Not functional | |
| 1 | CDF approach | 112 | 12 | 124 |
| 2 | Not CDF approach | 146 | 42 | 188 |
| Total | | 258 | 54 | 312 |

Referring table 5 above, from total 124 water points constructed by CDF approach 112 are functional. And from total 188 water points constructed by not CDF approach 146 are functional. This implies the functionality rate of water points constructed by the CDF approach is 90.3%, whereas the functionality rate of water points constructed by the not CDF approach is 77.7%.

To sum up, the improving trend of functionality rate which leads to sustainability is due to positive impacts of CDF approach that are directly related with empowerment of communities especially due to womens' representation in WATSANCOs; community

financing, procurement, and supervision role. Community supervision has a considerable role to improve construction quality that can support for functionality. In addition, upfront contribution and water fee collection for O&M, and saving in local microfinance institutions have vital roles for achievement of high functionality rates.

## 4. Implementation rate of water points

This part of the study is to analyze the RWSEP's CDF approach impact on community water points' implementation rate improvement. The study is based on 11 woredas' two years average pre and post CDF approach constructed number of water points which are tabulated by table 6 below.

Table 6

Two Year's average Number of Water points constructed pre and post CDF approach in 11 Woredas

| No | Woreda | Two Year's average number of Water points constructed | |
|---|---|---|---|
| | | Before CDF | After CDF |
| 1 | Yilmana Densa | 20 | 99 |
| 2 | Guangua | 10 | 59 |
| 3 | Farta | 12 | 29 |
| 4 | Dega Damot | 19 | 63 |
| 5 | Estie | 16 | 32 |
| 6 | Fogera | 36 | 44 |
| 7 | Dera | 23 | 40 |
| 8 | Ankesha | 20 | 65 |
| 9 | Bahir Dar Zuria | 29 | 49 |
| 10 | Bibugn | 45 | 44 |
| 11 | Quarit | 55 | 64 |
| Total | | 285 | 588 |

From the table 6 above, the implementation rates are about 26 and 55 water points per woreda per year during pre and post CDF approach respectively. The major factors for the improvement of implementation rate during post CDF when compared with pre CDF are community supervision and financial management including procurements. Other factor to be considered is Artesian training to increase the number of skilled man power in the woredas (districts) so as to have adequate number of micro contractors for the increasing number of constructions. This shows also the contribution of CDF approach for employment generations.

During pre CDF approach a total number of 614 Artesians trained, but from these it was only 369 Artisans was participating in construction work. But during post CDF there are more than 700 Artesians with not less than 15% of them are females, which are participating in constructions. These Artesians especially females are being empowered to have skill of construction and to gain employment. In addition, it is during CDF approach that the local suppliers are participating potentially in supplying the construction materials, such as cement, reinforcement bar, and construction tools. By these CDF approach is contributing to the rural entrepreneurship, and private sector development.

To sum up, CDF approach is improving implementation rate, and involvement of private sector in rural development activities. The improvement of implementation rate is directly related with fast grow of water coverage by going hand in hand with the growing population number.

## 5. The rural water supply and sanitation coverage statuses

The impact of RWSEP-CDF approach intervention on the improvement of rural water supply coverage was analyzed from the responses of 14 programme woredas WRDOs to the questionnaire format. The data have been summarized and tabulated by table 7 below.

Table 7

RWSEP woredas rural water points number and rural water supply coverage

| No. | Woreda | Total water points by users & technology type | | | | | | Users number & coverage | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Total WPS by users type | | | Total WPS by technology type | | | Total woreda rural population | Rural population served by water | Woreda RWS coverage |
| | | Total WPs in the woreda | Community WPS | Institutional WPs | HDWs | SPDs | Others | | | |
| 1 | Bahir Dar zuria | 432 | 416 | 16 | 366 | 14 | 52 | 196085 | 136750 | 69.74 |
| 2 | Yilmana Densa | 619 | 598 | 21 | 555 | 51 | 13 | 204692 | 154643 | 75.55 |
| 3 | Gonj kolela | 442 | 430 | 12 | 407 | 32 | 3 | 141966 | 115756 | 81.54 |
| 4 | Quarit | 334 | 319 | 15 | 265 | 68 | 1 | 115056 | 95565 | 83.06 |
| 5 | Dega Damot | 462 | 405 | 57 | 413 | 49 | 0 | 151076 | 111064 | 73.52 |
| 6 | Dera | 474 | 444 | 30 | 408 | 56 | 10 | 265530 | 169400 | 63.80 |
| 7 | Fogera | 483 | 444 | 39 | 455 | 28 | 0 | 210681 | 125902 | 59.76 |
| 8 | Farta | 715 | 647 | 68 | 474 | 239 | 2 | 256575 | 227249 | 88.57 |
| 9 | East Estie | 548 | 509 | 39 | 393 | 141 | 14 | 210660 | 177500 | 84.26 |
| 10 | West Estie | 242 | 230 | 12 | 176 | 64 | 2 | 123309 | 43034 | 34.90 |
| 11 | Ankesha | 426 | 391 | 35 | 256 | 120 | 50 | 191854 | 169369 | 88.28 |
| 12 | Guangua | 528 | 482 | 46 | 418 | 98 | 12 | 230579 | 194378 | 84.30 |
| 13 | Enebesie | 410 | 392 | 18 | 180 | 228 | 2 | 131842 | 99620 | 75.56 |
| 14 | Bibugn | 281 | 249 | 32 | 152 | 129 | 0 | 79222 | 56304 | 71.07 |
| Total | | 6396 | 5956 | 440 | 4918 | 1317 | 161 | 2509127 | 1876534 | 74.79 |

From table 7 above it can be observed that all 14 woredas are far more than the average regional rural water supply coverage of 60% (WRDB, 2010) except the new woreda, West Estie. The maximum rural water supply coverage is at Farta woreda, that is 88.57% and the minimum is at West Estie which is 34.9. The reason for Farta to achieve the biggest coverage is the existence of an CARE, an internatioinal NGO in the woreda implementing rural water supply projects in 22 kebeles out of the total 37 kebeles in the woreda. The low rural water supply coverage in West Estie due to it is a new woreda detached recently from East Estie and not yet this much capable due to lack of infrastructures, suppliers, and Artesian. In this woreda (district) also there are vast areas with relatively poor shallow ground water potential.

RWSEP's technology options for rural water supply are HDWs and not motorized spring developments, and table 7 shows HDWs are dominating in almost all woredas except in Enebesie woreda, the number of spring development schemes greater than the HDWs, 228 SPDs and 180 HDWs from the total of 410 schemes in the woreda. In 14 woredas, there are 161 schemes other than HDWs and SPDs. These schemes are drilled well with hand pumps, SPD gravity distribution network, motorized SPDs, and drilled bore holes with submersible pump. RWSEP financed only 4 of these types of big schemes and its contribution is only about 2.5 %, a very small share. The existence these 161 schemes indicates the demand for additional technology options were it is practically impossible to implement small schemes due to problems related to hydrogeology of the area and other factors, such as the existence of large number of beneficiaries at the woreda (district) capitals or rural centers.

During post CDF approach the implementation of institutional water points has been carried out through parent-teacher committees as that of WATSANCOs are doing for community water points. In RWSEP woredas (districts), there are 440 or 6.8%, institutional water points (school and health institution) out of the total 6396 water points. It has been identified also that, it is in Farta woreda (district) that, the maximum institutional water points, 68 out of 440 institutional water points are existing.

As far as the household latrine coverage is concerned the CDF appraisal criteria is playing a vital role to achieve high house hold latrine coverage. This is due to the fact that as per the appraisal criteria, the communities have to construct their house hold latrines in parallel with their community water points construction with locally available natural construction materials with their own expenses. It has been also identified that there are CDF woredas (districts), such Farta and Ankesha which have kebeles with 100% hose hold latrine coverage.

As a part and package of CDF approach there are sanitation promoters' trainings through woreda health offices which is contributing for high house hold latrine coverages. There are also house hold level follow ups on the proper utilization of the constructed latrines and other hygienic activities at house hold by kebele health extension workers and contact womens who are parts of the beneficiary communities. The post CDF institutional school latrine constructions follow the same CDF approach for institutional water point construction through parent- teacher committee.

To sum up, RWSEP- CDF approach has significant contribution for fast growth of rural water supply and sanitation coverage. The current programme woredas' average rural water supply coverage is 74.8%, which is very high compared with regional average of 60%. This is definitely due to the intervention of CDF approach in the woredas by having a share of 3985 CDF approach water points from total 5055 RWSEP financed water points and 6396 total number of water points in the woredas.

**6. Scaling up of Community Development Fund**

Although there are different alternative modalities of financing rural water supply and sanitation projects, CDF approach is an innovative financing approach by which beneficiary communities can have an access of managing the investment budget for their rural water supply and sanitation project construction.

CDF approach has been extended from two pilot RWSEP programme woredas in the 2003/2004 to fourteen woredas during 2007/2008. It is a demonstrative example to be an indicative for the possibility of scaling up of CDF. The expansion was made step by step , that is, during 2003/04 to Guangua and Yimana Densa; 2004/05 to Farta, East Estie, Dega Damot; 2005/06 to Enebesie, Dera, Fogera, Bahir Dar zuria, Ankesha; 2006/07 to Quarit and Bibugn; 2007/08 to Gonj kolela and West Estie woredas (districts).

These expansions also have been achieved with in the challenges and limitations. These are limited capacity of WRDO staffs, not filled vacant positions; vast paper works to fulfill CDF approach activities, and high turnover in woreda (district) WRDOs. Also

the frequent structural changes of governmental offices and the absence of local suppliers for industrial product building construction materials especially in the remote and new woredas (districts) were contributing negatively for the expansion of the CDF approach.

The needs for the scaling of CDF are arising from the encouraging results achieved through using this approach in RWSEP woredas (districts). The results are higher implementation rate, high functionality rate, and speedy water coverage. The bases for these results are community participation (men and women) at all stages of management of water points.

The uncommon and special part of CDF approach is community participation in the community financing modality. This is making CDF approach to contribute greatly in creating ownership filling and empowering the communities especially women. By this approach women have not been only represented in WATSANCOs, but also are getting one of the leader positions during CDF approach. The approach also contributing a lot for the growth of private sectors, artisans who have been trained and gaining experiences of construction, and spare part suppliers who are getting new market areas.

To replicate the approach the factors for its success need to be considered. These are detail guide lines and manuals with working formats, adequate budget for both investment and capacity building costs, simple technology choice for community management, suitable hydro-geological conditions, and committed partners at region,

zone, woreda (district), and community levels, and a consultant with motivated and committed team members. The micro finance institution in Amara National Regional State, ACSI is also playing its vital role in transferring budget for WATSANCOs due to its existence even in remote areas where commercial banks have no branches.

Recently from 2008, the GoF and GoE have expanded and is scaling up CDF approach to Benshangul Gumuz National Regional State. By now the approach is functioning as a financing mechanism for RWSS projects through a bilateral agreement between the GoF and Benshangul Gumuz National Regional State. The Organization for Rehabilitation and Development in Amhara (ORDA) and Sida Amhara Rural Development Programme (SARDP) are also showing initiatives to utilize CDF approach for rural development activities. Very recently also UNICEF, which is a potential donor in Amhara and other Regional States and Amhara National Regional State with its government budget are under the process for expansion of CDF approach.

To conclude, the UAP target of 98% WASH coverage by 2012 can be achieved if only if such an innovative financing mechanism for speedy and sustainable water coverage increment get considerations. Therefore, scaling up of CDF is vital and need attention by donors and financers to replace the conventional financing modalities that are do not participating the beneficiary communities.

## 4.2 Hypothesis testing

**Null hypothesis- 1:** There is no statistically significant difference between the average functionality rate of all water points constructed in Rural Water Supply and Environmental Programme (RWSEP) woredas (districts) and Community Development Fund (CDF) approach constructed water points in the same woredas.

The SPSS software, one-sample t-test method were utilized to analyze the difference between the average functionality rate of all RWSEP water points, that is 95.04% and the functionality rates at each woreda level for the CDF approach constructed water points functionality rate that are tabulated in table 4. The results are shown by table 8 and 9 below.

Table 8

One-Sample Statistics- functionality rate

| | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|
| percentage functional from CDF water points | 14 | 98.293 | 2.8329 | .7571 |

Table 9

One-Sample Test- functionality rate

| | Test Value = 95.04 | | | | | |
|---|---|---|---|---|---|---|
| | | | | | 95% Confidence Interval of the Difference | |
| | T | Df | Sig. (2-tailed) | Mean Difference | Lower | Upper |
| percentage functional from CDF water points | 4.296 | 13 | .001 | 3.2529 | 1.617 | 4.889 |

As per one sample statistics test gives descriptive statistics output table 8, the mean functionality rate and standard deviation of CDF water points to be 98.3 and 2.83 respectively. And output table 9 shows the test results, t=4.296, df=13, and P-value 0.001, which indicate that the observed mean difference is statistically significance.

Therefore, from the t-test result with 95% confidence interval, the null hypothesis must be rejected. And the hypothesis, there is statistically significant difference between the average functionality rate of all water points constructed in Rural Water Supply and Environmental Programme (RWSEP) woredas (districts) and Community Development Fund (CDF) approach constructed water points in the same woredas is confirmed to be true. The result also can be written as, t (13)=4.296: p=0.001

**Null hypothesis- 2**: there is no statistically significant difference between functionality rate of water points when grouped by CDF approach and not CDF approach.

The SPSS computer software was used for categorical variables CDF and not CDF and functional and not functional, which are cross tabulated using SPSS crosstabs procedure table 5. Chi-square test was utilized to test the null hypothesis the result is tabulated below with the output table 10, 11, and12.

Table 10

Case Processing Summary- functionality rate

| | Cases | | | | | |
|---|---|---|---|---|---|---|
| | Valid | | Missing | | Total | |
| | N | Percent | N | Percent | N | Percent |
| Implementation approach-CDF or not * Functionality status on the date of study-functional or not | 312 | 100.0% | 0 | .0% | 312 | 100.0% |

Table 11

Implementation approach-CDF or not CDF * Functionality status on the date of study-functional or not functional Cross tabulation

| | | | Functionality status on the date of study-functional or not | | |
|---|---|---|---|---|---|
| | | | Functional | Not functional | Total |
| Implementation approach-CDF or not | CDF | Count | 112 | 12 | 124 |
| | | Expected Count | 102.5 | 21.5 | 124.0 |
| | Not CDF | Count | 146 | 42 | 188 |
| | | Expected Count | 155.5 | 32.5 | 188.0 |
| Total | | Count | 258 | 54 | 312 |
| | | Expected Count | 258.0 | 54.0 | 312.0 |

Table 12

Chi-Square Tests-functionality rate

| | Value | Df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) |
|---|---|---|---|---|---|
| Pearson Chi-Square | 8.371(b) | 1 | .004 | | |
| Continuity Correction(a) | 7.510 | 1 | .006 | | |
| Likelihood Ratio | 8.923 | 1 | .003 | | |
| Fisher's Exact Test | | | | .004 | .002 |
| N of Valid Cases | 312 | | | | |

a Computed only for a 2x2 table

b 0 cells (.0%) have expected count less than 5. The minimum expected count is 21.46.

In the table 11 above, if the null hypothesis were true, there should be little difference between the count and the expected count. The expected count represents the number that would be in each cell when the variable independent each other. That is, if approach of implementation (CDF or not CDF) and functionality status (Functional or not Functional) were unrelated, then it is expected that 155 not CDF Water points to be functional rather than the actual 146 water points functional during the study time from the total 188 schemes constructed by not CDF approach.

Also table 12 provides a statistical hypothesis test for null hypothesis number one, the Chi-square statistic 8.37and a significance level ($p<0.05$) indicates that it is significant at 95% confidence interval. Therefore, it can be concluded that the null hypothesis can be rejected or disproved and the hypothesis there is statistically significant difference between functionality rate of water points when grouped by implemented by CDF and not CDF approach is true.

**Null hypothesis-3**: there is no statistically significant difference between implementation rate of water points when grouped by implemented by CDF approach and not CDF approach.

The SPSS computer software were utilized to analyze the data of water points constructed during before and after start of CDF approach, table 6 and the results are tabulated below with output tables, table 13, 14, and 15 below.

Table 13

Paired Samples Statistics- Implementation rate

| | | Mean | N | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Pair 1 | Two year's average number of water points constructed per woreda per year after CDF | 53.45 | 11 | 19.694 | 5.938 |
| | Two year's average number of water points consructed per woreda per year before CDF | 25.91 | 11 | 14.117 | 4.256 |

Table 14

Paired Samples Correlations- Implementation rate

| | | N | Correlation | Sig. |
|---|---|---|---|---|
| Pair 1 | Two year's average number of water points constructed per woreda per year after CDF & Two year's average number of water points consructed per woreda per year before CDF | 11 | .042 | .902 |

Table 15

Paired Samples Test- Implementation rate

| | | Paired Differences | | | | | T | df | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | | | | |
| | | | | | Lower | Upper | | | |
| Pair 1 | Two year's average number of water points constructed per woreda per year after CDF - Two year's average number of water points consructed per woreda per year before CDF | 27.545 | 23.742 | 7.158 | 11.596 | 43.495 | 3.848 | 10 | .003 |

Table 15 above shows the paired sample test statistics of the distribution of differences between the paired values (paired differences), 95% Confidence Interval of the difference, the t-value, df and its two tailed P value sig. (2 tailed). The 95% Confidence Interval is an interval calculated from the data that should include the true value of the parameter (in this case the mean difference in the population) in 95% 0f samples. Here the interval ranges from lower (11.596) to higher (43.495). Since this interval does not include null hypothesis ($H_0$) value of 0, t is significant beyond the 5% level on a two-tailed test.

From this table again it can be observed that the value of the test statistic t (on 10 degree of freedom) is 3.848, and that the 2-tailed P-value, sig. (2-tailed) is 0.003. Since we are testing directional hypothesis, dividing 0.003 by 2, it gives a value of 0.0015. Thus the null hypothesis can be rejected at the level of 1% (0.01). Accordingly, the hypothesis that there is statistically significant difference between implementation rate of water points when grouped by implemented by CDF and not CDF approach is confirmed to be true, and the null hypothesis can be rejected. The result also can be written as $t(10)= 3.848: P<0.01$.

**Null hypothesis- 4**: There is no statistically significant difference between the average rural water supply coverage of Amhara National Regional State (regional coverage) and RWSEP woredas rural water supply coverage.

The analysis was made using one-sample t-test to reveal the existence or not existence of statistical difference between the average rural water supply coverage of

ANRS, which is 60% and RWSEP woredas coverage, table 7. Based on SPSS software statistical analysis, the result is shown with table 16 and 17.

Table 16

One-Sample Statistics- water coverage

| | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|
| percentage of water coverage | 14 | 73.8499 | 14.23343 | 3.80405 |

Table 17

One-Sample Test- water coverage

| | Test Value = 60 | | | | | |
|---|---|---|---|---|---|---|
| | | | | | 95% Confidence Interval of the Difference | |
| | t | Df | Sig. (2-tailed) | Mean Difference | Lower | Upper |
| percentage of water coverage | 3.641 | 13 | .003 | 13.84989 | 5.6317 | 22.0680 |

The descriptive statistics, table 16 above shows the mean and the standared deviation of rural water supply coverage to be 73.85 and 14.23 respectively. And table 17 indicates the test results with t=3.641, df=13, and P-value 0.003 shows that the observed mean difference is statistically significance. The t-test result with 95% confidence interval revealed the null hypothesis should be rejected, and the hypothesis, there is statistically significant difference between the average rural water supply coverage of Amhara National Regional State (ANRS) and RWSEP woredas rural water supply coverage should be approved to be correct. This result can be written as, t (13) =3.641: p=0.003.

# CHAPTER FIVE
# CONCLUSIONS AND RECOMMENDATIONS

Drinking water supply and sanitation are among the most important necessities for human life. The unsatisfactory level of these human needs leads to poor health that has consequences of low productivity and poverty.

As other poor and developing countries, Ethiopia also has generally low level of rural water supply and sanitation coverage. In ANRS, the current rural water supply coverage is about 60%. Therefore this low level water supply coverage and unsatisfactory functionality rates and implementation rates should be improved by employing better community based demand driven approach.

CDF approach is a community financing mechanisms which have been practiced by a bilateral programme between the government of Finland and Ethiopia, ANRS-RWSEP. The core aim of this study is to analyze the significant role of this approach for sustainable development of RWSS schemes.

The reviewed literatures under the topics of RWSS and health, community management of RWSS schemes, gender and RWSS schemes, private sector and RWSS, and O&M of RWSS schemes shows that the issues of sustainable rural water supply and sanitation are complex and needs more attention by all donors, implementers, and beneficiary communities. This study has revealed that CDF approach is playing an important role to improve functionality rate, implementation rate, and water coverage

based on the study at 14 programme woredas (districts) in the four of Administrative zones in ANRS.

The higher functionality rate of CDF water points, 98.6% is identified to be related with the willingness to pay developed by the community that has been expressed by upfront contribution from the identification and application stage of the RWSS projects, the community procurement and supervision which improves the construction quality, the utilization of simple VLOM-RWSS technologies, suitability of the hydro geology of the project area, and very important trainings, such as for pump attendants and spring care takers.

The high implementation rate, about 55 new water points per woreda per year by CDF approach is due to the decentralization and shifting direction of budget transfer towards beneficiary communities by applying community managed financing mechanism. The community procurement is the major part of community finance management which is uncommon but is becoming very successful within CDF approach. In addition, the existence and important role of micro finance institution, ACSI; the capacity building by the programme office to the woredas (districts) partners by financing the procurements of vehicles, motor cycles, computers, moulds and tools have significant contributions and share for the success.

The relatively high rural water coverage by the CDF approach woredas (districts), 74.97% indicates that the capacity of the approach to avail potable water to inaccessible and highly marginalized communities. It also indicates the effectiveness of

promotional activities and technical assistances by the approach to create demand driven community managed schemes. Because having inaccessible and remote areas are common in ANRS as other parts of rural setting of Ethiopia, and water coverage cannot increase unless the unreached remote areas are addressed.

The comparisons between CDF and non CDF approach water points functionality rate, implementation rate, and rural water supply coverage data using SPSS software to test hypothesis shows that, CDF approach water points have statistically significant higher values than non CDF water points. This implies, it is meaning full to say, CDF is the better alternative approach for rural water supply and sanitation projects implementation.

The adaptability nature of CDF approach for its scaling up has a practical experience of year by year expanding from two pilot woredas (districts) to the existing fourteen RWSEP-CDF woredas. Recently UNICEF and the ANRS are starting preparations to scale up the approach in some woredas where there are no other donors.

Therefore, based on the results of very sensitive issues of rural water supply and sanitation which are improvements on functionality rate, implementation rate, and rural water supply coverage, it can be concluded that the ANRS-RWSEP-CDF approach is bringing positive impacts for sustainable rural water supply and sanitation projects implementation. It should be also noted that, these encouraging results due to intervention of CDF approach are the indicators of empowerment and ownership filling of the rural communities due to their pragmatic participation at all levels of project cycle

management, which is from project identification stage to construction supervision, procurement and to post completion monitoring stage.

Also, based on the study results, the following recommendation points are forwarded:

- Simplified financial management system by shifting the transfer of investment budget to beneficiary communities, CDF approach, is a practical community management approach. Therefore it needs to be strengthened and encouraged to achieve MDG and UAP and for empowering rural communities especially women who have no chance of getting financial management responsibility even in their house hold, in the context of ANRS, and as a whole in rural Ethiopia. Also this lead to sustainability of the schemes through the created ownership filling by involving directly the beneficiary communities.
- Although the objectives of opening saving account and depositing upfront contribution before construction and paying user fees during operation are to enable the communities to have their own budget at their disposal for O&MM, from the existing experience, major maintenances, relocations and reconstructions are mostly beyond the O&M capacity of the communities and have been covered by the programme office budget, like the new CDF approach water points constructions. Therefore, the possibility of credit development from the service giver, micro finance institutions, to the customers, beneficiary communities, should be considered seriously. This can ensure the sustainability of schemes.
- Technology choices of RWSEP need adjustments by including shallow machine drilled wells fitted with hand pump which is in the scope of VLOM to satisfy deeper

water table areas. The existing community contribution of at least 15% mostly by labor and natural construction materials may cannot be achieved in the case of this type of higher investment technology options; therefore, community contribution system should consider cash contribution from beneficiary communities as part of the investment cost. Also supply chain for spare parts through the private suppliers' shop should be strengthened to do not get jeopardize the existing high functionality rate.

- From RWSEP experience when starting CDF approach in new woreda (district) the permanent assistance by the consultant advisors at woreda (district) community level was intensive. This assistance is continuing currently also though not regularly. Therefore, scaling up of CDF should consider similar patterns for successful transfer of skill. The capacity buildings by which availing vehicle, motor cycle, computer, molds and tools, and trainings need considerations which definitely are among factors for the success of RWSEP-CDF approach.
- At present, there are different approaches for rural water supply and sanitation projects implementations. These are mostly dependent on the interests of donors and government and NGO implementing agencies on their conventional type of project management, financing mechanism, supervision and procurements. But the basic factors to have different types of approaches are mostly related with technology choices, hydro geology of the area, willingness and ability to pay of the beneficiary communities for O&M. Therefore harmonization towards efficient utilization of both financial and water resources by having uniform regional and national guidelines for sustainable community management schemes is very vital.

In sum, for those who are donating and implementing rural water supply and sanitation projects and striving for high functionality rate, implementation rate, and rural water supply coverage; CDF approach can be taken as an alternative practically demonstrated, community financing and management system. The approach also can contribute significantly to alleviate the existing low level of sustainable rural water supply and sanitation coverage and to achieve the UAP and MDG goals.

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**ANNEX- 1**

**Questionnaire format to collect data on Rural Water Supply Coverage, and on Operation & Maintenance Management issues from Woreda WRDOs**

| I. N. | Activity | Unit | Quantity |
|---|---|---|---|
| 1 | Number of existing rural water supply schemes in the Woreda | | |
| 1.1 | ➢ Total number of rural water supply schemes in the Woreda at the time of reporting (by RWSEP, government, NGOs etc.).<br>a) By users type<br>o Community water points<br>o School & health institution water points<br>b) By technology type<br>o HDWs<br>o SPDs<br>o Others | Number<br><br><br><br>Number<br>Number<br><br>Number<br>Number<br>Number | |
| 1.2 | ➢ Out of the total rural water points existing in the Woreda, how many of them are financed by RWSEP? | Number | |
| 1.3 | ➢ Out of the total RWSEP financed WPs, how many of them are financed by of CDF? | Number | |
| 2 | Un-functional status water supply schemes | | |
| 2.1 | ➢ Total number of rural water points not functioning in the Woreda at the time of reporting (by RWSEP, government, NGOs, etc.). | Number | |
| 2.2 | ➢ Total number of RWSEP financed water points not functioning in the Woreda at the time of reporting. | Number | |
| 2.3 | ➢ Out of the total RWSEP financed water points not functioning in the Woreda, how many of them are financed by CDF? | Number | |
| 3 | Rural water supply coverage of the Woreda | | |

| | | | |
|---|---|---|---|
| 3.1 | ➢ Rural population of the Woreda in 2002EFY. | Number | |
| 3.2 | ➢ Number of rural population served by water | Number | |
| 3.3 | ➢ The rural water supply coverage of the Woreda. | % | |
| 4 | Operation and maintenance fund status of water points | | |
| 4.1 | ➢ Total number of water points having O&MM fund account in ACSI. | Number | |
| | ➢ Total amount of O&MM fund/money collected in ACSI by all water point | Birr | |

## APPENDIX- 2

### Data collection format from woredas (districts) on water points constructed in each year

| No. | Kebele | Got | No. of Users | Type of WP | GPS reading | | | Name of WP | Depth (m) | Water strike | Water column in 12 hr | Construction | | Year of finance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | North | East | Elevation | | | | | Date of start | Date of completion | |
| | | | | | | | | | | | | | | |
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## APPENDIX- 3

## Site level field assessment, scheme inventory, data collection format on O&M status of water points

| No. | kebele | Name of WP | Year of construction | Type of scheme | Year of construction | Financing mechanism CDF/non CDF | Functionality status functional/non functional | WATSANCOs | | Pump attendants/ spring care takers | | No. of house hold latrine | Water fee collected |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | M | F | M | F | | |
| | | | | | | | | | | | | | |
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## APPENDIX- 4

## Glossary, definition of terms and concepts

### GLOSSARY

**Region**: in terms of administration it is the top body next to the federal state at the central level.

**Zone**: Administration between region and woreda (district).

**Woreda**: in English called district. Interns of administrative structure it is located below zone.

**Kebele**: it is administrative unit below woreda (district).

**Got**: it is a small settlement in the form of cluster; it is below kebele but not administrative unit.

**Birr**: Ethiopian currency.

### DEFINITION OF TERMS AND CONCEPTS

**Sustainable:** regularly existence or functioning within the life time of the created asset or the developed system without significant interruption.

**Accelerated**: is being made relatively faster or speedy to achieve certain targets.

**Water point/ scheme**: water source site, water collection or fetching sites. It can be hand pump site, spring development site, or distribution puplic fountain, or stand posts sites.

**Non functional**: not functional water point/ scheme on the date of study or scheme inventory due to minor maintainable damage or break down of parts.

**Functionality rate:** the functional number of water points when compared with the total water points. It can be expressed in number or percent.

**Implementation rate**: the number or the average number of water points construction per year in a given place.

**Water coverage**: the percent or number of population getting water in a given area and time.

**House hold**: family members or relatives or any relation living in the same home.

**Private sectors**: Artisan, Suppliers, Contractors, and Consultants.

**Artisan**: local micro contractor (mason man) especially for rural water supply projects construction.

**Suppliers**: shop owners to supply building materials, hand pumps and spare parts.

**Community Development Fund (CDF)**: An approach of community financial management mechanism (community financing system).

**Pre and Post CDF**: before and after the start of Community Development Fund (CDF) approach.