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**SCHOOL OF GRADUATE STUDIES  
COLLEGE OF DEVELOPMENT STUDIES, INSTITUTE OF RURAL  
DEVELOPMENT**

**The Challenges and Prospects of  
Multi-village Community Managed Rural Water Supply System  
Sustainability: Hitosa Water Supply Scheme, Oromia Region**



By  
**Aynalem Kassa Debay**

**A Thesis Submitted to the School of Graduate Studies of Addis Ababa  
University in Partial Fulfillment of the Requirements for the Degree of  
Master of Arts in Rural Livelihoods and Development**

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**DEVELOPMENT STUDIES**

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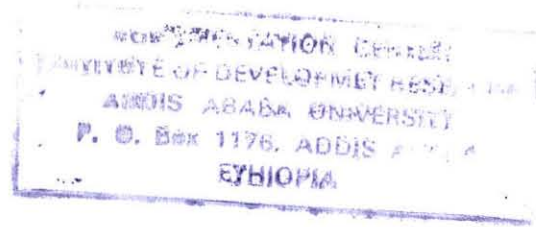
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## LIST OF ACRONYMS

ADB	Africa Development Bank
ADF	Africa Development Fund
ATP	Ability to pay
CRS	Catholic Relief Service
CSA	Central Statistics Authority
DFID	Department for International Development
EC	Executive Committee
FGDs	Focus Group Discussion (s)
GPPN	Global Public Policy Network on Water Management
HH	Household
IRC	International Water and Sanitation Center
KIIs	Key Informant Interview (s)
MDG(s)	Millennium Development Goal(s)
MoFED	Ministry of Finance and Economic Development
MoWR	Ministry of Water Resources
MV	Multi-village
NAP	National Academic Press
NGO	Non-governmental organization
O&M	Operation and Maintenance
OWRB	Oromia Water Resources Bureau
PASDEP	Plan for Accelerated and Sustained Development to End Poverty
PVC	pipeline
RGNDWM	Rajiv Gandhi National Drinking Water Mission
RWS	Rural Water Supply
RWSN	Rural Water supply Network
RWSS	Rural Water Supply System
UAP	Universal Access Plan
UNDP	United National Development Program
UNICEF	United Nations Children Fund
USAID	United States Agency for International Development
WA	Water Aid
WAO	Water Administration Office
WB	World Bank

WC	Water Committee
WEDC	Water, Engineering and Development Center
WELL	Water and Environmental Health at London and Loughborough
WFFC	World Fit for Children
WHO	World Health Organization
WMB	Water Management Board
WSP	Water and Sanitation Program
WTP	Willingness to pay
WUA	Water Users Association
WWW	World Water Week

## **Abstract**

*The provision of improved water supply service is a basic need, human right and a prerequisite for development. However, millions of people are still unable to obtain adequate potable water particularly in rural areas that deserve special attention. In order to meet the demand, a distant piped water supplies to rural areas is emerging as an option where local water sources are scarce, contaminated or high level of service demand due to change of the life style and population pressure. Hence, to benefit from the economies-of-scale, a distant piped water supply system is expected to serve multi-village. The performance of multi-village water supply system, however, becomes challenging and it rarely provide the planned level of services due to limited involvement of the community, low level of cost recovery, lack of adequate technical capacity, inappropriate institutional arrangements and environmental factors. On this thematic area, little work has been done so far about the current efforts, practices and challenges of multi-village water supply system at national level. To this end, this research tries to assess and analyze practices, challenges and prospects of multi-village rural water supply system. This study is conducted in Hitosa Multi-village Rural Water Supply system of Oromia Regional State. It employed multistage techniques: purposive, stratified and simple random sampling to select the WS system, the beneficiary kebeles and the HHI survey respondents. The system serves 19 rural kebeles and three towns. All rural kebeles are involved in the sampling frame. The beneficiary kebeles are stratified based on agro-ecology, of which, 6 kebeles(32%) were purposively determined as sample kebeles and proportionally distributed. A total of 222households were studied. Household survey, Key Informant Interviews, Field Observations, and Focused Group Discussions are the main research instruments. Mixed types of data collection techniques are adopted to gather sufficient and relevant information for this study. Descriptive statistics were employed to generate frequency tables, averages, standard deviations and graphs. The study revealed that the performance of Hitosa community managed MV RWS system is substantial in terms of addressing the local acute water shortage. It was found out that the practices of large scale gravity water supply system have good lessons that could be replicated to other areas provided that a comprehensive study of the specific local condition is carried out. However, currently, there is suppressed supply that considerably influences the satisfaction of the community. This is due to dysfunctional and partial functional of public taps, availability of water for short period of time and low pressure, lack of quality spare parts and sustainable supply chain and failure of implementing different manuals and guidelines, weak financial management, lack of institutional legal entity, inadequacy of trainings and incentives for voluntaries members and lower salary scale for the recruited staff, and lack of finance for major replacement and new source development to meet the growing demand. Therefore, the study call for: establishing sustainable spare parts supply chain through private sector, implementing the existing rural water supply guidelines and manuals, ensure institutional legal entity, select the water committee in terms of capacity and commitment, provide adequate trainings and attractive incentives to the water committees, the water management board members and the recruited staff, review the Water Administration Office staff salary scale and maintain appropriate benefits, mobilize funds for major replacements and new source development, installing master water meter at the head of the water source, conducting a detail study on the water source status and due attention must be also given to protect the water source and develop appropriate monitoring and evaluation mechanism for short and long term plans so as to ensure the sustainability and the prospect of maintaining a service delivery of the system.*

# CHAPTER ONE

## 1 INTRODUCTION

### 1.1 Background



Access to safe water and sanitation is a universal need and, indeed, basic human rights. It is essential element for human development and poverty alleviation and constitutes an indispensable component of primary healthcare. Humanity moves towards peace and development only if it ensures a sustainable access to water and sanitation to the largest majority of people (ADB, 2008; WHO & UNICEF, 2000). On the other hand, lack of safe water and poor sanitation are the major risk factors for mortality and morbidity, including diarrhea, cholera, worm infestations, hepatitis, malnutrition, intestinal nematode infections, lymphatic filariasis, Trachoma and Drowning among many (WHO, 2008). Thus, investing in clean water and sanitation facilities has a significant economic and social benefit through reduced healthcare costs, value of days gained from reduced illness, averted deaths, and time savings for productive endeavor (ADB, 2008; WHO & UNICEF, 2000).

Water has become an international agenda since the past three decades. Among several agenda in the water sector, International Drinking Water Supply and Sanitation Decade was launched by the UN in 1990 with a goal of providing safe and adequate water along with basic sanitary facilities to every person (ADB, 2008). Moreover, the Millennium Development Goal promulgated by the Commission for Sustainable Development in 2000 has the target to halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation (GPPN, 2008).

Observations and empirical evidences indicate that sustainable access to safe and adequate water is one of the key indicators of international development. It is a basic service and the major development priority for poor people (DFID, 2004; WHO, 2008). Improving access to safe water and sanitation and improved water resource management are the key steps to achieving many of the MDGs targets, including some of the more challenging goals such as eradication of

poverty and hunger, universal primary education, promotion of gender equality, reduced child mortality, improved maternal health, environmental sustainability, combating disease like HIV, malaria and enhance global partnership for development (DFID: 3, 2004).

Despite the emphasis given to the sector and efforts being made globally, about 1.1 billion people in the world are still forced to use unsafe water sources and about 2.6 billion people do not have basic sanitation facilities (ADB, 2008; CRS, 2005). Studies further revealed that one in six and two out of five people worldwide lack access to safe drinking water and sanitation facilities (Dawit, 2007). This problem is worse in developing countries in general and in Africa in particular. For example, in 2006 water supply and sanitation coverage was estimated at 4 and 38 percent, respectively, as compared to the world's averages of 87 and 62 percent, respectively (ADB, 2009). Therefore, inadequate water supply and sanitation facilities are the major causes for most communicable, infectious, preventable diseases and has led to a very low life expectancy in Africa (ADB, 2008; 2006), than anywhere else. It is also evident that the Millennium Development Goals (MDGs) implementation and assessment of efficiency shows, most of sub-Saharan Africa is continuing to fall behind its targets (GPPN, 2008).

Likewise, Ethiopia is cited as one of the countries with the lowest water supply coverage in Sub-Saharan Africa. In order to collect water from unprotected source, people have to travel long distances for many hours. For the same, rural women often have to walk on average five hours a day to fetch water and girls often miss school. Moreover, over 70 percent of the contagious diseases in the country are water borne and water related diseases (Intermon Oxfam, 2005; MoWR, 1999). As the result, about 20 percent of under five mortality of Ethiopian children is attributed to diarrhea (MoFED, 2006). In order to overcome these problems, the government of Ethiopia has made efforts to improve access to safe water supply and sanitation, which have a synergistic impact on the human productivity and breaking the cycle of poverty (Intermon Oxfam, 2005). Some of these efforts include a Plan for Accelerated and Sustained Development to End Poverty (PASDEP), aimed at increasing the RWS coverage to 80% by 2010 and Universal Access Program (UAP) in 2005 to provide access to safe water for 98% of the rural population of the country by 2012 (MoWR, 2009a).

According to the MoWR (2009a) report, the national water supply coverage enhanced from 45.59 percent to 59.5 percent for the last four consecutive years (2004/05 – 2007/08). The rural and urban water supply coverage is 53.9 and 86.2 percent, respectively, for the year 2007/08. The reviewed UAP reveals that the progress so far made is by far lower than the plan and entails much has to be done to achieve the target. The rural water supply achievements vary according to the regions. While SNNPR (63%), Dire Dawa (75.8%), Tigray (56%), Afar (53.1%) and Oromiya (52%) have achieved more than 50% water supply coverage; Amhara (49%), Gambella (43.9), B. Gumuz (44.3%), Harari (41%) and Somali (32.9%) are in the category of less than 50 percent (ibid).

Considering Oromia Regional State, the largest state in terms of population size and area, it is still facing challenges to provide reliable, safe and adequate water supply and sanitation services for nearly half of the population. The problems are attributed to fast growing population, low quantity and quality of water and poor sustainability of the water supply system. In order to overcome this problem, the region is practicing multi-village water supply approach especially in rural areas. Currently, there are about 32 multi-village rural water supply systems i.e. 4 motorized and 28 gravity systems in the region. Hitosa multi-village community managed water supply system is one of the largest systems in the region as well as in the country. The WS system serves above 80,000 populations who are living across four weredas (WA, 1998).

Therefore, it is valuable to assess the challenges and prospects of multi-village rural water supply sustainability holistically from the social, financial, technical, institutional and environmental perspectives to document experiences and draw lessons.



## **1.2 Statement of the Problem**

There are several approaches to procure water supply and sanitations in the rural Ethiopia. Nowadays, the rural water supply service delivery is shifting towards more piped systems through bringing water from distant sources. Particularly, it is an option where local sources are scarce, not fit for drinking, and when there is high demand due to population pressure and living style improvement. In order to benefit from the system, the economies-of-scale often dictates that more than one village need to be served. This concept is known as Multi- village RWS system which refers to rural-piped water supply systems that serve more than one village (WSP, 2001; 2000). Various case studies implied that multi-village water supply system simplifies management and regulation, enhance leadership quality, strengthen collaborative actions, attract professional cooperation and generate greater political support and thus offers a feasible and long-term solution. On the other hand, evidences illustrate that the sustainability of multi-village water supply system is affected by the institutional, financial, technical, social, environmental and other external factors like policy and political interferences (WSP, 2000). Hence, assessing the challenges of sustainability from point of view of this factors is paramount important.

There are three rationales to conduct this research on multi-village community managed rural water supply system. First, the role of multi-village water supply system in terms of coverage and sustainability is not adequately examined and documented in the country. Second, assessments so far carried out by practitioners, donors and researchers were focused on partial sustainability. However, system sustainability is an outcome of integrated components such as appropriate and standard technology, community and social factors, financial elements, institutional arrangements and legal issues and environmental factors. Third, the practice of multi-village community managed water supply system is not adequately documented, the lessons learned so far from this approach are not sufficiently recorded. Therefore, this research attempts to fill the knowledge gap through assessing the factors, in integrated manner, and documenting the practices and lessons drawn so far.

### **1.3 Objective of the Study**

The overall objective of the study is to assess the challenges and prospects of Hitosa community - managed multi-village rural water supply system towards sustainability.

To this end, the specific objectives are:

1. to assess the existing status and practice of Hitosa multi-village community managed rural water supply system.
2. to explore key factors that either facilitate or impede the sustainability of the system.
3. to draw lessons on the multi-village community managed rural water supply system.

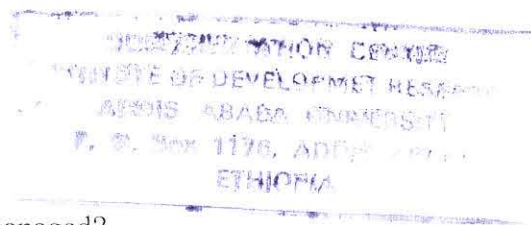
### **1.4 Research Questions**

The study attempts to answer the following key questions.

1. How Hitosa multi-village rural water supply system is managed?
2. What is the current condition of the WS system?
3. What are the main factors affecting the sustainability of the system?
4. What are the key lessons that could be drawn from practices of the system?

### **1.5 Significance of the Study**

This research attempts to contribute to the efforts of development practitioners, policy makers, researchers and academicians. First, the study on multi-village community managed water supply system is not thoroughly examined in the country in general. Therefore, the result of this study will contribute towards this end. Second, the findings may influence authorities and technocrats so as to consider the holistic sustainability elements while planning and implementing multi-village rural water supply development activities. In other words, it is believed that the findings drawn from such grass root level study could have a policy implication at both micro and macro levels. Third, it assesses whether the multi-village community managed water supply system provides desired level of service or not. Fourth, the study may motivate



those who are interested to conduct further research on similar issues in the country. Finally, the lessons learnt from the experiences of the study could contribute to the efforts of sustainable water supply development and management.

### ***1.6 Scope and Limitation of the Study***

Sustainability is a complex and dynamic concept which is made up of many interrelated components. Thus, the scope of this case study is to assess key factors such as community and social aspects, financial and related issues, technology, institutional and legal aspects and environmental factors in multi-village rural water supply system context. However, as the geographical and socio-economic conditions may vary even in the context of multi-village system, it is difficult to emulate the result of the study to other areas and/or other types of water supply systems. Moreover, the study was carried out only on beneficiary kebeles and cannot address non-beneficiaries in specific wereda. Hence, the socio-economic status, the type of water supply source and distribution system, the experience of the societies in community development activities are necessary to consider so as to scale-up the experiences and lessons of Hitosa Multi-village community managed rural water supply system.

## CHAPTER TWO

### 2 REVIEW OF RELATED LITERATURE

#### 2.1 *The Concept of Multi-village Rural Water Supply (RWS) System*

Multi- village RWS system (MVRWS) refers to rural-piped water supply systems that serve more than one villagery. The source of water could be borehole, river/stream and spring. It is different from point water supply system which extracts water from wells and/or boreholes and serves at a point (WSP, 2000; 2001; WB, 2001; RGNDWM, 2000).

Multi-village water supply systems are widely categorized in terms of physical structures, institutional arrangements, management models and financial outlays (investment, O&M cost) (WSP, 2000; RGNDWM, 2000). The first type of MVWS is a small, *simple scheme* which pumps water from a local source to a small group of villages. It involves relatively simple technology, low operation and maintenance costs and locally managed by a Water Users Association (WUA). The second type of MVS is also a small, but *complex scheme* that pumps water from a far source to a storage tank and then distributed to a small group of villages through secondary pump(s). The latter is demanding relatively higher investment and operation and maintenance costs and more complex institutional arrangements. The third category is a *large and complex scheme*. Here, water is pumped from a far source to one or more treatment works to storage tanks to supply a large group of villages. It requires a high technical capacity for design and implementation, significant O&M cost and complex management and coordination (ibid).

Multi-village system usually comes to existence through joint community initiatives, for the very reason of searching for a sustainable solution to the common problems. Due to local water scarcity, contaminated sources (unacceptable water quality) and population pressure, planners are attempting to examine a distant water sources as an alternative option to provide water supply coverage to rural areas in a way to provide an equivalent level of service for homogenous

population. Moreover, multi-village water supply systems have the potential to capture economies-of-scale and to facilitate higher level of services, and appear to offer a feasible and long-term solution to the acute water scarcity faced by many people (WSP, 2002; WB, 2001; RGNDWM, 2000).

According to WSP (2000:6), the driving factors for the realization of a community managed multi-village water supply system are:

**Coverage:** - in areas with few water sources, multi-village system provides a practical solution to a wider coverage amongst neighboring villages.

**Leadership:** - in order to initiate a water supply project, strong negotiating skills are required to open a dialogue with the support agencies, and to mobilize financial resources and community participation. These leadership qualities are often lacking in small villages, and are stronger when a number of villages grouped together.

**Quality of Service:** - rural water piped system should be justified when villages join together. In this case communities need to make informed choice about the type of system and the level of service that they will be able to maintain. When villages join together they have not only stronger leadership but also able to draw on a larger pool of candidates from which to select a higher caliber of professional staff for operations and maintenances of the system, and for financial management that ensure the system sustainability.

Therefore, the two vivid reasons for implementing MVS are: first, the scarcity of water which tends planners to get a distant water sources and multi-village systems which become attractive as a means of sharing the high investment and production costs of the bulk water supply system, reduce per capita costs and increase affordability. Second, where there is a serious drinking water quality problems related to excess fluoride, arsenic, salinity, iron or nitrate, it is very expensive to provide water treatment at every village, whereas centralized water treatment by multi-village systems may induce economies-of-scale and simplify management and regulation.

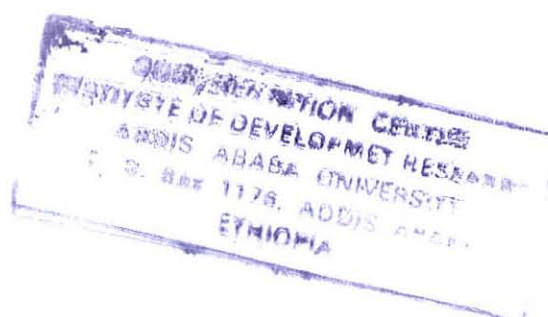
Despite the above advantages, multi-village water supply option has some flaws, which has different comparative costs. These include: depending on the types of technology it becomes more complex to operate and manage and incur higher coordination and management costs; greater legal requirements, more time for planning and implementation, and institutional development; the tariff becomes high if the technology demands power, groundwater depletion and shortages if the source is not properly studied and may lead to inequitable water distribution in tail-end point.

## **2.2 Types of Multi-Village Rural Water Supply Management Model**

The types of multi-village system management are arranged to handle all stages of the project cycle including financing the cost of infrastructure, preparation/mobilization, construction management and management/operation of the system. Unlike point water source, a complete management model is taken to be defined not simply in terms of who manages but also in terms of who operates (WB, 2001; WSP, 2000). The following are the widely applied types of multi-village water supply management models.

### **2.2.1 Community Water Users Association Management Model**

Water Users Associations (WUAs) are the effective form of management for small multi-village systems. The Water Users Association has many roles and functions. The majors are: the members often meet every year in general meetings, have the opportunity to define general polices, approve the work plan and budget, express their opinion over the quality of service, and elect an executive board among others. The executive board of the WUAs is responsible for general management of the system, including proposing the budget and hiring the manager and staff to carryout day-to-day operations and maintenances. Moreover, professional support services are contracted as required. As the result, WUAs are well suited to implement service levels, investments and tariffs to fit community willingness to pay (WSP, 1999; WB, 2001; 2000).



There are several examples that depict the success of small scale community managed MV RWS system relative to the large scale MV systems. Consider for example the study conducted in India in Maharashtra, Kohlapur small MV system as solicited below:

*...Mandal officials were strongly opposed to the idea of multi-village piped water systems serving more than five villages because this would hamper effective decision-making in the Mandal. This, they felt, was the main reason for the failure of larger multi-village water supply projects (WSP, 1999: 32).*

Furthermore, case studies undertaken in Colombia and Peru similarly described that small scale multi-village projects are well managed by communities. According to the studies, professional support agencies can play a significant role in small scale multi-village projects. The support services of the projects include social intermediation, technical assistance and financial support. Advice can also be provided on technology choice, cost estimates, construction management, financial management, tariff setting, expansion planning, water quality, and legal issues such as the registration of local management bodies (WB, 2001).

Unlike the above experiences, there is no tangible evidence regarding the number of multi-village systems and also the number of villages that this system serves in Ethiopia. However, scanty information about different regions indicated that Oromiya, SNNPR, Tigray and Amhara have 32, 2, 1 and 1 multi-village water supply systems. All these MV systems are managed by the communities. Those systems which serve large population found in Oromia and SNNPS are managed by community based Water Management Board, while those found in Tigray and Amhara are managed by the water committee.

In general, this approach will allow the community to have full control over the layout of the distribution system, the level of service provided, monitoring of water use and keep costs to a minimum. It should also improve the users' sense of ownership, and allow the management body to become familiar with the village system and develop some of the skills needed to maintain it (De Silva and Samantha, 2000).



### 2.2.2 Water Utility Management Model

Large multi- village water supply systems are serving a bulk of water to a large group of villages. The system needs high technical capacity for design and implementation, significant O&M management and coordination. These types of systems are often managed by Water Utility. The Water Utility is responsible for collection, treatment, distribution, maintenance and customer relations. It is financially autonomous i.e. finances, investments, operations and maintenances are from its own revenue and uses its own extensive technical resources (WB, 2001).

There are, however, some successes with Water Utility Management of rural water supply systems in South Africa and Cote d'Ivoire. But the approach was not a sustainable solution to solve the problem of operational performance (inefficiencies) unless it focuses on demand driven approach. The same case studies carried out in India indicated that, most large multi-village systems have been planned, implemented and managed using a 'top-down' approach. In these systems, the users generally have little or no involvement in the planning, implementation or management of the system. Accordingly, users feel minimal ownership of the systems and have little control over policy or administrative issues (WSP, 2000). Therefore, in absence of community participation and involvement, large MV systems are less likely to be sustainable compared to community managed ones.

### 2.2.3 Unbundled Management

Unlike the above two models, unbundled management model has separate functions. It allows a range of institutions to play the different roles, depending on the system characteristics and on their comparative advantages in the local or state context. The bulk water system is managed by state water board, an autonomous water company, a private entity, or other potential stakeholders but each village has a water user association (WUA) and manages its local system separately. Bulk water meters measure the supply to each village, and bulk water charges are made monthly according to a progressive tariff (WSP, 2001).

Though the unbundled management model has merits in the sense that it involves the relevant stakeholders at different levels, it has disadvantage in terms of incurring larger coordination costs. For instance, the early findings for rural water supply in South Africa highlighted the problems of high transaction costs and high risk, complex institutional arrangements create delays and reduce efficiency (Komives and Mas, 2000; Waddell, 2000). On the other hand, the separation of management functions and the use of simple institutional arrangements should enhance transparency and accountability, and thus these benefits are expected to outweigh any additional costs of unbundled management (WB, 2001; WSP, 2000).

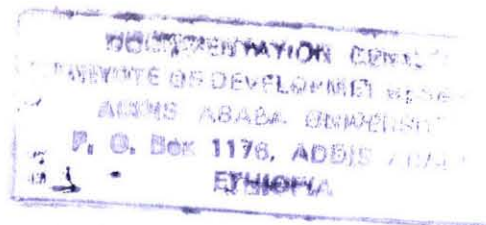
Some empirical evidences and literatures revealed that large scale multi-village water supply systems are not managed by communities. However, studies conducted in Ethiopia, Malawi, and Kenya denounced the fallacy of this orthodox thinking and proved that large scale multi-village systems have been successfully managed by the community for many years. Though, the management systems are different, the systems are sustainable due to social cohesion, sound financial management, good training for the community and management committee and access to technical and professional support (WSP, 2002).

Despite the pros and cons of the Water Management Models discussed so far, this case study will scrutinize the challenges and prospects of large community managed MV RWS system. This can answer the questions that illustrate whether a management model is one of facilitating or impeding factor for sustainability of large scale MV RWS and whether the management model of the case study is a good lesson for the replication for other systems.

## ***2.3 Approaches to Rural Water Supply System***

### **2.3.1 Supply Driven/Basic Needs/ Traditional Approach**

This is a conventional way of delivering water supply service focusing on a top-down supply driven approach. This approach was popular during 1960s and 1970s in international and national efforts focusing on the basic need approach of development paradigm in order to enhance the drinking WS coverage (Kleemer, 1995). The approach supports a highly centralized



decision making of the government with no role for users to participate in any decision making or service management responsibility. It considers the communities as a receiver of water points and playing only a symbolic role in system implementation and tends to lack a sense of ownership. It focuses on infrastructure building rather than on service delivery or its sustainability (Aklilu, 2009; Bezabih, 2008; WB, 2006b; Muluken 2005; Breslin, 2003).

Despite there have been vigorous efforts to improve coverage and upgrade water system through supply-driven interventions, it has not succeeded in providing sustainable water supplies for the poor communities. For instance, empirical evidences demonstrated that 25% of the systems implemented in this approach are not working and the number of systems being abandoned is approximately equal to the number of system being commissioned. Even if they do function they are often not used. Moreover, the drawback of supply side rules are the conventional view of considering people will pay about 3-5 percent for the service which is unrealistic and the rural households cannot afford to pay for piped water that have led to massive and poorly targeted subsidization of service (WB, 1993). The major reasons for the failure of this approach are attributed to incompatibility of technologies to local communities, lack of community participation at all project phases, inappropriate management model, limited sense of ownership, increasing demand for the service and the need for huge investment cost (Breslin, 2003; WB, 1992; Briscoe, *et al.*, 1990).

Most existing multi-village systems have been planned using a 'top-down' approach. For example, MV WS systems in India designed based on technical criteria rather than demand, and up-front financial commitments are rarely required from the communities which resulted in the failure of most MV systems. The study outcome verified that supply side approach or vertical delivery model is inadequate to solve a problem and that there is a need for a new paradigm (WB, 2001).

### 2.3.2 Demand Responsive/New Approach

World Bank and also other institutions working in this sector officially adopted the demand driven approach (the new approach) in 1990 in response to the failure of conservative supply

driven approach (Zelalem 2005; Kleemer, 1995; WB Water Team, 1993). The approach recognizes water as an economic resource and value, communities' initiative and contribution, full responsibility and decisions of the beneficiaries on the choice of technology, management system and tariff structure. Besides, women are encouraged equally to participate in the decision making at all stage of project cycle (WB, 2004; 1994; 1993; 1992; Breslin, 2003). Similarly, World Bank and USAID approved that the approach fits within broader trends towards decentralization of government services and transfer of responsibilities to lower levels of government and ultimately to communities themselves (Nicol, 2000).

Therefore, the approach aims to address the main failures of water supply service by bridging the gap between emphasis on infrastructure building (hardware) and service delivery and its sustainability through community management (software) (WBb, 2006). Furthermore, some studies found that employing a demand-responsive approach at the community level significantly increases the likelihood of water supply system sustainability (Wedgwood, 2003). The sustainability of RWS service in this approach is also directly related to the priority that a given community places on the service and the lack of alternative water resources and inaccessibility (Breslin, 2003; Harvey & Skinner, 2002).

Empirical studies carried out in different countries also indicated that water supply service sustainability is markedly higher in communities where household members made informed choices and preferences on the importance, type and level of service (UNDP and WB, 1998). Other evidences also revealed that subsidies to benefit the poor do not reach, thus, implementation of demand driven approach is essential to improve sustainable service and expand the coverage to the un-served poor (World Bank Water Team, 1993).

Consequently, unbundling of management functions, demand-responsive planning and choice of management institutions and meaningful involvement of users in decision making are key factors for the successful and sustainable multi-village systems. Therefore, unlike the top-down/conventional approach, the projects implemented through demand responsive approach were proved to be better in terms of cost effectiveness, quality of services and sustainability (WB, 2001). This clearly indicates that multi-village water supply systems which adopted

demand responsive approaches and improved management models are more successful and sustainable than those with supply driven approach.

## **2.4 Factors Determining the Sustainability of the RWS System**

### 2.4.1 Rural Water Supply Sustainability

Rural Water Supply (RWS) sustainability is a key issue intensively raised by various professionals, practitioners, researchers and policy makers who are engaged in the sector. In fact, as the majority of rural people in developing country are suffering due to shortage of water, discussing the issue is not an option but an imperative to procure adequate and clean water for them. However, it is immensely influenced by sustainability factors.

The concept of sustainability of RWS is different for different people in various fields of profession. Sustainability of drinking water supply project is defined as “the continued service of water supply project over time to serve their own purposes; proxies of sustainability are those factors affecting functioning, utilization, community participation” Mengesha *et al.*(2003:221). It can also be defined as whether or not the water service continues to work over time. For instance, Abrams (1998), substantiated sustainability of RWS is as follows:

*If the water flows, then all of the many elements which are required for sustainability must have been in place. There must have been money for recurring expenses and for the occasional repair, there must have been acceptance from the consumers of the service, the source supplying the service must have been adequate, the design must have been properly done, and there must have been sound construction (Abrams, 1998:3).*

This would mean that water continues to be available for the period for which it was designed in the same quantity and at the same quality as it was designed. Thus, rural water supply sustainability could be attained if the system has a minimal external assistance, self financing of regular O&M costs by users, the water consumed is not over-exploited, ensures a reliable and adequate water supply, the benefits of the supply continue at a reasonable cost, and the beneficiaries are fully involved in the management (Aklilu, 2009; Zelalem, 2005; Harvey, P. A. and Reed, R. A., 2004; WHO, 2003; IRC 2001).

The RWS sustainability can be measured with success criterion such as: effectiveness (the functionality of the facility, quality and quantity of water); efficiency (the output produced per unit of resources); equity (the water service reach to all members of the communities); and replicability (expanding the service to increase sustainable access) (WELL, 1998). Ensuring access to safe and adequate drinking water to the rural dwellers around the world is a huge challenge. The problem is not only that it has a slow progress but more terribly, many of the constructed services have not continued to work over time. Thus, thousands of people, who once benefited from a safe drinking water supply come back to use their traditional, unsafe water point. Nevertheless, a rehabilitation program tends to use the same management and maintenance principles and training even where these previously led to long term breakdown (Harvey and Reed, 2004; RWSN, 2008).

The causes of breakdown or non-sustainability are communities or households may never have been convinced of the desirability of new water sources; the financial costs which communities are expected to raise as a contribution to capital or recurrent expenses may be unacceptable or unaffordable; communities may never have felt ownership of the new infrastructure, and governments may have been overstretched and under-resourced, so that repairs and maintenances have not taken place due to lack or inadequacy of skilled manpower and benefits promised at the outset of projects have failed to materialize (Ademiluyi and Odugbesan, 2008; Carter *et al.*, 1999).

Other factors such as the on-going use of traditional sources of water, poor systems of cost recovery and the distaste for the water from the improved source also undermine sustainability (Parry-Jones *et al.*, 1999). This is confirmed by various evidences that, about 35 percent of all rural water supplies in sub-Saharan Africa are not functioning (Baumann, 2005), and despite the frequency with which it appears in development discourse, the reality of sustainability remains elusive.

Literatures in this area have illustrated that the critical factors for the achievement or failure of rural water supplies sustainability can be accounted to: (i) policy context, (ii) institutional

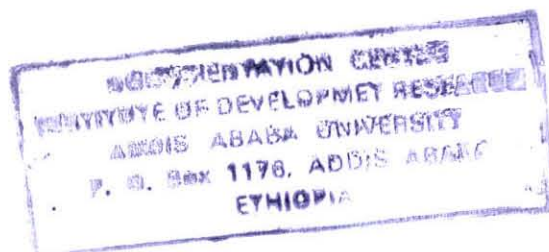
arrangements, (iii) financial and economic issues, (iv) community and social aspects, (v) technology and the natural environment; (vi) spare part supply, (vii) maintenance system, and (viii) monitoring (Harvey, and Reed, 2004; Mukherjee and van Wijk, 2002; Abrams, 1998; WELL,1998).

In the context of RWS service, multi-village water supply system is promoted to solve the problem of local water source scarcity, poor water quality and high demand for water. Accordingly, the sustainability of multi-village RWS is a key concern for providing adequate and clean water. Multi-village RWS sustainability has key principles and approaches to achieve sustainable operations. These include: the combination of two models i.e. a mixture of top-down and bottom-up, appropriate institutional model within the local context and proper legal framework, appropriate financial management model, necessary supports for planning and construction, involvement of the community at all level and protection of water sources and identification of new sources to satisfy unmet demand for water (WSP, 2000).

Multi-village RWS sustainability pertains to multiple aspects of rural water supply. It needs an integration of social, institutional, technical, environmental, financial and gender equity and empowerment dimensions. The above evidences have shown that one of the issues is significantly essential for sustainable service, but none of them is sufficient in itself (Bhattarai and Starkl, 2005; WELL, 1998; Abrams *et al.*, 1994). Thus, it is worth to note that each factor mentioned above contributes to sustainability but not provide the solution independently. Thus, a holistic approach is essential to address all factors.

#### 2.4.2 Community and Social Aspect

Community and social issues certainly have a considerable influence on the rural water systems and services sustainability. User communities must be granted true decision making authority without being pressured to follow the preferences of the facilitator (Shuchen *et al.*, 2004; Harvey, and Reed, 2004).



There are possibly three sustainability components in community and social aspects. Firstly, demand assessment is the first step to measure the needs of the community for an improved water supply system. It is central to provide detailed and representative information on user choices and preferences, willingness to pay, technology selection, willingness and ability to manage and response to improved services. Demand assessment demonstrates a desire for and commitment to a new service. System sustainability is directly related to the value that a given community place on their new water supply system by thoroughly assessing their perception (Harvey, and Reed, 2006; 2004). For example, numerous water supply projects have been unsustainable because they were planned and implemented without taking into consideration the expressed needs or demands of the users (Breslin, 1999; Jones, 1999; Manikutty, 1998; White, 1997). Secondly, unlike the traditional thinking, the community participation should be based on the concepts of ownership, control and responsibility for the water supply and sanitation development process. It has also been recognized that people in the community have not only the capability of managing their water supply services, but also the basic responsibility for their success or failure (UN, 1992 cited in WHO, 2000). Community participation is one of the most important factors contributing to water supply service effectiveness (Narayan, 1994 cited in Haysom 2006). Without participation, it has been claimed that systems are unlikely to be sustainable even if spare parts and repair technicians are available (Arouna and Dabbert, 2008).

The importance of community participation in rural water supply is often emphasized in African rural water supply sustainability through prioritization and vocalization of community needs, selection of appropriate facilities, technologies and locations, financial contribution to capital costs, provision of labour for construction of systems and facilities, management of operation and maintenance, setting and collecting water tariffs, and physical maintenance and repair activities (Harvey and Reed, 2004). This is supported by empirical evidences of the large scale multi-village systems in Ethiopia, Malawi and Kenya which are successfully managed by the community due to high community participation at all project level (WSP, 2002). Thus, full involvement of communities in the practice of multi-village community managed rural water systems at all stages of program implementation and management is a prerequisite and the correct pragmatic approach to achieve efficiency, effectiveness, equity and replicability for rural water supply service sustainability (Ademiluyi and Odugbesan, 2008; Harvey and Reed, 2004).

Thirdly, it has been well recognized that women are the principal collectors, managers and often users of water. Water collection and use and environmental sanitation may dominate women's daily lives, yet often they are denied of a real role in decision-making about water and sanitation (WSP, 2008; Hebert, 1997). Findings, noted that sustained rural water supply services are more likely to result from project interventions when they respond to the demand of women and empower them to take greater control over the service throughout the project cycle (Narayan, 1995). If the rural water services do not consider gender equity they may perform well technically, but have less impact on the abandonment of less safe water sources (IRC, 2002). It has also been confirmed that there is a strong positive link between focusing on gender and women's participation and the degree of WSS management sustainability (DFID, 2009; ADF, 2005). Hence, community and social issues noticeably have a considerable influence on the rural water system and services sustainability.

#### 2.4.3 Financial factors

Financial factor is other key aspect to rural water supply system sustainability. The sustainability is expressed in terms of cash contribution from the community to the total investment cost, adequacy of revenue collection, covering O&M costs, keeping records of financial transactions, setting suitable tariff, billing and following up on debtors etc (Harvey and Reed, 2004; Sara and Katz 1997; Abrams *et al.*, 1994). Financial sustainability can be ensured if tariffs generate enough resources to operate the system, finance the expansion of the service to new customers, and ultimately replace the infrastructure after its useful life (Harvey, and Reed, 2004; WELL, 1998; Abrams *et al.*, 1994).

Different case studies have revealed that financial issue is still one of the major obstacles to achieving a sustainable drinking water supply in developing countries (Brikké and Rojas, 2001 cited in Annis, 2006; IRC, 2001). The financial difficulties of RWSS services are not just with investment but also O&M. That means the tariffs do not even cover O&M let alone accumulate reserves for increasing system capacity. Thus, insufficient cost recovery for O&M has generally led to poor maintenance of systems which eventually lead to frequent breakdowns of water supply systems and consequent shut down (ADB, 2003). The adoption of cost recovery depends

on willingness and capacity to pay, financial management of collected funds, a method of fees collection and enforcement of payment (Schouten and Moriarty, 2003).

Most multi-village systems that have been planned using a 'top-down' approach are rarely required to demonstrate financial commitments from the communities involved. Moreover, low utilization and low reliability have serious implications for cost recovery and sustainability (WB, 2001). It seems clear that people are not willing to pay for services that are unreliable, or do not provide the level of service that they require. For example, the case studies in Colombia and Peru concluded that financing expansion and rehabilitation of large multi-village systems represent a major investment that is beyond the capacity of the communities that can offer less financial support (WSP, 2000).

Similarly, it has been also verified that only few of the water supply systems in rural Ethiopia have currently attained their financial status that is needed to run the systems effectively through the collection of service charges from community members (Sahle, 2002 cited in Zelalem, 2005). It is estimated that about 33 percent of rural water supply system in Ethiopia are non-functional which mainly is due to lack of funds for O&M (MoWR, 2007).

#### 2.4.4 Institutional Arrangements and Legal Issues

Institutional arrangement and related legal issues have an influence either to facilitate or impede the implementation and management of RWS services sustainability. It has been recognized since the 1980s that inappropriate institutional model is a key constraint for RWS sustainability (WHO, 2000). The major institutional issues that influence rural water supply system sustainability are institutional support for the community management and capacity building (Harvey and Reed, 2004). Moreover, it is particularly influenced by organizational framework and the quality of staff and inappropriate allocation of budget to carry out the mandate including budget lines for staff salaries, administration, equipment and transportation (Brikke, 2000).

The blurred legal frameworks of water sector institutional arrangements are often blamed for unsustainable RWS service (Das, 2006). It has also been found that achieving the physical

structures is not a sufficient strategy to cope with the water supply challenges but complementing the human dimensions such as institutional issues and governance which significantly determine 'the rules of the game' of water management systems (WWW, 2005).

The more complex aspect of MV RWS system is an institutional issue which often hinders smooth functioning of the system. For instance, review carried out in India implied that coordination of multiple water supply institutions, and no separation of regulatory and planning/implementation functions are challenges for effective MV RWS institutional performance (DFID, 1999). This is also supported by evidences in Timor-Leste of India as multi-village systems are unlikely to be sustainable in any circumstances without an established and qualified institutional and a proper legal framework (ADB, 2006).

Furthermore, the experiences of Brazil, Peru, Colombia, and Cote d'Ivoire depicted that the effective institutional model for large scale multi-village system is a combination of national or regional agency for planning, construction and delivery of bulk supplies while village water users association appointed for local distribution and day-to-day management (top-down and bottom-up). These further confirmed that institutional arrangements that allow autonomy and political support for cost sharing are essential ingredients for the success of a multi-village system (WB, 2001). Thus, appropriate institutional options and the existence of reliable and fair legal frameworks have indispensable importance to ensure the sustainability of MV RWS system.

#### 2.4.5 Technological Aspects

Technological factors and its relation to rural water supply sustainability have broadly categorized into (i) technology choice which are low-cost, easy to understand and maintain and repair are likely to be more sustainable; (ii) operation and maintenance which means sufficient revenues and appropriate skill for operations and maintenances have a potential to influence the RWS technology sustainability; and (iii) spare parts supply availability and adequacy is one of the quests for RWS system technology sustainability. The main issue is not predetermined without a thorough assessment and community consultation of different potential technical



options (WB, 2008; Harvey and Reed, 2004). In addition, evidences widely cited as the lack of involvement of communities in technology selection within their financial, managerial and technical capacity being and incapable of managing O&M are a frequent claim among the major constraints for water supply sustainability in developing countries (Breslin, 2002; WHO and UNICEF, 2000).

The success of RWS sector in East Africa confirmed that technologies chosen by the community with full information on the merits and demerits of each technology develop a sense of ownership and enable the community to make appropriate decision for RWS system sustainability, while inappropriate technology, inadequate tools and equipment, lack of managing O&M works have significantly influenced the RWS system sustainability in Kenya (WSP, 2008; CRS, 2005). Therefore, lack of sufficient revenues and appropriate skill for operations and maintenances are soundly influencing the RWS technology sustainability (WB, 2008). This is also evidenced by studies conducted in East Asia, South Asia, East Africa, West Africa and the Andes as well as in Ghana and Bolivia have confirmed that technical training for village-based system operators or caretakers is positively associated with technical sustainability (WB, 2008; UNDP and WB, 1998).

The technology factors related to MV RWS systems show that the type of technology choice, technical capacity to manage operation and maintenance and availability of spare parts requirements are dependent up on the types of MV RWS system (small and simple systems, small and complex systems and large and complex systems). In particular small and medium scale MV RWS systems technology are simple and managed by the community while large scale multi-village system require substantial technical capabilities, and coordination and cooperation among diverse groups (WB, 2001). In conclusion, even though the types of MV system matter on technology choice, O&M requirement and supply of spare parts, a significant technical assistance is demanded to all types of MV system to ensure technology sustainability.

#### 2.4.6 Environmental factors

Environmental factor is one of the most often ignored but a very vital for the sustainability of RWS system. The major environmental factors related to rural water supply substantiality includes water quantity (sustainability of yield from the proposed drinking water sources), and water quality due to natural and human related problems (WSP, 2008). Deterioration of water source quantity is a major concern in areas of low rainfall, or poor groundwater re-charge, where there is greater sensitivity to over-extraction. Even in relatively water abundant regions of the world, the source can fail to satisfy demand either due to population expansion or abuse of the supply for non-domestic purposes. Moreover, the quality of water source which determines the level of treatment to fulfill the minimum quality standard is also a great concern in the sector (WB, 2008; Dereje 2007). Empirical evidences have also illustrated that environmental issues should be critically assessed in multi-village systems while investigating water sources and its quality to sustain the system (WB, 2001; WSP, 2000).

To this end, this research will holistically attempt to explore the community and social aspects, institutional arrangements and legal frameworks, technological factors, technical and environmental issues that either facilitate or impede the sustainability of MV-RWS system.

### **2.5 The Status of Water Supply in Ethiopia**

The provision of safe and adequate water supply for the population has far reaching effects on health, productivity and quality of life, as well as on the socio-economic development of the nation. Lack of adequate and clean water and sanitation services in the country has been a serious problem (MoWR, 2009a). Significant numbers of children are dying every day because of absence of safe drinking water and appropriate sanitation and hygiene. Moreover, rural people, especially, women and children spend considerable time every day in fetching water. This becomes more difficult during drought periods when communities are forced to cover long distances for getting water for themselves and their livestock (MoWR, 2009a; WFFC, 2007).

In addition to low access, a considerable number of water supply systems are not functional due to lack of spare parts and poor maintenance budgets. During the dry season more traditional sources of water are placed under pressure as shallow wells or other perennial sources dry-up. These causes increase the rates of morbidity and mortality in rural areas (USAID, 2009). According to Getachew (2002), lack of finance, skilled manpower, inadequate stakeholder participation, lack of coordination among stakeholders, lack of well institutionalized setup and appropriate regulatory framework, and poor infrastructure are considered to be the major causes for low coverage of rural water supply service in the country.

The Federal Democratic Republic of Ethiopia's target of PASDEP (2005/6-2009/10) portrayed that the rural water supply coverage will increase to 80% and the proportion of non-functional schemes will reduce to 10% by 2010. Moreover, the government also endorsed the Universal Access Plan (UAP) in 2005 (2006-2012) to provide access to safe water for 98% of the rural population of the country by 2012 (MoWR, 2009a). According to the MoWR (2007-08) report, the rural and urban water supply coverage is 53.9 and 86.2 percent, respectively, for the year 2007/08.

The reviewed UAP report also indicated that the rural water supply coverage planned for 2008 is 64% based on the new population census of 2007. The rural water supply coverage achieved at the national level by 2008 is 54%, which is 67% of the UAP target. The review also indicated significant disparity between regions. Accordingly, regions that attained above 50 percent water supply coverage are SNNPR (63%), Dire Dawa (75.8%), Tigray (56%), Afar (53.1%) and Oromiya (52%), respectively. While some regions such as Amhara (49%), Gambella (43.9%), Benshagul Gumuz (44.3%), Harari (41%) and Somali (32.9%) are in the category of less than 50 percent (MoWR, 2009a). Recently, the performance of UAP was reviewed and the findings revealed that the achievement is lagging behind the target.

Thus, it would be challenging for the sector to achieve the water supply targets of the PASDEP and UAP. Realizing the problem, particularly its implementation strategies, more focus should now be given to the cost effective water supply systems which can be implemented at household and community level through community mass mobilization (MoWR, 2009a). In line with this,

the plan has also acknowledged the importance of multi-village system to enhance the rural water supply coverage and scale up the quality importance. This option is mainly feasible in areas where there is scarcity, poor quality and high demand for water.

## **2.6 Water Supply Policy in Ethiopia**

The water supply policy is derived from the water supply and sanitation policy which was endorsed in 1999 after the Ministry of Water Resources (MoWR) instituted at federal level. The goal of water supply policy is to enhance the well-being and productivity of the Ethiopian people through provision of adequate, reliable and clean water supply service and to foster its tangible contribution to the economy by providing water supply service that meets the livestock, and other water users' demands (Tesfaye, 2008; MoWR, 1999). The major objectives of this policy are:

- Provision of sustainable and sufficient water supply service to all.
- Carry out operation and maintenance of all water supply service in a sustainable and efficient manner.
- Promoting sustainable conservation and utilization of water resources through protection of water sources and efficiency in the use of water.
- Promote the involvement of non- governmental organizations, external support agencies and the private sector.
- Create sustainable capacity building in terms of the enabling environment, including institutions, human resources development, legislation and regulatory framework for water supply.

The key aspects of drinking water supply policy include allocation of water resources, institutional framework for management, financing, water pricing and cost recovery, technology and maintenance aspect. The pricing policy provides a basis for developing a framework for financing and cost recovery. In rural areas, the need for local level self financing projects and the need to indemnify full coverage of operation and maintenance costs by service providers, and

full operation and maintenance cost to ensure affordable access for the poor through appropriate mechanism for cross subsidization are well presented (MoWR, 1999).

The policy is also supported by other implementation rules, regulations and guidelines documents such as Water Supply and Sanitation Development Program; Water Supply and Sanitation Sub-sector Development Program, Water Supply and Sanitation Strategy and Water Sector Development Program Implementation Manual (MoWR, 2002). Different manuals, which include operation and maintenance, community management, wereda-training manuals, procurement guideline, were completed while some others are under preparation. Moreover, currently, the Water Sector Development Program is reviewing to evaluate the performance of the program and to make appropriate action (MoWR, 2009b).

## **2.7 Conceptual & Analytical Framework for Multi-village RWS System Sustainability**

### 2.7.1 The Concepts

Based on the review of related and theoretical literatures, there are several concepts that found to be clarified in the context of this study in relation to the sustainability of Multi-village Rural Water Supply system. These are community and social factors, institutional and legal issues, financial aspects, technological factors and environmental related matters.

The community and the social factors of the study focuses mainly on the assessment of the demand of community on the improved services, the degree of community participation at different levels and the level of users' sense of ownership and community satisfaction. Moreover, the extent of women participation and its roles in the management and the status and the capacity of WUA to manage the system are included in the community and social factor of sustainability. These have tremendous linkages to ensure the system sustainability in terms of effectiveness, efficiency and equity.



The financial aspect of the study has something to do with the appropriate financial management model in terms of system sustainability. These can be viewed from angles of willingness and ability to pay by the community, the type of revenue collection system, the financial ability to cover the O&M costs, financial capacity for replacement and system expansion and other tariff structure issues.

Regarding the institution and legal issues, major points like institutional model compatibility, capacity of human resources, finance, technical, logistic and manuals and guidelines issues are the major analytical subjects. The legal issues include policies and legal frameworks of water supply systems, guidelines and registration of local management, roles and responsibilities, management of illegal house connections and sanctions for non-payment and others related to legal matters. The level and types of institutional support from different stakeholders in terms of finance, technical, training and monitoring and its contribution to the system sustainability are also paramount important.

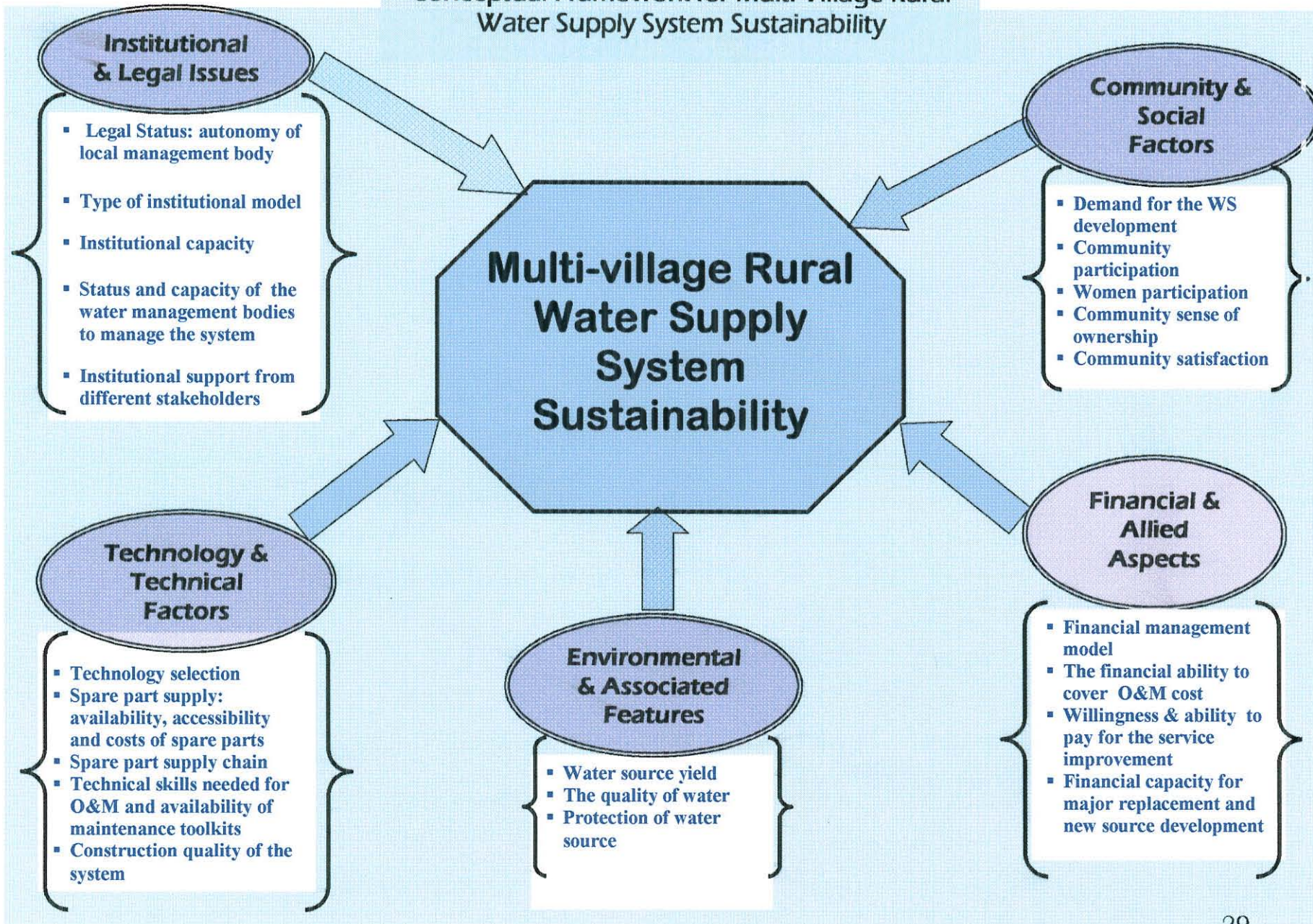
Another concept in this study is technological factors that need to be carefully assessed. The type of technology selection, construction quality of the scheme, availability, accessibility and costs of spare parts, technical skill for O&M and control of water losses and application of maintenance toolkits are the crucial aspects that either facilitate or hinder the MV RWS sustainability.

The concurrent environmental issues such as the reliability of water source, the quality of water as well as the practice of water source protection and other related points are imperative factors for RWS sustainability that need to be clearly addressed. Therefore, this study attempts to concretize these concepts and tries to scrutinize their synergies and interfaces among themselves and with respect to MV RWS sustainability.

### 2.7.2 The Framework

Multi- village RWS system and point water supply system are often confusing but different concepts. While the former refers to rural-piped water supply systems that serve more than one village from distant sources, which could be from borehole, river/stream and springs, the latter extracts water from specific point that could be well and/or borehole and serves at a point in a given village. Multi-village water supply system is basically recommended where the area is water scarce, water is contaminated and/or the communities' water demand is at the higher levels of service than the point water resources can provide. On the other hand, point water supply system can be used where there is adequate local water sources and acceptable level of water quality. The MV RWS sustainability is an outcome of integrated components such as appropriate and standard technology, community and social factors, financial elements, institutional arrangements and legal issues and environmental factors. Thus, this study focuses only on the synergies of sustainability factors in the context of the particular MV WSS. For the purpose of this study, the following (see figure below) conceptual framework is developed to assess the factors that either impede or facilitate the MV RWS system sustainability.

## Conceptual Framework for Multi-Village Rural Water Supply System Sustainability



## CHAPTER THREE

### 3 DESCRIPTION OF THE STUDY AREA AND METHODOLOGY

#### 3.1 Description of the Study Area

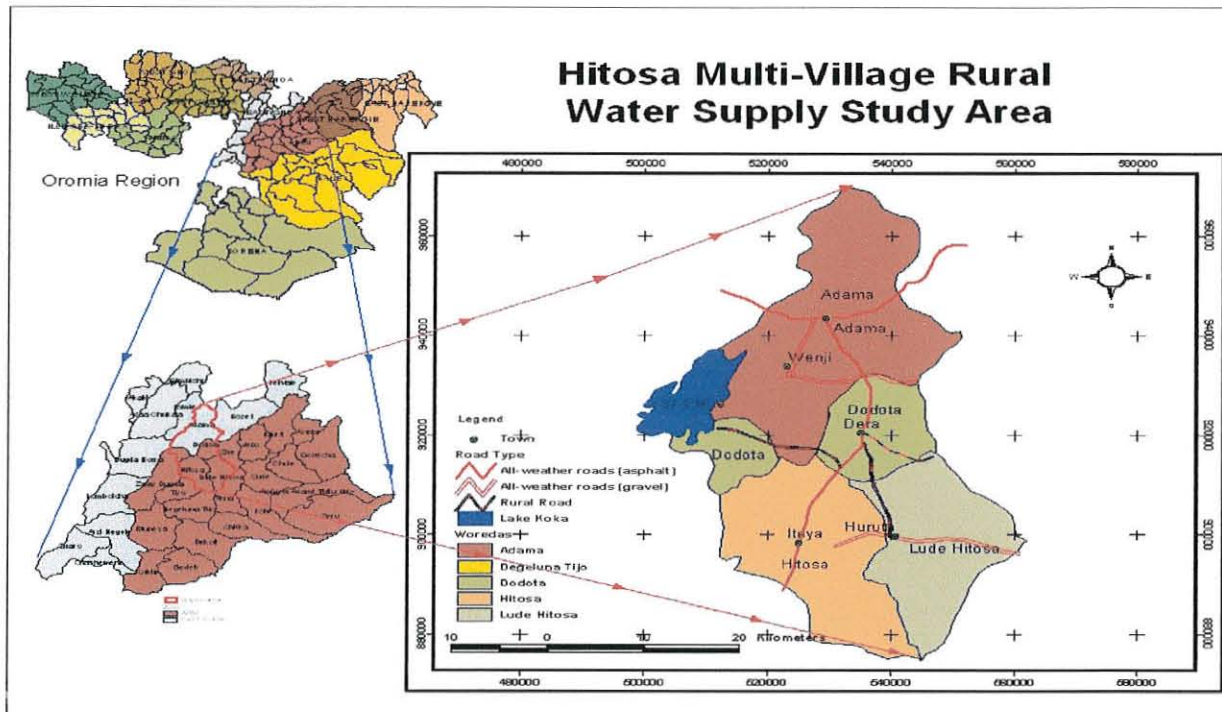
##### 3.1.1 Location

Oromia is one of the largest regional states in the Federal Democratic Republic of Ethiopia. It is located between 3°N and 12°N latitude and 34° E and 44° E longitude. The estimated area of Oromia is about 357,770 km<sup>2</sup> with the total population of 27.1 millions, of which 87.8% are living in the rural areas while the rest (12.2%) are urban dwellers. The regional population accounts for 36.7 percent of the total population of the country (CSA, 2008). It is bordering with all regional states of the country, except Tigray nationally and the Sudan and Kenya internationally (OWRB, 2006). The region has an estimated surface water potential of 58 billion M<sup>3</sup>/year and renewable groundwater potentials of 23.5 billion M<sup>3</sup>. The groundwater covers about 62% of the sources and the remaining 38 % of the sources is surface water (OWRB, 2006).

Though the region has abandoned water resources, due to economic drawbacks, infrastructure and lack of proper management system in the sector, as per the reviewed UAP the water supply coverage achieved so far is about 52 % (MoWR, 2009a). The information implied that half of the population living in the region needs further effort to provide potable water supply.

This study was conducted in *Hitosa wereda*, one of the 24 *Weredas* in Arsi zone and 180 weredas in Oromia National Regional State. It is located at south east of Addis Ababa at about 160 km and 25 km from northeast of Asella, the capital of Arsi zone. The study wereda shares boundaries with Dodota in the North, Yatiyo in the South, Zewya in the West and Lode Hitosa weredas in the East.





### 3.1.2 Climate and topography

Hitosa Wereda has three climatic zones. The agro-ecology of the area comprises 27 percent highland (dega), 31 percent midland (weyena dega) and the rest (41percent) is lowland (kola). The altitude of the wereda ranges from 1700m a.m.s.l. to 4170m a.m.s.l. The average temperature of the study wereda varies between 20.50 C and 270 C with minimum annual rainfall of 800mm. The area as a whole has very few reliable water sources. The lowlands below 1900m are hot and very dry with no permanent surface water, with large earth dams as the main source of water. The middle level plains of 2,200m elevation are extensively farmed for wheat, barley and oil producing crops (WELL, 1998).

### 3.1.3 Population and economic activity

The total population of the study wereda, Hitosa, is about 124,179. The sex composition is 62,335 men and 61,734 women, out of the total population 85 % lives in rural areas (CSA, 2008: 68). The Wereda has a total land area of 1141.01 km<sup>2</sup>. Agriculture is the dominant livelihood strategy of the majority of the population and it is one of the most agriculturally productive

weredas in Oromia region. Crops like wheat, barley, maize and teff are widely cultivated in the area.

#### 3.1.4 Water supply system

The majority of Hitosa multi-village community managed water supply system users are from Hitosa wereda. Previously, before the development of multi-village system, the community collected their water from a few shallow rivers and one spring. The water supply coverage of the study wereda is 67 percent.

### **3.2 The Research Methodology**

The study explores the challenge and prospect of Hitosa MV Community Managed RWS system towards sustainability. In due course, the assessment was focused on factors that either facilitate or impede the WS system sustainability. Thus, the study investigated the community and social, financial, technical, institutional and legal as well as environmental issues based on the developed conceptual framework. The approach employed both quantitative and qualitative methods.

#### 3.2.1 Samples and Sampling procedure

The study employed multistage sampling techniques i.e. a combination of purposive, stratified and simple random sampling techniques to select sample kebeles, surveyed households, focus group participants and key informants to generate pertinent information for the research.

Hitosa Water Supply System was purposefully selected because it is one of the largest MV community managed RWS system in the region, it serves for one and half decade in which the lifetime of the system helps to clearly investigate the key sustainability factors holistically and accessibility and availability of records. The system is serving about 22 kebeles (19 rural and 3 urban) of the total 103 kebeles found in four weredas. However, this study only focuses on the rural beneficiaries. The major reasons are: the rural kebeles alone representing 86 percent of the system users; the scattered nature of settlement has tremendous effect on the coverage and sustainability unlike the urban areas where the majority access water through public taps, high

environmental interferences due to agriculture and human activities; and the location of the source is also found in the rural area. Thus, the rural areas are in the disadvantaged position in terms of accessing water supply and influencing the sustainable use of the system. To this end, the following procedures were followed. First, the beneficiary kebeles were stratified by agro-climatic zone as highland (*Dega*), midland (*Weynadega*), and lowland (*Kola*). This is because agro-ecological variation has a significant impact on the degree of demand, quantity of water consumption by users and availability of alternative water sources. Accordingly, the number of beneficiary kebeles found in the highland, midland and lowland agro-climatic zones are 4, 11 and 7, respectively.

Second, 6 kebeles (32%) were purposefully determined for the study considering the relative homogeneity of the beneficiaries in the particular agro-ecologies, the available time, cost and spatially scattered nature of the beneficiary kebeles and proportionally distributed among the three strata. Then, the sample kebele from each stratum were selected by using simple random sampling method. Finally, taking into account the cost, available time and population homogeneity, 10 percent of the sample sizes are assumed to be representative for the rest of beneficiaries from each sampled kebele. The sample households were selected using simple random sampling technique from the list of weredas and Hitosa Water Administration Office beneficiary records. Accordingly, a total of 222 household heads of which 74 % male and 26 % female headed households were selected for the household survey. The detail of beneficiary weredas, kebeles and sample households are vividly depicted in the table 3-1 below.

**Table 3-1 Wereda, beneficiary kebele, sample kebele and sample HH**

Name of wereda	Total kebele	Rural	Urban	Beneficiary Kebeles	Sample kebele	No. of sample beneficiary HH	Sample beneficiaries HH (10%)
Lode Hitosa	22	19	3	4 (1urban)	1	350	35
Hitosa	25	23	2	11 (2 urban)	1	426	42
					1	300	30
					1	300	31
Dodota	12	10	2	3	1	420	42
Adama	44	37	7	4	1	420	42
<b>Total</b>	<b>103</b>	<b>89</b>	<b>14</b>	<b>22</b>	<b>6</b>	<b>2216</b>	<b>222</b>

Source: Hitosa WAO, Wereda Administration Office and HH survey, 2010

### 3.2.2 Data Type and Sources

Mixed types of data collection techniques are adopted to gather sufficient and relevant information for this study. The quantitative techniques are used to obtain relevant information from the sampled households with emphasis on information concerning the social, financial, institutional and legal issues, technical aspect and environmental factors, and dynamics of the sustainability of the water supply systems. The qualitative techniques are also employed to gather evidences and to supplement the quantitative information so far obtained. This includes the institutional set-up of the community, the status, practices, challenges and the prospects of the Hitosa MV RWS system.

The sources of the information involve both primary and secondary types. The secondary sources of data are document reviews, various reports, case studies, internet sources, journals, books and other related documents at the wereda, zonal and regional levels. The types of information obtained include socio-economic data, climate and topography, profiles of the beneficiaries and maps. Triangulation has been made within and across the data sources to improve the validity and reliability of the data.

The other source of data was primary information to get first hand evidence about the topic under investigation. The sources were key informants, focus groups, fields and sampled households through instruments such as key informant interviews, focus group discussions, field observations and household survey. The details are discussed hereunder.

#### 3.2.2.1 Key Informant Interview/KII/

Key informant interviews were conducted with different experienced experts and individuals at different levels of government and non-government organizations. These include Oromia Water Resources Bureau rural water supply expert, at regional level, head of Water Supply and Sanitation bureau at zone and wereda levels, and WaterAid-Ethiopia. Furthermore, six local elders at each beneficiary Kebele were interviewed to obtain a local expertise, experiences and practices of the community. The discussion points were broadly focused on issues like the

existing water supply conditions, the capacity of the water committees, water management board and water administration office staffs, management systems, different practices and challenges, lessons and mitigation measures in relation to the key sustainability factors.

### **3.2.2.2 Focus group discussion (FGD)**

Focus group discussions were employed to complement the findings of primary and secondary information and to have an in depth understanding of the social dynamics and perceptions of beneficiaries on the water supply systems. In general, about 10 FGDs were conducted with beneficiaries, members of the water management board, relevant wereda government institutions, water management committee members, women groups and water attendants. Each group constitutes 8-10 members.

### **3.2.2.3 Observation**

Personal observation and transect walk was also made to have an insight about the functioning and performance of the water supply systems and to cross-check with other sources of information. While walking down the villages with the local leader and other interested beneficiaries, informal discussions were made with the group, water attendants and on spot water users. Moreover, pictures that are relevant to the study were taken.

### **3.2.2.4 Household survey**

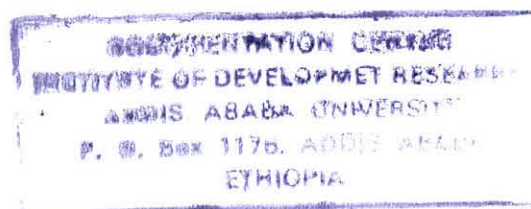
This instrument is employed to collect detailed information from sampled households. Structured and semi-structured survey questionnaires were prepared to gather both quantitative and qualitative data from the sample beneficiary households. The data captured through this instruments are the demographic characteristics of sample households, household income level, livelihood, community and social factors (community participation, access and reliability of potable water and consumption, availability of alternative water source, sense of ownership, efficiency of the service and satisfaction, among others) and financial issues (financial management model, beneficiary willingness and ability to pay, system of revenue collection & efficiency, ability of covering O&M cost). In addition, technology and related factors (type of technology, spare part availability, accessibility and costs, adequacy of technical staff and their

capacity ), institutional and legal issues (efficiency of water board, water committee and water administrative office, type and level of support from different potential stakeholders), and environmental factors (water source reliability, potable water quality and water source protection).

In order to administer the household survey questionnaires, nine experienced enumerators were selected from wereda administrative offices who are currently serving as a community and social affairs organizers. Intensive training on the principles and characteristics of every question in the household survey questionnaires were also given for two days. The household survey questionnaire was pre-tested before the actual work and corrections were also made accordingly. Throughout the process, the researcher has been closely following up the data collection.

### 3.2.3 Method of Data Analysis

Various data generated through quantitative and qualitative methods were analyzed using different techniques. The primary data collected from household survey were edited, coded and labeled. Then, the data entered in the Statistical Package for Social Scientists (SPSS) software for analysis. Descriptive statistics like mean, frequencies, percentage, ranges, averages, standard deviations and others were used for data analysis. The qualitative information drawn from FGD, KII and observation were classified into different categories, checked and verified to identify regularities and patterns of different issues. Moreover, the data collected from different secondary sources were also reviewed to underpin different information gathered through HH survey, FGD and KII. Triangulation was used to crosscheck reliability and consistency of various sources of information. The key findings of the study were presented in the form of narration, graphs, diagrams, charts and tables. Pictures were also supplemented to the study outcome where appropriate.



## CHAPTER FOUR

### 4 Household Socio-economic Characteristics

#### 4.1 Characteristics of the sample households

The household survey was carried out in six rural sample kebeles. A total of 222 household heads were interviewed. Of the total sample household heads 16, 46 and 38 percent are living in highland, midland, and lowland, respectively. The evidences show about half of the beneficiaries are found in the midland (Hitosa wereda). The proportion of sample households taken from each sample kebeles is depicted in table 4-1.

**Table 4-1 Proportion of households from each sample kebele by agro-ecology**

Agro-ecology	Wereda	Kebele	Frequency	%
Highland	Lode Hitosa Wereda	Tulu Yambo	35	16
		Hate Handode	30	14
Midland	Hitosa Wereda	Iteya Shaki	31	14
		Boru Lencha	42	19
		Dodota Alem	42	19
Lowland	Dodota Wereda	Dodota Alem	42	19
	Adama Wereda	Bekoji Dewero	42	19
<b>Grand Total</b>			<b>222</b>	<b>100</b>

*Source: Household Survey, 2010*

#### 4.1.1 Sex, Age, Ethnic and Religious Composition

The sample HH survey revealed that 74 percent were male and 26 percent were female headed households. The sample involved few female headed households because of the existing socio-economic reality and the status of women in rural areas. The mean age of the household heads is 43 years. The minimum and the maximum age of the household heads are 22 and 80 years, respectively. Of the sample household heads, 97 percent were under the age of 64 years. Concerning ethnicity, the Oromos are the dominant ethnic groups consisting of 78 percent of the total samples followed by Amhara (21.5%) and others share (0.5%). Furthermore, 60 percent of

the respondents were followers of Islam and the remaining 39 percent are orthodox and 1 percent Catholic Christians. The details are portrayed in the table 4-2 below.

**Table 4-2 Sex, Age, Ethnic and Religious composition of the sample HH head**

Indicator		Agro-ecology (%)			Frequency	Group Total (%)
		Highland	Midland	Lowland		
Sex	Male	71	69	81	164	74
	Female	29	31	19	58	26
	Total	100	100	100	222	100
Age	15-64 years	97	96	98	215	97
	> 64 years	3	4	2	7	3
	Total	100	100	100	222	100
Ethnicity	Oromo	26	79	99	173	78
	Amhara	71	21	1	48	21.5
	Others	3			1	0.5
	Total	100	100	100	222	100
Religion	Orthodox	100	73	27	133	60
	Muslim		27	70	87	39
	Catholic			3	2	1
	Total	100	100	100	222	100

Source: Household Survey, 2010

#### 4.1.2 Marital Status and Family Size

With regard to marital status, 79.7 percent are currently married, 11.7 percent are widowed and the rest are either divorced (5.4 percent) or not engaged (3.2 percent) in any form of marital conditions. The total population of the respondents is estimated at 1,404, with an average family size of 6.3. Agro-ecological distribution of population comprises as: 21.1, 40.8 and 38.1 percent in highland, midland and lowland, respectively. Of which 50.4 percent are male and the remaining 49.6 percent are female with a sex ratio of 0.98. Children of under age of 15 constitute 43.7 percent whereas, the rest age groups accounted for 56.3 percent. Table 4-3 shows the detail.

**Table 4-3 Marital Status and Family Size (%)**

Description	Agro-ecology			Frequency	Group Total
	Highland	Midland	Lowland		
<b>Marital Status</b>					
Single		4.9	2.4	7	3.2
Married	91.4	72.8	83.3	177	79.7
Widow		18.4	8.3	26	11.7
Divorce	8.6	3.9	6.0	12	5.4
Group Total	100	100	100	222	100
<b>Family size</b>					
< 4	8.6	27.2	19.0	47	21.2
4 - 8	62.9	58.3	65.5	137	61.7
> 8	28.6	14.6	15.5	38	17.1
Group Total	100	100	100	222	100

Source: Household Survey, 2010

#### 4.1.3 Literacy Status

Of the total surveyed households, the majority (83.6%) is literate of which about a quarter (25.7%) completed grade 9 and above, 43 percent attend primary education and 15 percent are able to read and write. Out of 16.4 illiterate households, female headed households are higher than male headed households. The proportion of female headed households who attended higher level of education is also lower than male headed households. This implies females were dropped out from school than male which is mainly due to social, economical and cultural factors. Currently, 22 percent of the households' members are attending school (12 percent are male and 10 percent are female). Table 4-4 describe the detail.

**Table 4-4 Literacy status of the sample household heads by agro-ecological category (%)**

Literacy Status	Agro-ecology			Group Total	Male	Female
	Highland	Midland	Lowland			
Unable to read & write	17.1	22.2	8.8	16.4	10.1	33.9
Able to read and write	11.4	16.2	15	15	12	23.2
First cycle (1-4)	17.1	7.1	15	11.7	13.9	5.4
Second cycle (5-8)	45.7	28.3	28.8	31.3	35.4	19.6
High school (9 - 12)	8.6	25.3	20	20.6	22.2	16.1
College and above		1	12.5	5.1	6.3	1.8
Group Total	100	100	100	100	100	100

Source: Household Survey, 2010

#### 4.1.4 Occupations and Income Sources of the Household

Agriculture is the dominant livelihood strategy for the majority of the sample households. However, the households generate their income from more than one source. Prominently, 91 percent of the households are engaged in agriculture (crop and livestock production), 2.6 percent are government employees, and the rest are engaged in wage employment and other activities. Moreover, the income sources of the household were surveyed. The survey focused on annual cash income because most of the household income is generated from agriculture. As it is difficult to get income related data at the household level, care has been taken in collecting and interpreting. The survey data indicated that, the mean income of the household heads is about 889 birr per month. As per the agro-ecological data, the mean income of the surveyed households in highland, midland and lowland is about 573, 1064 and 808 birr per month, respectively. The minimum and the maximum monthly income of the sample household is 83 and 3750 birr. The data shows income distribution inequalities which could be due to the agro-ecological setting, land size, amount of crop and animal production and family size. It should be noted from the previous discussion that the average family size is 6.3 person per household. Table 4-5 clearly shows the detail.

**Table 4-5 Mean, minimum and maximum monthly income, income category & family size**

Description	Agro-ecology			Group Total
	Highland	Midland	Lowland	
Mean	573	1064	808	889
Minimum	83	85	83	83
Maximum	1250	3750	2164	3750
StdDev	304	678	356	554
Income category				
< 500	54.3	20.6	22.9	26.8
501-1000	34.3	43.1	56.6	46.8
1001-1500	11.4	15.7	15.7	15
>1500		20.6	4.8	11.4
Group Total	100	100	100	100
Income category	Family size category			Group Total
	< 4	4 - 8	> 8	
< 500	44.7	23.7	15.8	26.8
501-1000	51.1	47.4	39.5	46.8
1001-1500	4.3	16.3	23.7	15
>1500		12.6	21.1	11.4
Group Total	100	100	100	100

Source: Household Survey, 2010

## CHAPTER FIVE

### 5 Challenges and Prospects of Hitosa MV WS System

#### 5.1 Existing water supply condition

The water supply for the sample kebeles is from two protected and developed springs located at the head of the water course of Burkitu, a perennial spring in Lide Hitosa wereda. The water is distributed through 140km of pipelines to beneficiary kebeles. Of the total samples that have access to this water sources, 83 percent were served by public taps and 17 percent owned private yard connections.

In order to know the existing water supply source condition, the household survey assessed the beneficiaries' main source of water along with the purpose of utilization. The finding reveals that the majority of the beneficiaries are using piped water source either from individual yard connection (private tap) or public tap for the purpose of drinking and cooking. Similarly, though the percentage vary by agro-ecology, the majority of the household use piped water source for the purposes of bathing (95%), cloth washing (82%), washing utilities (92%) and livestock (64%). The agro-ecological disaggregated data indicated that beneficiaries living in highland area use unprotected springs and rivers for bathing (34%), cloth washing (69%), washing utilities (52%), and livestock (94%), respectively.

Thus, the majority of the beneficiaries are using the protected spring for all domestic purposes. However, unprotected springs and rivers are also an alternative water sources for highland dwellers while midland and lowland beneficiaries are using pond mainly for livestock only at rainy season. Table 5-1 shows the detail.

**Table 5-1 Source of water supply for various domestic purposes**

Description		Agro-ecology			Group
		Highland	Midland	Lowland	
Source of water for drinking	Piped connection own	17.1	27.2	3.6	16.7
	Public fountain	82.9	72.8	96.4	83.3
Group Total		100	100	100	100
Source of water for cooking	Piped connection own	17.1	27.2	3.6	16.7
	Public fountain	82.9	72.8	96.4	83.3
Group Total		100	100	100	100
Source of water for bathing	Piped connection own	17.1	27.2	3.6	16.7
	Public fountain	48.6	72.8	96.4	77.9
	Spring unprotected	14.3			2.3
	River/stream	20.0			3.2
Group Total		100	100	100	100
Source of water for washing cloths	Piped connection own	17.1	27.2	3.6	16.7
	Public fountain	14.3	72.8	76.2	64.9
	Pond			20.2	7.7
	Spring unprotected	17.1			2.7
	River/stream	51.4			8.1
Group Total		100	100	100	100
Source of water for washing utilities and others	Piped connection own	17.1	27.2	3.6	16.7
	Public fountain	31.4	72.8	96.4	75.2
	Spring unprotected	8.6			1.4
	River/stream	42.9			6.8
Group Total		100	100	100	100
Source of water for livestock	Piped connection own		22.3	3.6	11.7
	Public fountain	5.7	60.2	60.7	51.8
	Pond		4.9	35.7	15.8
	Spring unprotected	40.0			6.3
	River/stream	54.3	12.6		14.4
Group Total		100	100	100	100

Source: Household Survey, 2010

### 5.1.1 Population served and type of water supply connection

Hitosa water supply system is designed for 15 years to serve about 71,843 people with 25 liters per day. Though operation of the system started in 1994, the physical implementation of the system was fully completed in 1995 (WA, 1998). Data regarding the total number of beneficiaries vary in different studies. For instance, the data from wereda water administration office indicated that the system serves about 120, 000 population. While the study carried out in

2009 for the purpose of new water source development estimated the beneficiaries about 85,000 (WAO, 2009). Of the beneficiaries about 86 percent are found in rural areas.

In line with this, the researcher gathered the number of beneficiary household from different sources like inventory work carried out by the WaterAid, WAO and from the beneficiary kebeles administrative offices. Accordingly, the current available data indicated that a total population of 84,315 benefited from the WS system. However, the total beneficiaries could be above the expected. At present, there are 157 water points, 2,496 private and 96 institutional connections. About 89 percent of the public tap and 28 percent of private connection are found in rural areas. The water supply coverage is estimated at about 67 percent (WAO, 2010). The study has also come across that 185 (83.3 %) of the surveyed households are public tap users and 37 (16.7%) owned private yard connections. Among the total public tap users, 44 percent are found in lowland while the rest 40 and 16 percent are in midland and highland areas, respectively. In the same token, 76 percent of the private connections are found in the midlands, 16 percent in the highlands and the remaining 8 percent are found in the lowlands. Table 5-2 indicates the detail.

**Table 5-2 Sample beneficiaries by types of water source use**

Agro-ecology	Sample kebele	Individual yard connection		Public fountain users		Group Total	
		Frequency	%	Frequency	%	Frequency	%
Highland	Tulu Yambo	6	16.2	29	15.7	35	15.8
Midland	Hate Handode	8	21.6	22	11.9	30	13.5
	Iteya Shaki	10	27.0	21	11.4	31	14.0
	Boru Lencha	10	27.0	32	17.3	42	18.9
Lowland	Dodota Alem			42	22.7	42	18.9
	Bekoji Dewero	3	8.1	39	21.1	42	18.9
Group Total		37	100	185	100	222	100

Source: Household Survey, 2010

The mean water consumption per capita per day is 15 liter with a minimum of 4 liter and a maximum of 50 liter which is almost similar with the study conducted by WA-Ethiopia in 2008. However, it varies with the agro-ecological zone i.e. the average per capita water consumption in highland, midland and lowland beneficiaries is 8.3, 16.5 and 16 liter, respectively. Availability of alternative water sources could be the main reason for the level of water consumption. For

instance, the midland and lowland dwellers have limited alternative water resources compared to highland settlers. Table 5-3 below shows the daily per capita water consumption of sample households by agro-ecological zone.

**Table 5-3 Water consumption per capita per day by types of water source & agro-ecology**

Description		Agro-ecology			Group Total
		Highland	Midland	Lowland	
Daily Per capita water consumption in Public tap users	Mean	8.1	16.2	15.6	14.7
	Minimum	3.6	5.7	4	3.6
	Maximum	13	50	30	50
	StdDev	2.9	5.4	4.5	5.5
Daily Per capita water consumption in Private yard connection	Mean	9.1	17	14.9	15.6
	Minimum	4.4	12.7	14.3	4.4
	Maximum	15	20	16	20
	StdDev	4.4	2.2	0.9	3.9

Source: Household Survey, 2010

Several studies revealed that water consumption is a function of HH income, access of alternative water sources, family size, and distance of the potable water source and literacy status. Likewise, the result of this study indicated that as family size and income increases the per capita water consumption also increases. As indicated in table below, the per capita water consumption of households with family size of less than four is by half less than larger family size. Similarly, households with the highest income consume more water compared to those with the lowest income. Literacy and educational level have negligibly significant relation in influencing the level of per capita water consumption.

However, currently, there is a significant shortage of clean water especially in midland and lowland area where there is no other alternative sources of water because of the increase of beneficiaries from time to time. This is further aggravated by an inadequacy of public tap numbers compared to the size of beneficiaries and short term (i.e. 2-4 hour per day) availability of water. This minimizes the usually observed water consumption difference between private yard connection and public points water users. Tables 5-4 depict the detail.

**Table 5-4 The relationship between family size and income with level of water consumption (%)**

Daily water collection (jerry can)	Family size category			Group Total	
	< 4	4 - 8	> 8		
< 2	44.4	10	23.5	20.6	
2 - 5	55.6	64.5	32.4	56.6	
5 - 8		25.5	38.2	21.7	
> 8			5.9	1.1	
Group Total	100	100	100	100	
Monthly income category	Daily water collection by jerry can				Group Total
	< 2	2 - 5	5 - 8	> 8	
<500	51.3	31.4	4.9		29.4
500-1000	43.6	46.7	53.7	50	47.6
1001-1500	5.1	15.2	22	50	15
>1500		6.7	19.5		8
Group Total	100	100	100	100	100

Source: Household Survey, 2010

#### 5.1.2 Distance and time to collect water

A distance to safe water point is one of the key indicators to measure the water supply system service accessibility. This is because, even though provision of water with an acceptable quality is essential factor, distance and effort involved in collecting water are the major decisive elements for the quantity of water consumption particularly in rural areas. Evidences revealed that even water supply gravity systems developed in a good quality were failed after two years since the traditional water source was nearer than the potable water points (DFID, 1998). Hence, a good source of water is one that can be collected with relatively short time and located within a reasonable distance. For instance, a desirable access to water in rural Ethiopia is 15 liter per capital within a distance of 1.5 km (MoWR, 2009a).

With this regard, the survey indicated that 73 percent of the public tap users should travel; less than 500 meters and the remaining 27% travel more than 500 meters to access the nearest public tap. Furthermore, 53 percent of the beneficiaries spend 30 to 60 minutes and the rest 47 percent spend less than 30 minutes to fetch water from the public tap including the waiting time at round

trip. Factors like dysfunctional of public taps, inadequacy of water availability and abandoned of public taps due to different reasons are some of the major constraints that make the beneficiaries to travel longer distance than the expected time considered during the design period. Table 5-5 shows the detail.

**Table 5-5 Distance and time taken to collect water from the Public tap by type of agro-ecology**

Description	Agro-ecology						Group Total	
	Highland		Midland		Lowland			
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
<b>Distance of respondent's residence to the improved water source</b>								
Public tap found up to 500 meter	29	100	61	81.3	46	56.8	136	73.5
Public tap found > 500 meter			14	18.7	35	43.2	49	26.5
Group Total	29	100	75	100	81	100	185	100
<b>Estimated time at round trip</b>								
Less than 30 minutes	18	62.1	53	70.7	16	19.8	87	47
30 minutes - 1 hour	11	37.9	22	29.3	65	80.2	98	53
Group Total	29	100	75	100	81	100	185	100

Source: Household Survey, 2010

### 5.1.3 Responsibility for daily water collection activity

It is public figure that fetching and carrying of water is part of a daily routine of millions of women around the world. They often carry a water container which typically holds about 20 liters or weights 20 kilograms. Carrying such a heavy weight on the head, back, or hip has severe health implications for women like backache and joint pains. In extreme cases, curvature of the spine and pelvic deformities result, creating complications in pregnancy and childbirth (WaterAid, 1996). It has also found that collecting water is not only physically stressful but also time consuming. Women in rural Africa often walk ten miles or more every day to fetch water. Moreover, children, particularly girls are required to help their mothers with water collection and other domestic tasks. This means they are not able to attend school and often have little time left for play. For evidence, studies conducted by Intermon Oxfam (2005) indicated that Ethiopian rural women often have to walk five hours a day to fetch water and girls often miss school.

The research finding is consistent with the widely accepted facts. Accordingly, 69 percent of the respondents replied that wife (40.5%), adult female (23.2%) and children female (5.4%) are responsible to collect water. Contribution of adult and male children and husbands in this activity account 16.8, 13 and 1 percent, respectively. Hence, women, girls and female children are burdened in carrying water containers over a long distance every day. Relieving them of that burden by constructing clean and adequate water with a reasonable distance is a laudable aim. Table 5-6 describe the proportion of household members responsibilities in collecting water from the water source.

**Table 5-6 Proportion of household member responsible to fetch water**

HH members often responsible to fetch water	Agro-ecology						Group Total	
	Highland		Midland		Lowland			
	Freq.	%	Freq.	%	Freq.	%	Freq.	Col %
Adult male	6	20.7	16	21.3	9	11.1	31	16.8
Adult female	12	41.4	18	24.0	13	16.0	43	23.2
Children male	4	13.8	11	14.7	9	11.1	24	13.0
Children female			10	13.3			10	5.4
Wife	7	24.1	19	25.3	49	60.5	75	40.5
Husband			1	1.3	1	1.2	2	1.1
Group Total	29	100	75	100	81	100	185	100

*Source: Household Survey, 2010*

Furthermore, as women play a pivotal role in the provision, management, and safeguarding of water, involving women in decision-making activities have the greatest impact on the sustainability of WS&S programs, and there is a need to bring them into play at all levels.

**Figure 5-1 Women, children female and male collecting water from public tap**



*Source: Field Observation, 2010*

Therefore, the current condition of Hitosa MV RWS system suggests that there is shortage of water supply as population is growing over the potential of system. This, in turn coupled with other factors, forced women, girls and children to travel longer distance and spend more time to collect water and carrying heavy containers. Thus, a closer availability of water supply can reduce the burden of the women and girls' day off from school.

## **5.2 Status of Hitosa Multi-village Rural Water Supply systems**

It is noted that the dismal situation created by inadequate access to WSS services is aggravated by large numbers of broken down or malfunctioning water services. The health benefits from an improved water supply can be destroyed overnight if people are forced to revert to contaminated water sources when the public supply systems fail. A capital investment in new services is wasted unless there is adequate provision of the reliable operation and maintenance of the installed facilities.

In case of multi-village water supply systems, in addition to huge investment relative to other types of water supply system, the management model demands continuous follow up, and coordination and cooperation among various user groups due to longer pipeline and larger population coverage (WB, 2001). Thus, in order to benefit from the economies of scale, higher levels of service and feasible and long-term solution, the functionality rate of multi-village water supply system could be high.

According to information obtained from WA (1998), the WS system had 122 public water points and 143 private connections in 1998. Currently, it has 157 public water points and 2,496 individual private connections (WAO, 2010). Among the total public water points 89 percent are found in rural areas while the rest 11 percent are constructed for urban dwellers. Furthermore, the information indicated that there are about 30 dysfunctional public water points which all are found in rural areas. The non-functional public taps accounts 21.6 percent from the total and almost all functional public taps are serving partially because half of the water taps are out of use. Observation also proved that some of the public taps are either dysfunctional or partially functional.

According to the field survey, 81 percent of public tap users collect water from their residence nearby water points while the rest (19%) use the adjacent areas water taps. This makes the beneficiaries to travel longer distance and spend more time. A follow up question was asked to know when the public taps became non-functional. In this case, the majority (62%) of the respondents estimated at more than 2 years while the remaining (38%) replied 1-2 years. FGDs held with sample beneficiary kebeles and local informants have also explained that some of public taps were nonfunctional more than five years ago. A lack of good quality spare parts, inadequate training for the technicians and technical drawbacks during the construction phase are some of the reasons given by the WAO. Table 5-7 describes the detail.

**Table 5-7 Percentage and time of dysfunctional public taps in sample beneficiary kebeles**

Description		Agro-ecology						Group Total	
		Highland		Midland		Lowland			
		Freq.	%	Freq.	%	Freq.	%	Freq.	%
Whether the public taps are working	Yes	24	68.6	80	77.7	76	90.5	180	81.1
	No	11	31.4	23	22.3	8	9.5	42	18.9
Group Total		35	100	103	100	84	100	222	100
The time when the public taps are non-functional	1 - 2 years	4	36.4	9	39.1	3	37.5	16	38.1
	> 2 years	7	63.6	14	60.9	5	62.5	26	61.9
Group Total		11	100	23	100	8	100	42	100

Source: Household Survey, 2010

Unlike the point water source supply system, one of the predicaments of multi-village systems are the probability of increasing pipeline maintenance cost and water leakage due to lengthy pipeline that cover large population. Some of the empirical evidence confirms that since much of the system is located outside the served village, physical losses are generally higher in multi-village systems than in point water source (WB, 2001). This could be one of the other causes for inadequacy of water reached to the users and also a loss of income for the service giving sector.

With this regard, of the total survey respondents, 90 percent were reported the incidence of service interruption due to pipeline burst. Concerning with frequency, majority (98%) of the surveyed household replied as the interruption is occurred sometimes. Furthermore, question was also raised to the beneficiaries to know for how long the problem stayed to come to functional. In this case, about 64.8 percent estimated at less than one month followed by 1-3 months (21.6%) and a few (13.6%) do not have any idea about it. For the detail see table 5-8.

In order to examine this issue, the study has also made a thorough discussion with beneficiaries, WAO, wereda water desk, regional water resources bureau and WaterAid-Ethiopia. The discussions disclosed that the breakages of pipeline were often happened previously due to

human as well as technical problems. Recently, the problem is minimized as the community took actions to control and watch the distribution pipelines within their village and penalize the guilty individuals. Though the problem is relatively managed at village level, misuse of pipeline that passes along the borderline (Arsi and East Shewa zones) is still demanding a permanent solution. Furthermore, the WAO informed that in September 2009 the main pipeline that transport water from the highland to midland and lowland areas was broken. During that time, a significant proportion of the beneficiaries were suffered by lack of clean water as well as income that could be collected was lost. It has been notified that inappropriate laying of pipelines at the required level, nature of PVC pipeline and lack of cattle trough especially in lowland areas are some of the major causes of the problem. This implied that the management of multi-village water supply system demand effective follow up, cooperation and coordination among beneficiaries as well as concerned potential stakeholders.

**Table 5-8 Extent of pipeline breakage and its frequency by type of agro-ecology**

Description		Agro-ecology						Group Total	
		Highland		Midland		Lowland			
		Freq.	%	Freq.	%	Freq.	%	Freq.	%
Whether the improved water supply pipelines have a problem	Yes	35	100.0	85	83	79	94	199	90
	No			18	17.5	5	6.0	23	10.4
Group Total		35	100	103	100	84	100	222	100
Frequency of the problem	Most of the time	4	11.4	1	1.2			5	2.5
	Sometimes	31	88.6	84	98.8	79	100.0	194	97.5
Group Total		35	100	85	100	79	100	199	100
Average time the pipeline stayed non- functional	< one month	23	65.7	65	76.5	41	51.9	129	64.8
	1 - 3 months	9	25.7	5	5.9	29	36.7	43	21.6
	I do not know	3	8.6	15	17.6	9	11.4	27	13.6
Group Total		35	100	85	100	79	100	199	100

Source: Household Survey, 2010

### **5.3 Factors Affecting Multi-Village Rural Water Supply System Sustainability**

The intensive literature review in Chapter two indicates multi-village rural piped water supply system sustainability is affected by a number of factors. These are broadly categorized as: community and social issues, financial & related matters, institutional and legal aspects, technology and environmental factors. These factors are also discussed in detail based on the results of field surveys, FGDs, KIIs and personal observations.

#### **5.3.1 Community and related factors**

The most persuasive argument in support of the importance of demand for project sustainability is that an expression of demand is an expression of value. A person's willingness to give valued resources in an exchange for a service indicates that the person values that service. If this value at the community level is greater than or equal to the cost of providing and maintaining the service, one can assume the community could be willing and able to maintain the service. In a community where the value placed on the service is less, it is likely that the community will not be willing to maintain the system over the long term (Garn 1997, Khan 1997). This implies that water-supply services which are more demand-responsive are more likely to be sustainable at the community level than services which are less demand-responsive.

Development of multi-village water supply system is basically recommended where the area is water scarce, water is contaminated and/or the communities' water demand is at the higher levels of service than local water resources can provide. This principle markedly demonstrated that community demand is a key factor for multi-village water supply system sustainability. Considering its importance, the study used different indicators to assess the demand of the community through parameters like project initiation, contribution, consumer satisfaction and sense of ownership.

### 5.3.1.1 Project Initiation

Project initiation refers to the degree to which community members felt responsibility to initiate the request for the water supply system in contrast to being selected by the project or government. In this regard, the studied household survey revealed that almost 50 percent of the respondents' agreed on the project initiated by the community. This is followed by the request derived in collaboration with community, government and NGO (26.6 percent); only government (12.6 percent), only NGO (5.9 percent) and community and government (5.4 percent). This shows community has a great role in the project initiation in one or in another way prior to the water supply system construction phase. Similarly, information gathered through focus group discussion further verified that those communities especially who are living in most parts of Hitosa and all parts of Dododa and Adama weredas have no other alternative water sources. The discussants further explained that they were forced to travel 5 – 15 km either to unprotected pond or river prior to the development of Hitosa MV Water Supply system.

The respondents were also asked whether the water supply system was their priority or not. Accordingly, 217 (97.7 percent) have responded that clean water is their first priority since they were suffering for long time and faced a lot of problems and only 2.3 percent were not. The latter are living in the highland agro-ecological zone and they do have alternative water sources in their locality and prioritized an access to road and emphasized the availability of agricultural inputs. Table 5-9 illustrate the percentage distribution of project initiation and prioritization by different category.

**Table 5-9 Nature of community initiation and prioritization of the improved WS system**

Description		Agro-ecology			Group
		Highland	Midland	Lowland	
Initiated the water supply project	Community	11.4	57.3	56.0	49.5
	Government	60.0	5.8	1.2	12.6
	NGO		12.6		5.9
	All in collaboration	2.9	21.4	42.9	26.6
	Community and government	25.7	2.9		5.4
	Group Total	100	100	100	100
Whether the improved WS system is their priority or not	Yes	85.7	100.0	100.0	97.7
	No	14.3			2.3
	Group Total	100	100	100	100

Source: Household Survey, 2010

During the FGD a woman at Bekoji Dewero kebele explained the level of severity of getting water prior to the development of Hitosa MV water supply system as:

*I did not remember the year but it was before we got clean water from Hitosa water supply system, in dry season, one of our relatives gave birth and we had no water to wash the baby as well as the mother. The baby cleaned with pieces of old cloth; however, it was difficult to clean the mother. Then, she hid herself from visitors for at least a week due to unpleasant smell. At that moment, often people were suffering from water borne diseases and losing a considerable productive time to fetch water. This was also the day to day practice for the community. Thus, we were forced to forward our request to get clean water to the concerned body. Even though we do not have adequate clean water, compared to our situation of some years ago, I fell ashamed even to mention now the issue of adequacy.*

A woman at Bekoji Dewero kebele, 2010

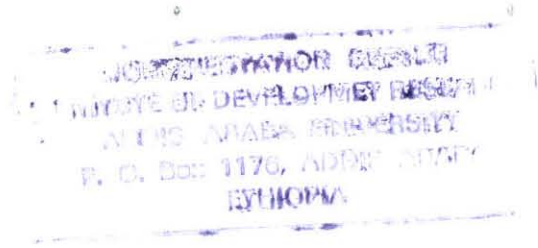


Figure 5-2 below shows the FGD held with beneficiaries living in Bekoji Dewero Kebele, the lowland part of East Shewa Zone.

**Figure 5-2: FGD at Chaka Dewereo ketena, Bekoji Dewero Kebele**



Source: Field Observation, 2010

The findings indicated that since majority of the beneficiaries suffered with shortage of water for more than a decade, they curiously communicated with each other regarding the issue. Thus, it was the community eagerness that motivates different concerned stakeholders to realize the improved water supply system.

### **5.3.1.2 Community participation**

Community participation in the WSS sector goes far beyond the traditional definition of community participation. It is much more than the provision of labour and the contribution of materials rather it is based on the concept of ownership, control and responsibility for the development processes. In order to ensure sustainability, the beneficiaries not only expected to manage their development services but also their basic responsibility for the success or failure of the water supply system. This is also clearly stated in the second Dublin Principle (1992) as water development and management should be based on a participatory approach, involving users, planners and policy makers at all levels is important. This means that decisions should be

taken at the lowest appropriate level with full public consultation and involvement of users, planners and policy makers at all levels.

Community mobilization to multi-village water supply system is an intensive work because the anticipated beneficiaries are living across different villages. Thus, in order to meet the intended objective, a number of village communities began to work together and establish a strong joint committee representative from each beneficiary village. This entails that multi-village WS systems require an active involvement of the community, coordination and cooperation between larger and diverse groups.

Recognizing the importance of community participation to water supply system sustainability, the study assessed the situations at different levels. In view of that, 99 percent of the beneficiaries participated during the development of water supply system. Moreover, the assessment of the level of community participation at different project phases indicated that 83.8 percent of the community took part during the selection of public tap sites and aligning pipeline. In this regard, majority of the communities (79.7 percent) contributed in cash i.e 35–45 birr to the initial capital investment and labour, while those households mainly living in lowland area (Dodota and Adama) (20.3%) contributed only labor. For the detail refer table 5-10.

**Table 5-10 Level of community participation prior and during the construction phase**

Description		Agro-ecology			Group Total
		Highland	Midland	Lowland	
Community participated to the development of WS system	Yes	100	100	97.6	99.1
	No			2.4	0.9
Total		100	100	100	100
Community participated during site selection to laying pipelines and public tap	Yes	80.0	81.6	88.1	83.8
	No	20.0	18.4	11.9	16.2
Total		100	100	100	100
Community contributed cash, labour & local material	Yes	91.4	95.1	56.0	79.7
Community contributed only labour	No	8.6	4.9	44.0	20.3
Group Total		100	100	100	100

Source: Household Survey, 2010

Information gathered through FGDs and KIIs have also substantiated the HH survey findings regarding the extent of beneficiary's participation prior and during the construction phase at various levels except in choosing of technology. The participation of the community during site selection for public tap and aligning the pipeline was very active because majority of the area used for this purpose was their farmland. However, the construction phase was very challenging due to the length of the pipeline (140 kms) along with the geographical nature of the area. The evidences witnessed that there were active involvements of the community prior and during the construction phase. The community contributed 17 percent of the capital cost (14% in cash and 3% in kind) (WA, 1998). Figure 5-3 shows the community participation during the water supply system construction phase.

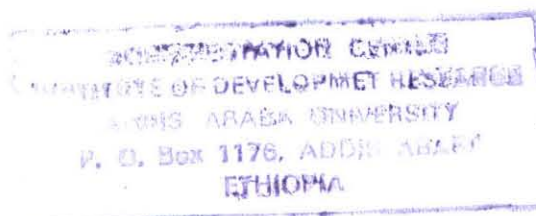
**Figure 5-3: Community participation during the water supply construction phase**



Source: WaterAid- A people's project report, 1998

### 5.3.1.3 Women's participation

Collecting of water is a back-breaking work that drains precious energy and restricts involvement in productive activities and community affairs for many women and children. On average, rural villagers spend a considerable time per day collecting water from unprotected sources. For instance, in Ethiopia, rural women often have to walk five hours a day to fetch water and girls often miss school (Intermon Oxfam, 2005). Women are the most often users, providers and managers of water in the household. Recently, it is widely accepted that their traditional role in most societies as water fetcher, cooker and leader of the household play critical



roles in water supply development project. Thus, it is crucially important to involve women at all stages of rural water supply systems studies. On the other hand, excluding women involvement in the sector has an adverse impact on project sustainability. However, the practicality of balancing the roles of women and men in water and sanitation projects is still challenging.

In this regard, 91.9 percent of the respondents replied that women had participated prior and during the construction phase at different levels. Discussion held with beneficiaries as well as the reviewed secondary data have also come up with similar finding. In this concern, women actively participated by contributing cash, labour and selection of public tap sites apart from all burdens of social and economic activities. During the establishment of water committee, out of the total seven water committee members, four were women. Whereas, in the construction phase, almost half of the trainees were women, at present, half of the water committees as well as the water management board members are women. Moreover, 81 percent of public tap attendants are women. Table 5-11 depicts the detail.

**Table 5-11 Level of women participation during pre-construction phase**

Type of participation		Agro-ecology			Group
		Highland	Midland	Lowland	
Did women participate prior to the construction phase?	Yes	94.3	91.3	91.7	91.9
	I do not know	5.7	8.7	8.3	8.1
Total		100	100	100	100
Did women participate during the selection of site location	Yes	37.1	35.9	32.1	34.7
	No	62.9	64.1	67.9	65.3
Total		100	100	100	100
Cash contribution	Yes	74.3	87.4	42.9	68.5
	No	25.7	12.6	57.1	31.5
Total		100	100	100	100
Labour contribution	Yes	100	91.3	100.0	95.9
	No		8.7		4.1
Group Total		100	100	100	100

Source: Household Survey, 2010

Regarding the level of women participation in post construction period, of the total respondent, 51.4 percent believed that women are currently active while the rest (48.6 percent) have a doubt on it. Hence, as per the survey findings, though the level of women involvement in pre-construction period was high, the circumstance is declining during the operation phase. Discussion held with WAO has also implied that the extent of water committee activities has been declining compared with the previous situations. For the detail refer table 5-12.

**Table 5-12 Level of women participation during the operational phase**

Description		Agro-ecology			Group
		Highland	Midland	Lowland	
Do you think that women actively participate at present?	Yes	51.4	48.5	54.8	51.4
	No	48.6	51.5	45.2	48.6
Total		100	100	100	100
Do you think that women participate on setting of water tariff	Yes	22.9	39.8	35.7	35.6
	No	54.3	35.9	33.3	37.8
	I do not know	22.9	24.3	31.0	26.6
Total		100.0	100.0	100.0	100.0
Do you think that women participate on O & M management?	Yes	20.0	13.6	17.9	16.2
	No	45.7	64.1	45.2	54.1
	I do not know	34.3	22.3	36.9	29.7
Total		100.0	100.0	100.0	100.0
Do you think that women participate on managerial decision?	Yes	22.9	38.8	36.9	35.6
	No	28.6	35.0	21.4	28.8
	I do not know	48.6	26.2	41.7	35.6
Group Total		100	100	100	100

Source: Household Survey, 2010

In line with this, during the FGD with water committee, one of the water committee members stated her observation as follows:

*I was selected as a water committee member two year ago without my presence. I was not disappointed by the situation because water supply issue is one of my vital concerns. Unanimously, I accepted the responsibility and start to work. However, when I came to practical duty the situation was different. Other committee members who were working with me and I did not clearly know whom to contact even in wereda water desk or in the Hitosa Water Administration Office to get an immediate response to the beneficiaries' requests. We do not have also a clear rule and guideline. Thus, I felt that we are just assigned to fulfill the number of committee member and attend the annual meeting. In general, it is very challenging to actively perform our commitment unless there is an organized working environment including basic guidelines.*

A woman from Dodota Alem Kebele, 2010

The assessment concerning the type and level of community participations were very active at all levels; however, gradually the participations are weakening. This could be due to weak communication between WAO and water committees, inadequacy of incentive to the water committee and failure of implementing the guidelines and manuals.

#### **5.3.1.4 Managing the water supply system**

The concept of community participation has gained universal acceptance during the 1980's International Drinking Water Supply and Sanitation Decade (IDWSSD). As per Nicol (2000), it marked an important institutional policy change in international development towards basing the provision of services on *demand*, rather than the conventional *supply* driven model. The essential role of local communities as the best primary manager for rural water supply systems is a strategy to reduce maintenance costs, make better use of local resources, skills and knowledge and empower local ownership of community infrastructure. Evidences recommended that communities shall be trained and supported in order to effectively perform their role and responsibility as the primary managers.

The study assessed the performance of Hitosa MV RW system water management bodies working at different levels. It found that 56.3 percent of the respondents acknowledged the good performance of Water Management Board (WMB) followed by unsatisfied (28.8%) and a few (14.9%) were a difficulty to judge. The reasons given for the weak performance of the WMB include inadequate training (37.5%), busy with other commitments (26.6%), insufficient incentive (15.6%), weak interest (7.8%) and inadequate training and incentive (6.3%). The perception of the respondents related to the performance of water administration office indicated that 60.4 percent satisfied while 29.7 and 9.9 percent replied as unsatisfactory and difficult to evaluate. Similarly, a follow up question was asked to know the reasons behind the weak performance of WAO. In this case, the justification include lack of adequate training (45.5%), lack of adequate training and attractive salary (27.3%), salary is not attractive (22.7%) and lack of interest to work (4.5%).

Moreover, the study has also examined the perception of the respondents regarding the capacity of the water committees in the water supply service activities. The result shows that, of the total respondents 30 percent are recognized for their good performance while 64 and 6 percent replied as unsatisfactory and in difficulty to guess, respectively. The major reasons given were lack of training (43%), busy with other commitment (19.7%), inadequate incentive (17.6%), have less interest (12%) and inadequate training and incentive (6.3%). Table 5-13 illustrates the detail.

**Table 5-13 Respondent's perception on performance of WAO, WC & WMB**

Description		Agro-ecology			Group Total
		Highland	Midland	Lowland	
Do you think that the WMB has adequate capacity to manage the WSS?	Yes	57.1	58.3	53.6	56.3
	No	34.3	29.1	26.2	28.8
	I do not know	8.6	12.6	20.2	14.9
Total		100	100	100	100
If no, what is/are the possible reason(s)?	Lack of adequate training	33.3	46.7	27.3	37.5
	Lack of interest	8.3	6.7	9.1	7.8
	Lack or inadequacy of incentive	16.7	16.7	13.6	15.6
	Very busy with other commitments	33.3	16.7	36.4	26.6
	Lack of adequate training & incentive	8.3	10.0		6.3
	I do not know		3.3	13.6	6.3
Total		100	100	100	100
Do you think that WAO has adequate capacity to perform their duties?	Yes	57.1	61.2	60.7	60.4
	No	42.9	33.0	20.2	29.7
	I do not know		5.8	19.0	9.9
Total		100	100	100	100
If no, what is/are the possible reason(s)?	Lack of adequate training	40.0	44.1	52.9	45.5
	Lack of interest	53.3			12.1
	No have adequate salary		41.2	47.1	33.3
	Lack of adequate training & incentive	6.7	14.7		9.1
Total		100	100	100	100
Do you think that Water Committee has adequate capacity to perform their duties?	Yes	31.4	28.2	32.1	30.2
	No	68.6	67.0	58.3	64.0
	I do not know		4.9	9.5	5.9
Total		100	100	100	100
If no, what is/are the possible reason(s)?	Lack of adequate training	20.8	38.2	60.0	43.0
	Lack of interest	16.7	14.7	6.0	12.0
	Lack or inadequacy of incentive	25.0	22.1	8.0	17.6
	Very busy with other commitments	20.8	14.7	26.0	19.7
	Lack of adequate training & incentive	16.7	10.3		7.7
Total		100	100	100	100

Source: Household Survey, 2010

Thus, findings suggested that the performance of the water management bodies are weakening through time due to inadequacy of regular training, lack of transparency, failure of implementing the guidelines and manuals and unattractive incentives and salaries.

#### **5.3.1.5 Consumer satisfaction**

Consumer satisfaction is one of the key issues in the water supply sector. Factors such as water sufficiency, reliability of water supply, trustworthiness of the water-user committees, convenient water-point location, water quality, and water pressure (flow rate) have become prime indicators of users' degree of satisfaction (Bhandari, & Grant, 2007).

The household survey assessed beneficiaries' perceptions to examine the level of consumer satisfaction in the water supply sector. As per the survey findings, about 71 percent expressed their satisfaction with the service while the rest 29 percent are not happy. The survey further categorized those disappointed households by their reason. Accordingly, among the unsatisfied surveyed households about 11.3 and 8.1 percent explained their reasons as public taps and pipelines are not maintained on time and water is not regularly available. The remaining percentage categorized as: water is often available for short period of time (5%), it has low pressure (3.2%) and a combination of maintenance problem and water not regularly available (1.8%). Furthermore, assessment has also made on the degree of water quality since it is an influential element to determine the level of consumer satisfaction. In this regard, almost all surveyed household responded as the improved water has no quality problem. The detail survey findings categorized by type of agro-ecology depicted in table 5-14 as follow.



**Table 5-14 Extent of beneficiaries' satisfaction and sense of ownership (%)**

Description		Agro-ecology			Group
		Highland	Midland	Lowland	
Level of satisfaction of the beneficiaries with the improved WS service	Yes	62.9	75.7	67.9	70.7
	No	37.1	24.3	32.1	29.3
Total		100	100	100	100
If no, what is/are the possible reason(s)?	Public taps and pipelines are not maintained on time	31.4	7.8	7.1	10.4
	Low pressure			8.3	3.2
	Water available for a short period of time		3.9	8.3	5.0
	Water is not regularly available	5.7	8.7	8.3	9.0
	1 and 4		3.9		1.8
Level of sense of ownership for the improved WS system	Yes	88.6	97.1	100	96.8
	No	11.4	2.9		3.2
Total		100	100	100	100

Source: Household Survey, 2010

Beneficiaries focus group discussants have also verified that, one or two public tap which are found near to their residence did not work due to different reasons mentioned above. Thus, they are forced to travel more distance and waiting a long queue. Moreover, the functional public taps are also working for short period of time (1-4 hour) and lack sufficient pressure especially in lowland area. Partial functioning of the public taps (2 water tap out of 4) and breakage of the pipelines due to improper laying of pipelines at the required depth and misuse of pipelines to watering livestock are the major reasons for the interruption of the water supply service. As per the WAO and beneficiaries' discussants missing of cattle trough especially in low land area could be one of the causes for pipelines misuse. Though the community has tried to minimize the problem through negotiation it has not brought a sustainable solution.

The demand for the improved MV RWS system and the degree of satisfaction has played a great role to inculcate the sense of ownership. In this regard, even though some of the respondents are not satisfied with the current level of service due to inadequacy of water distribution, about 97 percent expressed a higher sense of ownership. They compared the condition to the previous

clean water scarcity and believed that the system belonged to them and needs some improvements.

In general, as per the findings, the development of the water supply system relied on the demand of the beneficiaries irrespective of low community awareness building in water source development area (highland). Hence the level of community participation in terms of cash contribution, providing in labour and supplying materials during the construction phase was also highly appreciable. Women were considered as a main user and emphasized to involve in different activities by overcoming local traditional challenges. Though the study outcome assured the demand responsiveness of the project, constraints like shortage of water availability, dysfunction of public taps, passive participation of water committee and community, misuse of pipelines are reducing the satisfaction of the beneficiaries.

### 5.3.2 Financial and allied aspects

The financial factor is one of the key aspects that determine the multi-village water supply system sustainability. Multi-village water supply systems are assumed to be financially sustainable and have the potential to capture economies of scale when supplying bulk water to a large number of communities. One of the reasons, it reduces the per capita costs (affordable tariff) that incurred due to high initial capital investment and to meet the financial capacity at the required level to manage a large converge. Moreover, the capacity to manage the income is also needed so as to attain the financial sustainability. Concomitantly, investment capital and cost sharing, the degree of O&M expenses based on the type of technology, willingness to pay, capacity for replacement & new system development and type of financial management model are vital sub-indicators in the financial sector. These key indicators of financial aspects are broadly discussed below.

#### 5.3.2.1 Investment Cost and Cost Sharing Arrangement

In a demand-responsive approach, contributions should serve as mechanisms for signaling demand. The level of contribution should be reflected both at the initial investment period as well as during the recurrent operation time. The basic principle of cost sharing is to make clear

the proportion of the cost to be shared by all stakeholders and also enable the community to choose the levels of service for which it is willing to pay (UNDP-WB WSP, 1997). It has an essential ingredient for the success of a multi-village WS system.

The total investment cost for Hitosa MV RWS system was more than 1million birr. It was covered by WaterAid (79%), community 17% (13% cash & 4% labour) and government 4%, respectively (WA. 1998). It was discussed in previous section that 99 percent of the community (80% both in cash and labour and 20% only in labor) were contributed. In all cases, the cost sharing arrangements were participatory and the community demonstrated their commitment to the development of the system by contributing cash for capital investment and agreed to meet O&M costs.

### **5.3.2.2 Water Tariff, Consumer Perception and Affordability**

Setting an appropriate tariff structure is one of the crucial tasks in water supply sector. Tariff overestimating (not affordable) or underestimating (not sufficient to cover the costs) are directly related to the sustainability of the system. Consistent with various studies, tariff structures in multi-village WS system varies with the type of technology. For example, spring gravity flow water supplies technology has relatively lower tariff rate (low operation and maintenance cost) compared to water supply technology that use energy. Specifically, the Ethiopian Water Resources Management Policy (1999) stated that tariff setting shall be site specific i.e. the rural tariff settings consider to cover the operation and maintenance cost while the urban areas tariff should expect to cover investment as well as O&M costs. Moreover, the policy give due attention to the social tariff for the poor communities living both in urban and rural areas.

Hitosa MV RWS water supply tariff has revised three times since 1996. The first water tariff was 0.75 cents per m<sup>3</sup> and after two years it raised to 1 birr per m<sup>3</sup>. The third water tariff was introduced since February 2009. It is 3 birr per m<sup>3</sup> which is currently at work. The rising of tariff was necessary to cope up with the rising price of various spare parts as well as different running costs. At present, the social tariff for lower band consumer both in urban and rural area is flat rate of 15 cents/20liter. Progressive tariff rate is working in case of private yard connection. In

this category, beneficiaries are charged higher rates per unit of water for successive blocks. Table 5-15 describes the operational tariff structure.

**Table 5-15 Existing official water tariff structure**

No.	Consumption Block	Tariff rate in ETB
1	Public Tap 0 - 1m <sup>3</sup>	3.00
Private connection		
1	0-5 m <sup>3</sup>	3.25
2	6 – 10 m <sup>3</sup>	3.50
3	11-30 m <sup>3</sup>	3.75
4	> 30 m <sup>3</sup>	4.00

*Source: Hitosa Water Administration Office, 2010*

In addition, the study examined the beneficiaries' opinion concerning the existing water tariff both for public tap and yard connection users as well as the yard connection fee condition. There is a flat tariff rate for public tap user's which is 15 cents per 40 liter (two jerry cans). The private connection customer pays per month based on billing system. Of the total sample private connection owners, 57 percent currently paid 10-20 birr per month followed by 27 percent birr 20 – 30. The rest paid less than 10 birr (10.8%) and greater than 30 birr (5.4%). In line with this, 97 percent of the private yard connection owner paid for the water service on time. According to the FGD, there is a week interval for the customer to pay for the service, however, after a week there is a penalty which is 10 birr and also the service would be disconnected for those who are not paying for three consecutive months.

Regarding the private connection fee, more than half of the respondents (57%) paid between 500-1000 birr following by birr 1001 – 1500 (19%), greater than 1500 birr (13.5%) and less than 500 birr (10.8) percent. Of the total private yard owners, 65 percent consider that the connection fee is affordable. The remaining perceived that the connection fee is high due to the limited private sector involvement in supplying materials which is currently dominated by few individuals. The WAO had attempted to supply the materials for short time though it was not succeeded due to lack of adequate experience.

The shortage of clean water forced the majority (82%) of the respondents to buy water either from neighborhood connection or from those individuals' who bring water from far area. In this case, the cost of water per jerry ranges from 10 to 50 cents i.e. 52.5 percent pay 25 – 40 cents 32.2 percent more than 40 cents and the rest 15.3 percent pay between 10 – 20 cents, respectively. Despite the official water tariff at public tap is Birr 1/m<sup>3</sup>, the individual buy water from a vendor would pay with a minimum of 10 – 15 cents which make the tariff between Birr 5-7.5/m<sup>3</sup>. Amazingly, those households who bought at the rate of 25 - 40 cents and more than 40 cents per jerry paid between Birr 12.5 – 20 and more than Birr 20 per m<sup>3</sup>, respectively, excluding the labour cost. In the lowland areas it is more costly and the water price rises to birr 1 /jerry can especially in dry season. A lack of alternative water sources even to their livestock makes the problem more severe. For the detail refer table 5-16.

**Table 5-16 Private connection water cost, connection fee and cost of water from water vendor**

Description		Highland	Midland	Lowland	Group Total
Private connection water cost/month	<10 birr		14.3		10.8
	10 - 20 birr	66.7	50	100	56.8
	20-30 birr	33.3	28.6		27.0
	> 30 birr		7.1		5.4
Group Total		100	100	100	100
Do you regularly pay for the WS service?	Yes	100	100	100	100
Total		100	100	100	100
Connection fee category	<500 birr		14.3		10.8
	500-1000 birr	100	50	33.3	56.8
	1001-1500 birr		17.9	66.7	18.9
	>1500 birr		17.9		13.5
Total		100	100	100	100
Tariff per jerry can from water vendor	0.10 - 0.20 cents	28.6	24	2.5	15.3
	0.25 - 0.40 cents	71.4	74.7	25	52.5
	> 0.40 cents		1.3	72.5	32.2
Group Total		100	100	100	100

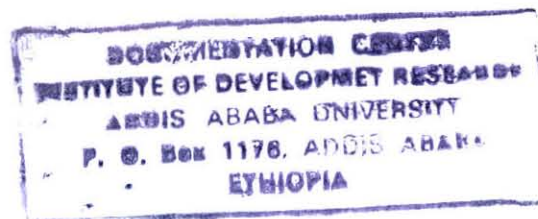
Source: Household Survey, 2010

Affordability of the water price is another crucial issue recognized by Dublin Principles, which were developed at the International Conference on Water, held in Dublin (1992). As per the principle, though water supply and sanitation services are being viewed in economic terms, it is strongly articulated to recognize primarily the basic right of all human beings to have access to clean water and sanitation at an affordable price. Basing the principle, the Ethiopian Water

Resources Management Policy (1999), Water Sector Strategy (2001a) and Water Sector Development Program (WSDP) 2002-2006 (2001b) also acknowledged it.

Concerning this, the sampled households were asked whether they can afford the existing water supply tariff or not. Accordingly, 93 percent of the respondents (both public tap and private connection users) replied that the tariff is affordable while the rest (7%) were disagreed. Furthermore, 97 percent of the private yard connection owner paid for the water service on time. Therefore, it is possible to say that the existing water tariff is within the financial capacity of the beneficiaries.

The study has also carried out the affordability test based on the monthly income of the households and the expense allocated for the water supply service. The findings indicated that public tap users mean household income spent on water is 1.4 percent with the minimum of 0.3 percent and the maximum of 5.4 percent, respectively. Regarding the private yard connection users, the average estimated income spent on water is 1.1 percent with the minimum of 0.7 and the maximum of 2.2 percent, respectively. Moreover, the standard deviation of their income and their expenditure on water varies with agro-ecology as there is a variation in accessing different alternative sources of water in the highland than the lowland. The detail is clearly depicted in the table 5-17 below. Thus, findings revealed that the private connection customers spend less cost compared to the public tap users which is due to the latter is often collected water from vendors with higher price.



**Table 5-17 Affordability test of public tap users based on the existing tariff & income**

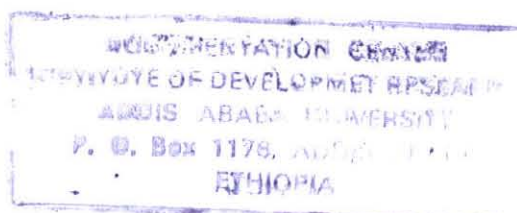
Agro-ecology	Description	Monthly Income	Water cost per month	Water cost income ratio
Highland	Mean	490	5.7	1.4
	Std. Deviation	194	1.9	0.9
	Minimum	83	2.25	0.5
	Maximum	833	9	5.4
Midland	Mean	915	9.7	1.3
	Std. Deviation	510	4.1	0.8
	Minimum	83	2.3	0.3
	Maximum	2917	22.5	5.4
Lowland	Mean	800	10.4	1.5
	Std. Deviation	354	3.8	0.9
	Minimum	83	2.3	0.3
	Maximum	2164	18.0	5.4
Total	Mean	797	9.4	1.4
	Std. Deviation	431	4.0	0.9
	Minimum	83	2.3	0.3
	Maximum	2917	22.5	5.4

Source: Household Survey, 2010

### 5.3.2.3 Financial Ability to Cover the Cost

Empirical evidences show that no matter what type of technology they relied on, systems were not being repaired and were often falling into disuse with a minimal cost recovery and insufficient tariff to pay for operation and maintenance. The efficiency of tariff collection and cost recovery are the major decisive factors in water supply and sanitation sector to attain financial sustainability. The good design criteria is to incorporate key principles like community contribution to capital and operation and maintenance expense to ensure long-term sustainability of water supply and sanitation services. The demand responsive approach emphasizes the cost recovery issues need to be openly communicated to all stakeholders, especially to the anticipated beneficiaries. This enables the communities to demonstrate their commitment by making cash contributions towards the capital cost and agreeing to meet O&M costs of the system.

The HH survey also assessed the beneficiaries' perception whether the tariff generated from the water supply service cover different expenses. Accordingly, more than 90 percent of the households believed that minor maintenance and water attendants' salary is cover by the tariff.



About 75 – 80 percent of the respondents considered that costs like technicians’ salary, major maintenance and spare parts are covered from income generated through the water supply service. However, the perception of HH regarding the replacement or/and system expansion expense to be covered by the water tariff is less than 10 percent. Table 5-18 illustrates the detail.

**Table 5-18 Perception of respondents on the types of expenses covered by water tariff (%)**

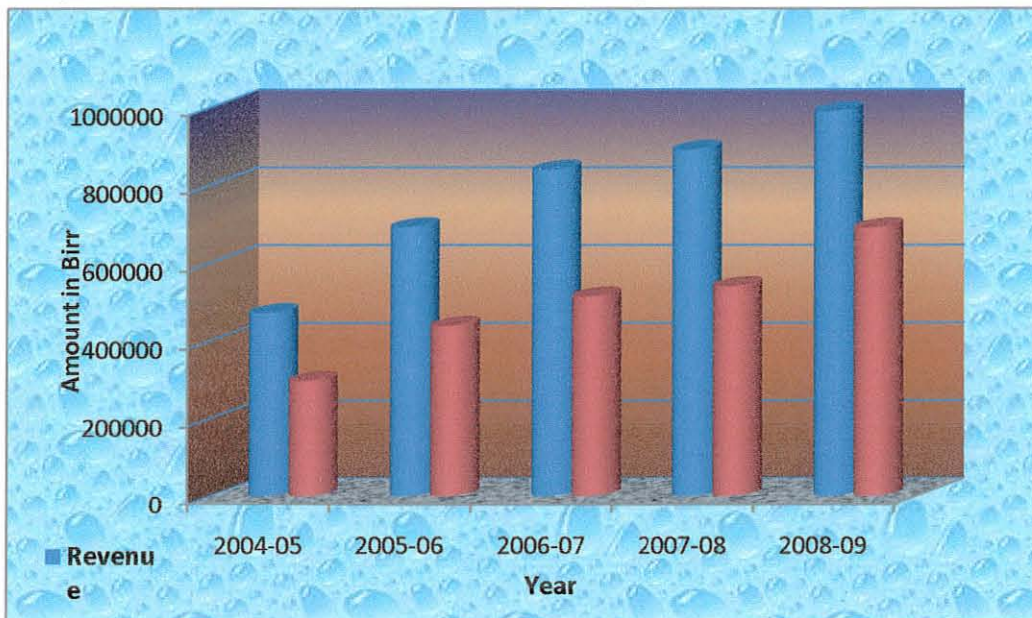
Description		Agro-ecology			Group Total
		Highland	Midland	Lowland	
Do you think that the tariff cover minor repair?	Yes	91.4	95.1	92.9	93.7
	I do not know	8.6	4.9	7.1	6.3
Total		100	100	100	100
Do you think that the tariff cover major repair?	Yes	62.9	81.6	77.4	77.0
	No	28.6	10.7	3.6	10.8
	I do not know	8.6	7.8	19.0	12.2
Group Total		100	100	100	100
Do you think that the tariff cover water attendants’ salary?	Yes	91.4	93.2	90.5	91.9
	No			2.4	0.9
	I do not know	8.6	6.8	7.1	7.2
Total		100	100	100	100
Do you think that the tariff cover technicians salary?	Yes	71.4	88.3	78.6	82.0
	No	20.0	2.9	1.2	5.0
	I do not know	8.6	8.7	20.2	13.1
Total		100	100	100	100
Do you think that the tariff cover spare part cost?	Yes	71.4	80.6	78.6	78.4
	No	20.0	4.9		5.4
	I do not know	8.6	14.6	21.4	16.2
Total		100	100	100	100
Do you think that the tariff cover replacement/expansion expense?	Yes	5.7	11.7	8.3	9.5
	No	68.6	33.0	46.4	43.7
	I do not know	25.7	55.3	45.2	46.8
Group Total		100	100	100	100

Source: Household Survey, 2010

Moreover, the study analyzed the financial performance of the water supply system based on the five years revenues and expenses and the ten years water sales generated from public tap and private yard connections. Accordingly, the water supply service income increased by 47, 21, 6 and 10 percent, respectively, from year 2004/05 to 2008/09. The computed data based on the

types of users indicated that income generated from the public tap rose by 11 percent compared to private yard connections for the year 2004/05. However, revenue from private yard connections increased by 14, 49, 47, and 36 percent, respectively, as of the year 2005/06 and onwards. Likewise, quarterly income generated from private yard users (2009/10) is 36 percent more compared to public tap on the same period. Figure 5-4 shows the revenue and expense trend for five consecutive years.

**Figure 5-4 Five Years Trend of Revenue and Expenses**

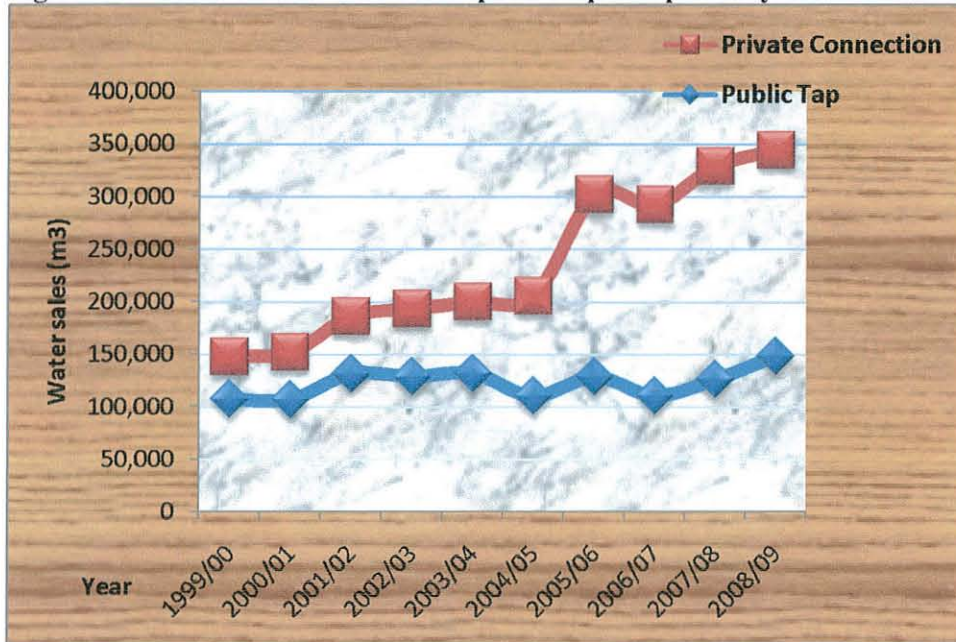


*Source: Computed based on Hitosa WAO data, 2010*

Regarding the expense, there was a decrease of 37 percent for the year 2004/05 while raised by 17, 5 and 22 percent from year 2005/6 to 2008/9. Salary is the major expense which estimated at one-fourth of the total expenditure for the year 2005/6 but it became half and more in the preceding years. Costs like transport and allowance, fuel and lubricants and operation and maintenance were also recorded as the major expenses of the water supply system in the same year.

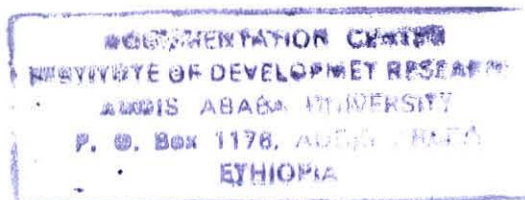
Computation based on the income and expense report indicated that the water supply system net revenue increased by 22.7, 22.4, 38.8, 24.5 and 17.8 percent for the five consecutive years (2005/06 – 2008/9, respectively). Figure 5-5 shows the trend of water sale from public tap and private yard connection for ten years.

**Figure 5-5 Trend of water sale from public tap and private yard connection**



Source: Computed based on Hitosa WAO data, 2010

FGD held with Water Management Board and WAO has also confirmed that income generated from the water service fully covers the operating expenses. Indeed, currently, Hitosa MV RWS system has more than 1 million birr cash deposit at bank. The system is financially better and attains the operating expenses compared to other rural water supply systems that often face this problem. However, the system could not undertake major replacement and new source development due to shortage of finance. Recently, the WAO in collaboration with the Zone Water Resources Bureau prepared a proposal to seek fund for the new water source development. The investment cost estimated at about 3.3 million birr.



Thus, this finding revealed that the water supply system has a good financial capacity in terms of covering the operating costs; however, costs require for the major replacement due to the closing of the designing period and the need to develop the new water supply system to meet the growing population pressure are beyond the financial capacity of the system.

#### **5.3.2.4 Willingness and Ability to Pay for the Service Improvement**

Willingness and ability to pay is one of the key issues to the water supply service. Major factors influencing willingness and ability to pay for the service improvement include the existing drinking water services condition, household level of income, attitude of the beneficiaries towards the improved service and educational level.

As discussed earlier, the beneficiary expressed their willingness and ability to pay prior and during the construction phase by contributing to the initial investment and accepting the proposed tariff to cover the O&M cost. Furthermore, the research assessed whether the beneficiaries are willing and able to pay more if the water supply service would be improved. Accordingly, 83 percent of the public tap users and all of the private yard connection owners are willing to pay more if the service would be improved. Major reasons given by those who are not willing to pay more in case of public tap users are due to the disappointments in the shortage of water supply and considering the existing tariff is adequate to cover for the improvement.

Regarding the affordability, the average ability to pay proposed by the public tap users is greater than 16 cents per jerry can which is more than double compared to the existing water tariff rate (0.15/2 jerry can). The mean percentage of public tap users monthly income spends on water would be 2.8 percent. The minimum and the maximum percentage of household income anticipated to spend on water would be 0.4 and 12.6 percent, respectively. Concerning the private yard connection owner, about 51.4 percent proposed to pay more than 30 Birr per month if the service improved which was 5.4 percent in case of the current condition. Moreover, 57 percent of the respondents who paid 10-20 birr per month decline to 12 percent in case of the proposed ability to pay. Surprisingly, 51.5 percent of private yard connection users proposed to pay more than 30 birr per month against 5.4 percent on the actual case. The rest household heads

have anticipated to pay between birr 21-30 per month for the service improvement. For the detail refer table 5-19.

**Table 5-19 Willingness and ability to pay for the improved water supply service**

Description		Agro-ecology			Group Total
		Highland	Midland	Lowland	
Willingness to pay by public tap users	Yes	75.9	78.7	90.1	83.2
	No	24.1	21.3	9.9	16.8
Total		100	100	100	100
Willingness to pay by private yard connection owner	Yes	100	100	100	100
	Total	100	100	100	100
Current water tariff from public tap	15 cents/two jerry can				
Proposed ATP per jerry can from public tap to the improved WS service	10 cents/jerry can	44	19.7	37.0	31.4
	15 cents/jerry can	48	23.0	23.3	27.0
	20 cents/jerry can		57.4	12.3	27.7
	25 cents/jerry can	8		27.4	13.8
Total		100	100	100	100
Current HH water cost per month from their own connection	<10 birr		14.3		10.8
	10 - 20 birr	66.7	50.0	100.0	56.8
	20-30 birr	33.3	28.6		27.0
	> 30 birr		7.1		5.4
Total		100	100	100	100
Proposed ATP per month by private yard users to the improved WS service	10 - 20 Birr	66.7	7.4		12.1
	21 - 30 Birr		33.3	100.0	36.4
	> 30 Birr	33.3	59.3		51.5
Group Total		100	100	100	100

Source: Household Survey, 2010

Furthermore, the study analyzed the relationship between the degree of beneficiaries' willingness to pay (WTP) with the family size, monthly income and literacy status. The study outcome revealed that the WTP of those households who have large family size, earn more income and better educational status are relatively more compared to the other households who have less in all stated aspects. Table 5-20 below shows the detail.

**Table 5-20 Relationship of WTP to family size, literacy status and monthly income**

Description		Are you WTP for the improved service?		Group Total
		Yes	No	
Family size	< 4	17.8	41.9	21.2
	4 - 8	63.9	48.4	61.7
	> 8	18.3	9.7	17.1
Total		100	100	100
HH head Literacy Status	Unable to read and write	13.0	36.7	16.4
	Able to read and write	13.0	26.7	15.0
	First cycle (1-4)	12.5	6.7	11.7
	Second cycle (5-8)	33.7	16.7	31.3
	High school (9 - 12)	21.7	13.3	20.6
	College and above	6.0		5.1
Total		100	100	100
HH monthly income	<500	21.1	63.3	26.8
	500-1000	48.4	36.7	46.8
	1001-1500	17.4		15
	>1500	13.2		11.4
Total		100	100	100

Source: Household Survey, 2010

The outcome of the study revealed that though there is suppressed supply which significantly influence customers' satisfaction, currently, beneficiaries markedly express their WTP and propose a higher water price than the existing tariff for the service improvement. This could be one of the prospects to the existing WS system sustainability and for the development of a new water supply system provided that the shortcomings should be addressed properly.

### 5.3.2.5 Financial management and accounting system

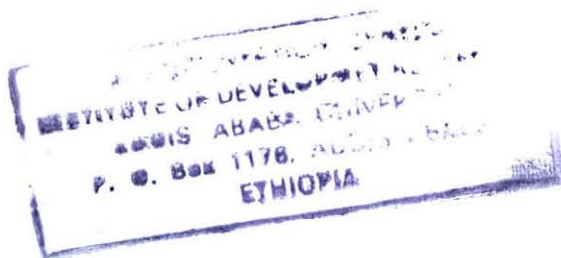
Financial management is one of the crucial sub-indicator that significantly determines the financial sustainability in the water supply sector. Empirical evidences indicated that demand-responsiveness alone could not determine the quality of financial management for a particular water system. Instead, the age of the system, the capacity of the financial management unit including trainings, the existence of manuals and tools and the level of service are vary essential. Moreover, according to UNDP-WB assessment report (1998), poor Financial Management and Accounting Systems derived from improper handling of revenue and expense, the method of recording and system of accountability widely used in India does not provide sufficient

information for constructing accurate individual financial statements, needed to make sound management and investment decisions.

Similarly, the study investigated the financial management system of the water supply system, in terms of revenue collection, bookkeeping, accountability, practice of manuals and monitoring system. Accordingly, in relation to water sale collection, the private connection customers and the water attendants pay per month to the assigned staff near to their locality with the pre-designed schedule. There are two water meter readers who manage these activities both for private yard connection and public tap. There is also a mechanism to administer the dalliance and non-payer of the private connection users.

The financial unit in Water Administration Office (WAO) is in charge of all financial management activities. It employed a single entry accounting system where the system comprises only basic books of accounts such as standard cash register book, budget control register and other forms. The unit prepares a sort of financial report to the Water Management Board as well as to the Executive Committee. However, it is not possible to prepare an official financial report that could be utilized by external users which is one of the short coming of single entry accounting system. As per the discussion with the Administration Unit head, one of the problems of this financial recording system is the difficulty of cross-checking the accuracy of transaction.

It is the responsibility of the executive committee and the water management board to approve budget for the WS system. The WAO is authorized to spend up to 5,000 birr for different expenses and needs the approval of the water management board when the budget is beyond this limit. The WAO as well as the water management board do not practically follow financial management manuals and regulations to disburse operational expenses.



Availability and implementation of financial management manuals have a valuable contribution to administer the fund efficiently. Even though the WAO has different financial management manuals, which were prepared by Water Aid-Ethiopia, the documents are not put into practice. The Regional Water Resources Bureau, KII, has explained this issue as one of serious problem in majority of the rural water supply systems found in the region including Hitosa MV RWS.

In this regard, the HH survey assessed the perception of respondents whether the income generated from the water supply service is well managed. Accordingly, 60 percent of the respondents believed that there is a good financial management while 22 and 18 percent of the respondents replied about the issue as “no” and “we do not know”, respectively. The reasons given for the poor financial management by those unsatisfied respondents are lack of transparency (44%), inadequacy of incentive or salary of the staff (41%) and insufficient training (15%). Table 5-21 show the detail.

**Table 5-21 Sample beneficiaries’ perception on the efficiency of financial management**

Description		Highland	Midland	Lowland	Group Total
Opinion of the respondents whether the income generated from the water service is well managed	Yes	54.3	59	64	60
	No	34.3	21	18	22
	I do not know	11.4	19	18	18
Total		100	100	100	100
Possible reasons given for the weak performance	Lack of adequate training	15.4	12	21	15
	Inadequacy of incentive or salary	30.8	52	29	40
	Lack of transparency	53.8	36	50	44
Group Total		100	100	100	100

Source: Household Survey, 2010

Therefore, the financial and related factors assessment outcome disclosed that the water supply system has a good financial performance in terms of income generating, revenue collection and cost recovery. Moreover, there is a net incremental income trend in the life of the WS system. However, there is a weak financial management system. This is attributed to a lack of implementing the rural water supply guidelines, financial management regulations and manuals, inadequate trainings, and lack of transparency in executing financial transaction.



### 5.3.3 Technical and related factors

Technical and related issues are essential elements to establish a framework through which demand can be expressed and interpreted. Vital sub-indicators for technical sustainability include the choice of appropriate technology, accessibility, availability and costs of spare parts, technical skill, existence of manuals and practice, trainings, and construction quality. Each of the indicators is shortly discussed below.

#### 5.3.3.1 The choice of technology

The choice of suitable technology greatly depends on the availability and types of water source and the capacity of the community to operate, maintain, and manage the system. Inevitably, community involvement in the selection of technology with full information regarding the merits and demerits of each aspect is essential to ensure the technology responsiveness to the local needs and realities.

Hitosa lacks ground water sources even at the depth of 300 meters and there are no rivers or streams around the settlement areas. Thus, the communities had to walk for several hours to fetch water for several decades. To address this problem, spring with gravity flow technology option was proposed by the Swedish International Development Agency (SIDA) and Arssi Rural Development Unit (ARDU) as a permanent solution. Based on the proposal, WaterAid has further made its own assessment and financed the majority of the investment costs.

The community had limited involvement in the choice of the technology. Since it was not possible to avail a basket of technologies to the community, adequate explanations were given by WaterAid, regional, zonal and wereda water resource bureaus and offices regarding the merit and demerit of the proposed technology. Thus, the community has accepted the chosen technology and expressed their consent and commitment to be involved in the development.

The study has also examined whether the selected technology can be easily operated and managed by the community. The result shows the majority (89%) of the beneficiaries responded that the technology is within their own technical and financial capacity. Similarly, 85 percent of the respondents noted that the technology is also socially accepted. This was proved by the selected beneficiaries and water committees during the FGD. For the detail refer table 5-22.

**Table 5-22 Beneficiaries view on the type of technology & level of acceptability**

Description		Agro-ecology			Group Total
		Highland	Midland	Lowland	
Ability to operate and manage the technology by the community	Yes	91.4	93.2	91.7	92.3
	No	8.6	6.8	8.3	7.7
Total		100	100	100	100
Level of social acceptability of the technology	Yes	82.9	89.3	88.1	87.8
	No	5.7	3.9	8.3	5.9
	I do not know	11.4	6.8	3.6	6.3
Total		100	100	100	100

Source: Household Survey, 2010

### 5.3.3.2 Technical Skills and Adequacy for Operation and Maintenance

The availability of skilled technicians is another essential component for effectively undertaking the operation and maintenance activities in the water supply system. Failure of the projects is recognized even when communities have high demand for water but lack the capacity to operate and maintain the system on their own. An adequate training on operation, repair and protection of the system could contribute much to solve most of the problems. It is also important to ensure self-reliance in maintenance and enhance their potential to sustain the WS system. Periodical training has currently recognized as an imperative approach to minimize the breakdowns and reduces expenses in terms of time and money to ensure sustainability.

Information gathered from Hitosa WAO has revealed that there are five technicians who are responsible to carryout maintenance as well as new connections. During the construction phase, WaterAid trained water technicians selected from the community for a period of one month. Furthermore, the trainees participated on a three to four months on-the-job training to further develop their skills. However, as per the FGD with WAO, the delivered trainings so far are not adequate to efficiently undertake the O&M activity which has an adverse impact on system sustainability. The problem is more challenging since the WS system is close to completing the design period.

The beneficiaries' opinion concerning the effectiveness of operation and maintenance activities is consistent with the above realities. Of the total respondents sampled for this study, a half replied that there is no adequately trained technician compared to the demand of O&M activities. In the same token, majority of the surveyed HH (69%) reported that they are not satisfied with the performance of the technicians. The reasons given by the respondents for the poor performance were lack of adequate spare parts (39.5%), poor management (23.7%), inadequate training (13.8%) and others. For the detail refer table 5-23.

**Table 5-23 Respondent's opinion about the adequacy of technicians and their skill for O & M**

Description		Agro-ecology			Group Total
		Highland	Midland	Lowland	
Do you think that the WAO has adequate trained technicians?	Yes	31.4	51.5	45.2	45.9
	No	68.6	40.8	53.6	50.0
	I do not know		7.8	1.2	4.1
Total		100	100	100	100
Do you think the technicians properly perform their responsibilities?	Yes	8.6	34.0	25.0	26.6
	No	85.7	58.3	75.0	68.9
	I do not know	5.7	7.8		4.5
Total		100	100	100	100
If no, what is/are the possible reason?	Their salary is not attractive	6.7	10.2	12.7	10.5
	Lack of adequate technicians	23.3	10.2	9.5	12.5
	Lack of adequate spare parts	23.3	42.4	44.4	39.5
	Due to poor management	40.0	20.3	19.0	23.7
	Lack of adequate training	6.7	16.9	14.3	13.8
Group Total		100	100	100	100

Source: Household Survey, 2010

In conclusion, inadequacies of trained technicians as well as different shortcomings described in the above table are adversely affecting the technician performance over time. Besides, the poor quality of spare parts, weak practice of protecting public taps and a lack to timely address the problem are the major causes for the inefficient O&M activities. Though the WAO has adequate toolkits, failure to implement the operation and maintenance manual make the O&M problem more challenging.

### **5.3.3.3 Availability and Affordability of Spare parts**

Availability, accessibility, quality and costs of spare parts are vital to effectively carry out the O&M and related activities. The failure of acquiring spare parts hampers majority of the rural water supply service even if the community management capacity is found in a better condition. For instance, in Ethiopia, approximately one-third of the water supply systems are non-functional at any one time due to lack of spare parts (MoWR, 2007). A unique feature of the water supply sector is that failure of the weakest link can lead to the interruption of the water supply service. The problem is immense in multi-village water supply systems as a single laying pipeline can serve a large population through public taps and individual yard connections.

In this case study, 55 percent of the surveyed households replied that spare parts are a problem to the water supply service, a quarter do not know (25%) and the rest said it is accessible (20%). A follow up question was raised regarding where the water supply system can get spare parts for the replacement and maintenance activities. Accordingly, 39 percent considered that spare parts would be bought from market while 17.6 and 23 percent of the respondents perceived that it is supported by the NGO and government, respectively. In addition, 11 percent do not know where it is from, 7 percent reported that it is from government and NGO, and only 3 percent believed that it could be from market, government and NGO. Table 5-24 shows the perception of the respondents in detail.

**Table 5-24 Respondent's perception regarding availability and accessibility of spare parts**

Description		Agro-ecology			Group Total
		Highland	Midland	Lowland	
Do you think that spare parts are easily available and accessible?	Yes	22.9	25.2	13.1	20.3
	No	68.6	35.0	72.6	54.5
	I do not know	8.6	39.8	14.3	25.2
Group Total		100	100	100	100
Source of spare parts	From Market	42.9	49.5	25.0	39.2
	Support from government	22.9	22.3	9.5	17.6
	Support from NGO	11.4	11.7	41.7	23.0
	Government and NGO	8.6	6.8	6.0	6.8
	From market, government and NGO	2.9	1.9	3.6	2.7
	I do not know	11.4	7.8	14.3	10.8
Group Total		100	100	100	100

*Source: Household Survey, 2010*

A lack of good quality spare parts can also be one of the common reasons for the failure of operation and maintenance activities in the water supply service. For instance, as per the WAO information, spare parts like water tap, gate valve and pipelines relatively need replacements in the water supply system. However, the replaced spare parts were not serving at least half of the expected period of time due to low quality problem. Thus, currently, this contributes for the partial operation of the majority of the functional public water points (from four tap only two are working). Figure 5-6 and figure 5-7 show the dysfunctional public tap and cracked pipelines.

**Figure 5-6 Dysfunctional public tap**



*Source: Field observation, 2010*

**Figure 5-7 Cracked pipe at Kuchura kebele, Lode Hitosa Wereda (Highland)**



*Source: Field observation, 2010*

The establishment of permanent spare parts supply chain at local level is very essential to alleviate the problem on a sustainable base. It has also found that the dominant procurement



practices and spare part supplies by the public sector have stifled supply chains for the rural water supply construction and operation activities (UNDB & WB, 2007). Thus, recently, involvement of the private sector is recognized as the better solution and it is also acknowledged by the MoWR (2009a) at the national level.

The surveyed households were asked whether it is possible to get adequate spare parts from the private sector suppliers in their locality. Of the total, 40 percent responded that they can get while the rest replied not (44%) and 16 percent do not know about it. The cost of spare parts is also another issue in the household questionnaire. In this affair, it is only the 15 percent who replied that the existing spare part cost is affordable whereas the majority (85%) replied either not affordable (60%) or do not have information on the existing spare part cost (25%). The perception of respondents regarding the level of private sector involvement in the spare part supply activities are presented in detail in Table 5-25.

**Table 5-25 Level of private sector involvement in supplying spare parts and affordability**

Description		Agro-ecology			Group Total
		Highland	Midland	Lowland	
Is there a possibility to get adequate spare parts in your locality?	Yes	31.4	43.7	39.3	40.1
	No	65.7	39.8	40.5	44.1
	I do not know	2.9	16.5	20.2	15.8
Total		100	100	100	100
Is the cost of spare parts affordable?	Yes	14.3	21.4	8.3	15.3
	No	48.6	66.0	56.0	59.5
	I do not know	37.1	12.6	35.7	25.2
Group Total		100	100	100	100

Source: Household Survey, 2010

The above discussions indicated that availability of adequate and quality spare parts is one of the major causes for inefficient performance of the operation and maintenance activities. Moreover, lack of well developed spare part supply chain at local level makes the problem challenging. Moreover, though the importance of private sector participation has recognized at national level there is no clear strategy to ensure the participation and also it requires capacity buildings.

### 5.3.3.4 Construction quality

Water for Hitosa MV RWS system comes from two springs. The length of the main pipeline is 140 km with four pressure breaks and a reservoir of 575 m<sup>3</sup> capacities. The WS system was designed to supply 72,000 people with 25 liters per capita per day. The design period of the system is 15 years since the operation period of 1997 (end at 2010/11) (Water Aid, 1998 & 2008). Construction was completed on time and within cost, with the enthusiasm and commitment of the community members.

The water supply system that is designed and constructed at a good quality is one of the factors to ensure technical sustainability. On the other hand, lack of flexibility on the design to take into account the existing conditions and limited involvement of the envisaged beneficiaries during the construction phase have an adverse impact to technical suitability. For instance, studies carried out in India indicated that poor plan, design and construction (leading to under utilization of facilities, high water losses, limited flexibility and community participation) are the major causes for the poor performance of most large multi-village systems (WB, 2001).

The study assessed the respondents' perception concerning the system construction quality (source, public taps and pipelines). Accordingly, 45.9 and 5.9 percent of the surveyed households responded that the construction is 'good' and 'very good' whereas 32.4 and 15.8 percent replied 'not good' and 'difficult to evaluate', respectively. Table 5-26 presents how the respondents perceived the level system construction quality.

**Table 5-26 Perception of respondents on construction quality of the water supply system**

Description	Agro-ecology			Group Total	
	Highland	Midland	Lowland		
Respondents opinion regarding the level of system construction quality	Very good		4.9	9.5	5.9
	Good	51.4	45.6	44.0	45.9
	Poor	37.1	27.2	36.9	32.4
	I don't know	11.4	22.3	9.5	15.8
Group Total	100	100	100	100	

Source: Household Survey, 2010

Evidences from the multi-village water supply system (WB, 2001) recommended that installation of master water meters at the head of the source as well as in the branch line is crucial to administer the operation activities and assist in leakage detection. However, in the Hitosa MV RWS system there is no master water meter at the outlets of the springs. For this reason, it is difficult to detect water losses (Unaccounted For Water) which includes overflows and leakages. Moreover, it is not possible to predict spring flow behavior and the long-term future performance of the system (WaterAid, 2008). The KII from the WaterAid explained that it is overlooked during the construction phase and no correction was also made onwards.

FGD held at different levels and observation across the sampled beneficiary kebeles indicated that some of the reservoirs have a leakage and also lack top covers. This makes the surrounding areas swampy and the water is not safe to use for domestic purposes. Moreover, there are public taps which are constructed at marginal position and dried up after serving some years and others have low water pressure and serving for a short period of times (2–4 hours). Thus, beneficiaries living in this area are waiting long queue, collect water from far or buy water from vendors at higher tariff. In addition, some of the public taps constructed at the water source kebele is relatively far from the beneficiaries residences. This is due to the resettlers had returned to their original settlement area when the villagization program passed. However, the condition was not taken into consideration though the situation was notified prior to the construction phase.

The objective of Hitosa MV RWS program was only focused to provide water for human. As a result, it has not incorporated components like cattle trough though it is very essential in the rural context. Discussants mentioned that ignoring of cattle trough could be one of the reasons for the miss utilization of pipelines especially in lowlands. Moreover, the types of pipelines (PVC) and failure of laying pipes at the required depth, can be also the other causes for breakage of pipelines by agricultural activities and the like. Figures 5-8 and 5-9 show some of the technical drawbacks observed in the study area.

**Figure 5-8 Leakage through reservoir located at lowland area**



*Source: Field observation, 2010*

**Figure 5-9 Public tap dried up after serving some years**



*Source: Field observation, 2010*

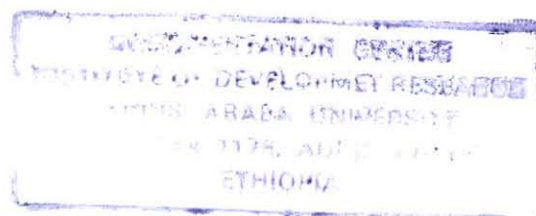
In general, technical findings indicated that the chosen technology is low-cost, easy to understand, operate, maintain and repair within the capacity of the community. It was also the only option where other sources are scarce in the area. However, there are some technical drawbacks which were overlooked during the design or/and at the construction phase. These

include: missing of installation of master water meter at the head of the spring, leakage of the reservoirs, construction of public taps relatively far from the settlement area and at marginal position. Moreover, lack of sustainable spare part supply chain and its quality and inadequacy of trainings and failure of implementing O&M manuals are the major problems which currently hinder the performance of the water supply service.

#### 5.3.4 Institutional and Legal Issues

Technical standards and viable economy are important for physical structure, the soft path that focuses on institutional arrangements and governance which determines the rules of the game is very essential for system functional on sustainable condition. Institutional arrangements are a key for the sustainability of multi-village systems. For instance, studies carried out by WB (2001) indicated that without appropriate and sustainable management, even multi-village systems implemented using international technical assistance and participatory approaches have been known to fail. Moreover, evidences in Brazil and Colombia have also confirmed that the appropriate institutional model for a multi-village system depends largely on the context i.e. for a very large and technically complex systems, the combination of a "utility" model for planning, construction and delivery of bulk supply; and for internal distribution and operations management "individual village association" model seems to be the most sustainable option. For relatively smaller or technically less complex systems, a multi-village user association model alone could be sufficient.

Concerning this, the study examined factors such as institutional arrangement and its organizational framework, policies and legislations, institutional capacity in terms of human resource, logistic and budget allocation and the degree of institutional support from different stakeholders to the water supply service.



#### **5.3.4.1 Institutional Arrangements**

It has acknowledged that the key for the success of WS system management is the demand-responsive choice of institutions. This process takes into account the existing relationships between communities, local authorities and elected representatives, and to build institutions that the communities trust and value.

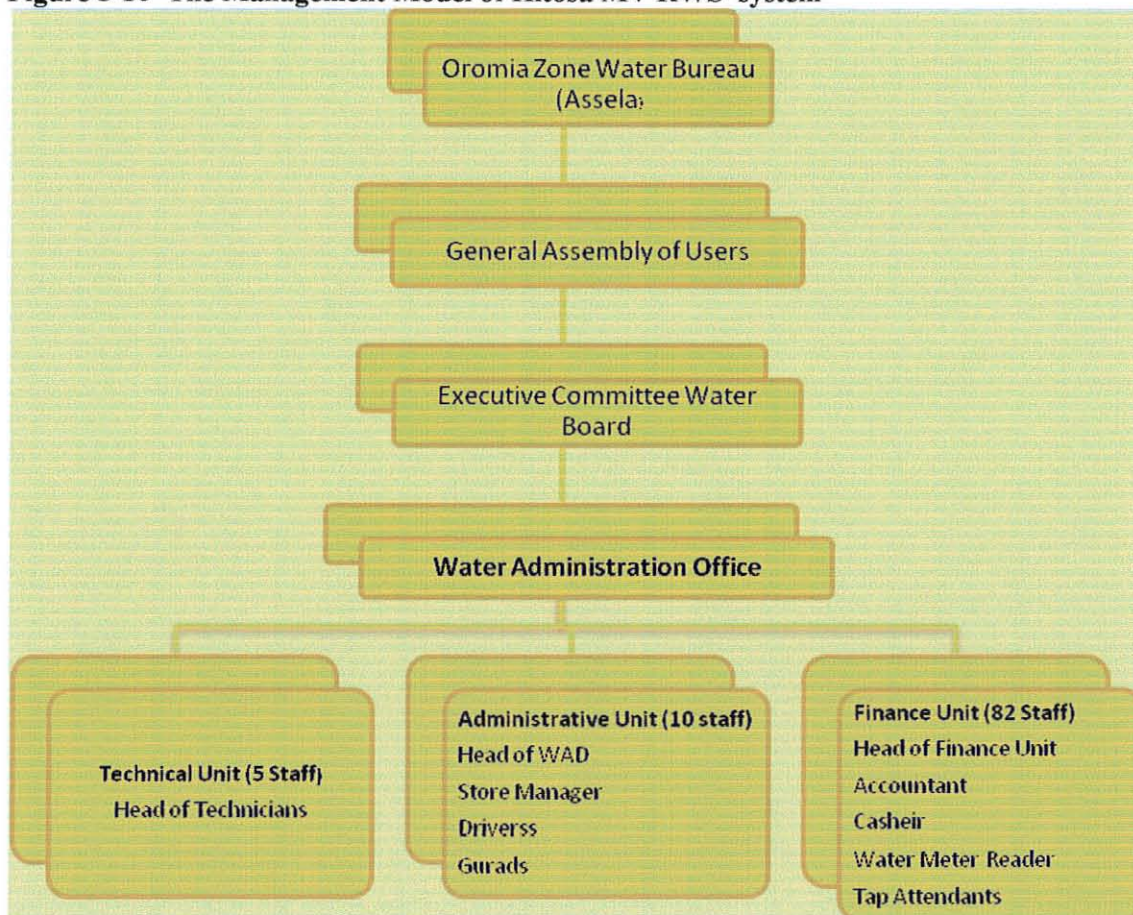
The institutional arrangement of Hitosa MV RWS system started at the initial stage. In order to execute the project activities, the government established a Project Coordination Office with staff assigned from the Zonal Natural Resources, Agricultural and Health Departments through the resources provided by WaterAid, the envisaged beneficiaries and the government. A steering Committee that represented from the Project Coordination Office, Community and WaterAid was the highest decisions making body of the project and managed the Project Coordination Office. After awareness was created by the assigned body, each kebele chose seven people (four female and three male) and established the Water Committee. During the pre-operational phase, the water committees were responsible to handle community cash and labour contribution and protecting project property, equipment and staff while in the post operational phase, the task has changed into the supervision of public tap attendants, problem solving and reporting.

Hitosa water supply system management system is established during the project implementation phase. The Water Management Board (WMB), the highest decision making body, is formed from the members of WATSAN committees and represented by two water committee member from each beneficiary kebele water committee. It is composed of 42 members with an equal number of men (21) and women (21). Its main responsibility is to approve the annual budget and prepared plan by WAO and to provide relevant information to the Executive Committee and WAO as required. An Executive Committee was elected from the water management board that consists of nine representatives (five from Water Board and four from local government officials). The executive committee was formed a Water Administration Office (WAO) that is responsible for operation and management of the water supply system. The performance of WAO is supervised by the Executive Committee including the day to day activities. The assessment so far carried out on this area portrayed that the institutional arrangement of Hitosa

MV RWS system was carried out with full participation of the anticipated beneficiaries so that the responsibility for implementation and post implementation is within the community. Figure 5-10 below shows the management model of the system.

**COMMUNITY BASED WATER BOARD MANAGEMENT  
OF A MULTI-VILLAGE WATER SUPPLY SYSTEM IN HITOSA**

**Figure 5-10 The Management Model of Hitosa MV RWS system**



Source: Hitosa WAO, 2010

**5.3.4.2 Policies and Legislation**

Ethiopia has formulated and promulgated Water Resources Management policy since 1999. This policy is a base for the formulation of approaches, strategies and plans for the development of the sector including water supply and sanitation. Likewise, Oromia Regional government issued a proclamation No. 40/2004 and 78/2004 to provide legal backing for the rural water supply system

management. The laws demanded for the formation of autonomous and community based institutions, i.e. the Water Board and the users association to be established having legal personality in the region. However, as per the reviewed UAP (2008), even though there is proclamation, there is no detail procedure on how these associations would be registered to work as a legal entity. Because of this reason all rural water supply systems including Hitosa Water Supply Service did not have legal entity. Moreover, the Region Water Resources Management regulation is under process. The rural water supply systems are managed based on the guideline prepared in 1998 (Oromia WMERD, 1998). As per the guideline, all the rural water supply systems are managed by the community. Nevertheless, the guideline has failed to be implemented in Hitosa water supply system. This could be one of the major causes for the blurred rights and responsibilities among Water Management Board, Water Committee and WAO and led for unnecessary interferences.

#### **5.3.4.3 The Water Supply System Institutional Capacity**

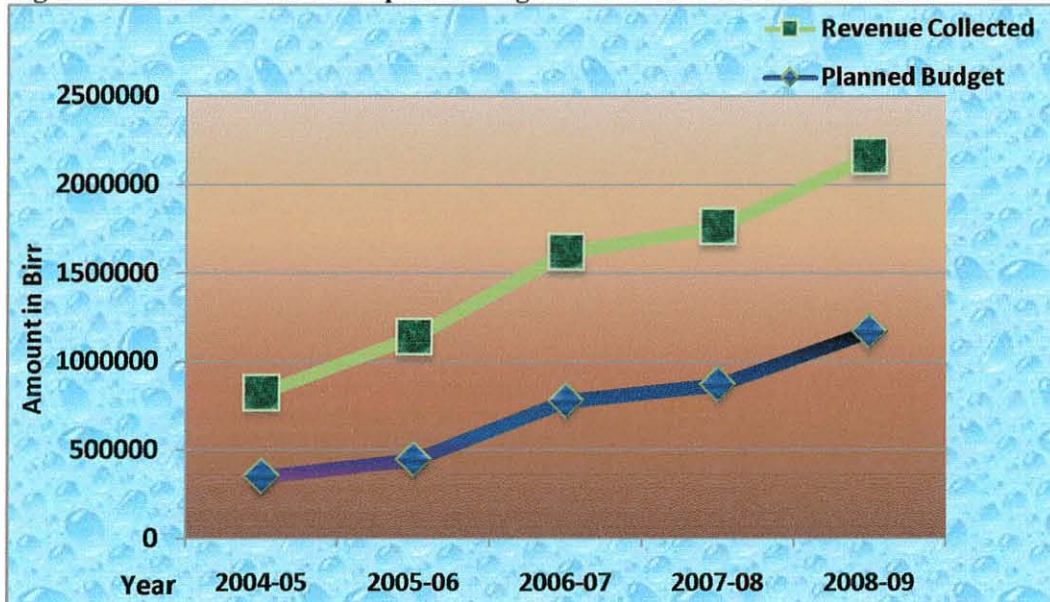
The capacity of the water supply institution could be explained in terms of budget allocation, availability of the sufficient manpower, logistics, management capacity and the level of support from different stakeholders which will be seen in detail hereunder.

- **Budget**

Allocation of adequate budget and proper utilization has a significant impact to perform the water supply service activities efficiently. The study of water supply system budget is prepared by the WAO. The budget comprises estimate of the revenue and expenditure accounts to be utilized for smooth operation of the water supply service. It is approved by the Water Management Board to realize. The water supply service data indicates the revenue collected from the water supply service has been more than the budget throughout the project life. For instance, revenue generated against the plan was 128, 130, 90, 99.5 and 86 percent during the year 2004/05– 2008/9. However, cost for the major replacement work, which is expected to undertake within the operation phase and investment capital for the development of the new water source, could not be covered through income generated from the water supply system alone. Thus, the WAO has recently prepared the proposal and seeking a fund. Figure 5-11 shows

the trend of five years planned budget and actual revenue collected from the water supply service.

**Figure 5-11 The Trend of Proposed Budget and Actual Revenue Collected**

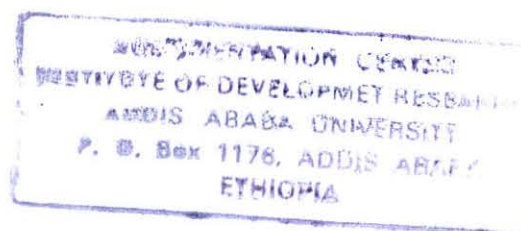


Source: Hitosa WAO, 2010

- **Human Resource**

Availability of adequate and trained manpower at local level is one of the crucial factors for water supply system sustainability. Hitosa MV RWS system has a total of 97 employees of whom 75 percent are public tap attendants. Employees are categorized under three sections such as Administrative, Technical and Finance Units. Of the total employees 72 percent are female (84% are tap attendants) and the remaining (28 %) are male. There are 24 employees working at office (except tap attendants). The maximum, minimum and average age of the workers is 38, 32 and 21 years, respectively. Regarding the educational status, 29 percent have diploma and others completed from grade 6 to 10+3 levels. Furthermore, 58 percent have been working with the water supply system for more than 10 years (of them 79% are working since the initial project operation period).

Salary structure of the water supply system depicted that the maximum, minimum and average salary of the employees are 1,228, 780 and 376 Birr, respectively. Of the total employee about



79 percent are paid less than 1000 birr. The FGD with the WAO staff believe that they are underpaid compared to other community based water supply system that operate at the same level. In addition, the water service employees are working on contractual base and lack different benefits like annual leave, pension or compensation which makes the employees to be feel as job unsecured. In contrast, the rural water supply guidelines have clearly explained that the Water Management Board is authorized to adjust the salary and different benefits based on the water supply system financial status to attract and retain the staff for efficient performance. The assessment revealed that the number of manpower of the water supply system seems adequate. However, lack of adequate trainings and losing of employees moral due to low salary scale are wakening the performance of the WAO staff.

- **Logistic**

Equipped with adequate materials can strength the institution and facilitate the operational activities in the water supply service. At present, the WAO has four computer and four printers for financial and secretarial activities. Moreover, there are five vehicles, a motor cycle, two bicycles and various O&M toolkits. In general, the office seems to have adequate logistic capacity to undertake the WS service activities. All logistics were donated by the WaterAid during the pre and post construction phase. However, currently, lack of adequate and quality spare parts is one of the major causes for the poor performances of the O&M activities.

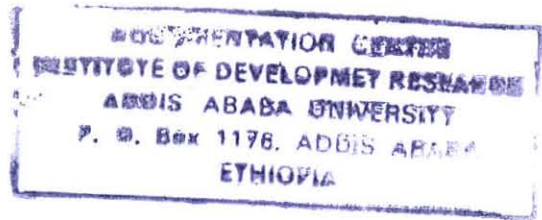
- **Institutional support from different stakeholders**

Effective management of the operation, maintenance, replacement and upgrading of water supply systems is essential to guarantee the sustainability of water supply services. This is realized if the government and non-government agencies provide adequate technical and managerial support to ensure sustainable use of the developed water supply project. On one hand, evidences revealed that the community management model is by far the most widespread approach for rural water supply services in low-income countries. On another hand, it could be one of the reasons to be the failure of delivering the expected level of sustainability due to lack of support at different level (CDS, 2008). Besides, different studies shows that although communities are able to take up a substantial share of responsibilities, external support services

will always be required because there is a limit to what communities to take up (Brikke et al. 1995, Brikke and Iwsc 1993, Glennie 1983). This signifies that if projects are to survive and real services are to be delivered, investment and expertise needs to be targeted at ensuring that the institutional support systems are established and have the capacity to perform their functions. It is unlikely to assume the service will continue to function over the years without support.

With this concern, the research attempted to assess whether there is any type of support from government and/or non-governmental organizations. In this case, 65 percent of the respondents perceived that government support for the water supply activities while 35 percent perceived that non-government organization (WA-Ethiopia and Wenji Catholic) support the water supply activity. The sampled households were also asked which types of support are rendering by government or non-government bodies. Majority of the respondents believed that government support financially while non-governmental body is supporting through training. However, discussion held with WAO, wereda and zone water bureaus clarified that government provide support through technical advice and facilitating activities basing the request of WAO. Similarly, WaterAid provides training twice a year and recently carried out studies like business plan and assessment of the spring yield status upon the request of WAO.

Therefore, the institution arrangement of Hitosa MV RWS system was carried out based on demand-responsive approach. Moreover, the responsibility of implementation and post implementation are inclusive of the anticipated beneficiaries. The capacity of the institution in terms of budge, logistic, human resource and operational manuals are sufficient. However, factors like lack of legal entity, failure of implementing guidelines and manuals, inadequate trainings both the voluntaries and recruited staff, weak monitoring and evaluation system and inadequate external support influence the institution capacity.



### 5.3.5 Environmental and associated feature

Environmental sustainability of the WS service relates to the proper recharge of water sources, the level of water source protection and the degree of the water quality. The emphasis given to the protection and conservation of water resources reflects a growing recognition that freshwater is becoming scarcer and that neglect of pollution control threatens the sustainability of future resources. For instance, studies carried out by WB (2000) in Peru and Colombia regarding multi-village rural water supply system indicated that a single water source that serves many communities requires greater protection and conservation. Sustainability could be attended when neighboring beneficiaries act together for the same objective. It is also important to adopt a command area approach to legally secure the source and effectively realize the intended target. In this regard, the study assessed environmental concern of the WS system in terms of the source yield; water quality and level of source protection which directly either enhance or hinder the water supply system sustainability. Moreover, observations were also carried out in some of the public taps to examine the situation.

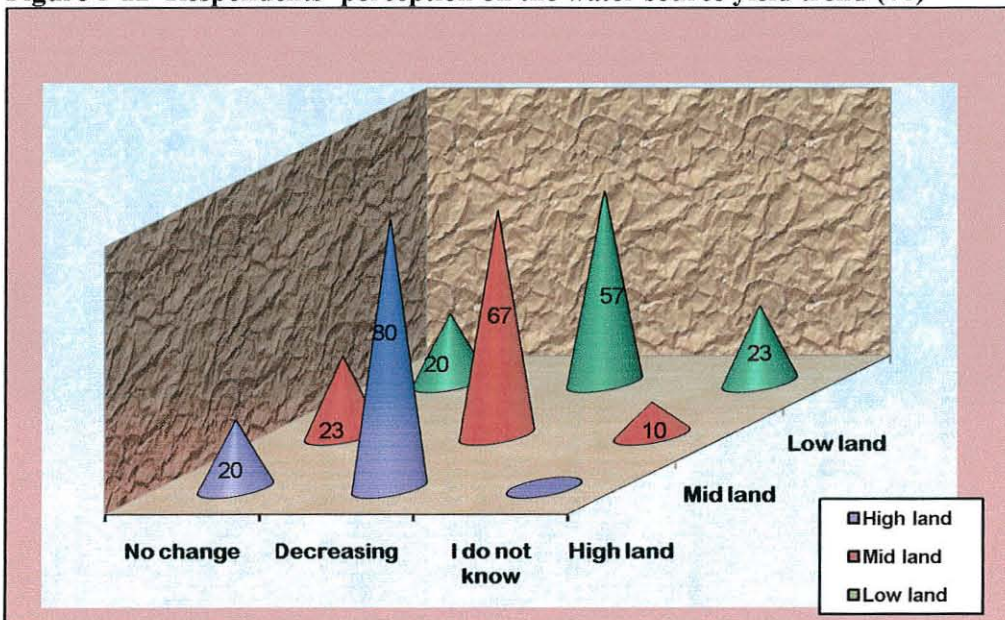
#### 5.3.5.1 Water source yield

It was discussed in the previous sections that Hitosa water supply system is sourced from two springs located at the head of a watercourse known as Burkitu. The climatic condition of the area is Woina dega and Dega. Data recorded prior to the construction phase indicated that the spring flow rate was 19.4 l/s (WA, 1996). However, in 2007 studies carried out by WAO via WA-Ethiopia showed the yield of the spring was declined to 13.6 l/s. The justifications given by the practitioners for the decline of spring yield are high population pressure and expansion of system network above the design level, and the possibility of the general progressive climatic change. This is also becoming a big concern of the water supply service management and beneficiaries as the water supply pressure is gradually declining in some of the public water points and a few are dried. Recently (2008), WaterAid-Ethiopia had conducted a study concerning the yield of the primary spring source. In contrast with the above facts, the investigation came across that the spring yield was recorded at 20 l/s, which is almost similar to

the initial designing period. This study also suggested a detail investigation and has strongly forbidden any expansion work until the causes are clearly identified and the demand situation is clearly known.

In order to know this situation, the household survey has also examined the beneficiary’s opinion regarding the trend of the water source yield. Accordingly, of the total respondents, 44.6 percent considered that the yield is declining while the rest 36.9 and 18.5 percent replied as ‘no change’ and ‘we don’t know’. Furthermore, information obtained from the FGDs and KIIs explained their uncertainty concerning the existing water supply source yield. Figure 5-12 illustrates the detail. Therefore, this assessment suggested a further technical investigation about the water source yield as it is one of the serious issues in the water supply system.

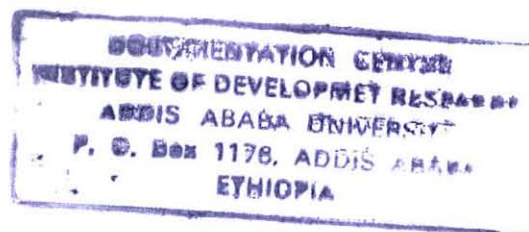
**Figure 5-12 Respondents’ perception on the water source yield trend (%)**



Source: Household Survey, 2010

### 5.3.5.2 Quality of water source

The quality of water source is one of the crucial issues in the water supply sector. It is often studied based on the national or international standards during the initial water source selection phase and demand regular monitoring activities. Various studies indicated that the degree of water quality varies by types of water sources. For instance, springs are typically the cleanest



source of water available since the various soil textures in the water table act like a sand filter removing bacteria and viruses (Jonathan, 2006). Technically, it is found the best choice for a source of potable water supply because contamination is unlikely even if human activity continues in above the source. However, most causes of pollution from these sources occur at the mouth of the spring from poor spring box construction (ibid).

Concerning this, the surveyed households were asked whether the protected water has the quality problem. Consequently, 95.9 percent respondents agreed on the good quality. Moreover, discussions held at different levels have also verified that the source has no quality problem. Furthermore, water quality test data collected from WAO support the finding.

### **5.3.5.3 Source water protection**

Source water protection is one of the essential components for the water supply system sustainability. Empirical evidences acknowledged that keeping the water source area to protect from pollution, covering tree around the source to slow down surface run-off, working on the groundwater recharge to prevent the spring from drying up are some of the major activities carried out under source water protection. Recently, it has been more widely recognized that source water protection is a critical and first step in the multiple-barrier approach to providing safe drinking water advocated by the Environmental Protection Agency (EPA) and the American Water Works Association (NAP, 2000).

The studied water source is found in Lode Hitosa wereda, kuchura kebele, which is as far as 17 to 50 km from other beneficiary kebeles. The surveyed households asked whether the water source area is fenced and covered with trees and bushes or not. Accordingly, the majorities (63.5%) were replied that they do not know about it while 91.4 percent of the beneficiaries living within the water source kebele responded that the water source is not fenced and not covered with trees and bushes. Selected beneficiaries and KII of the water source kebele explained that the water source area was covered by indigenous trees prior to the implementation phase. However, it was destroyed through time and now it looks bared. The detail is presented in table 5-27.

**Table 5-27 Respondents' perception regarding the source water protection (%)**

Description		Agro-ecology			Group
		Highland	Midland	Lowland	
Is the water source area fenced?	Yes	8.6	9.7	7.1	8.6
	No	91.4	17.5	14.3	27.9
	I do not know		72.8	78.6	63.5
Total		100	100	100	100
Is the water source area using as a waste dumping site?	Yes	40	15.5		13.5
	No	42.9	7.8	16.7	16.7
	I do not know	17.1	76.7	83.3	69.8
Total		100	100	100	100
Is the water source area using as a grazing land?	Yes	88.6	16.5		21.6
	No	11.4	6.8	16.7	11.3
	I do not know		76.7	83.3	67.1
Total		100	100	100	100
Is the water source area shaded with trees and bushes?	Yes	8.6	5.8		4.1
	No	91.4	17.5	8.3	25.7
	I do not know		76.7	91.7	70.3
Group Total		100	100	100	100

Source: Household Survey, 2010

Moreover, FGDs held with the beneficiaries, especially with those living in the source area, water committee, WAO and Water Management Board members and observation of the site disclosed that the water source area was owned by an individual farmer who used it as a grazing land prior to the development of the water supply system. However, the title of ownership has not yet settled even after fifteen years of the project life and this could be one of the causes to the poor management of the water source area. Recently, a committee represented from the water source and Hitosa wereda administrative offices, wereda water desk, zone water bureau and WAO was established and reached on a consensus to fence and protect the source area.

Thus, the source water protection indicated that the activities so far carried out and the plan formulated are neither satisfactory nor substantial for further consideration. Figures 5-13 and 5-14 show the primary and secondary water sources of the water supply service.

**Figure 5-13 Major source water site at Lode Hitosa wereda**



*Source: Field observation, 2010*

**Figure 5-14 Second source water site at Lode Hitosa wereda**



*Source: Field observation, 2010*

## **5.4 Key Lessons and Prospects**

This section summarizes the key lessons drawn from this research and the prospect of the WS system in particular and its replicability for other similarly systems in general. It is intended to provide the good experiences and practices at the grassroots level (beneficiaries), water committees, water management boards and WAO. These could have a far reaching contributions for similar interventions designed in such a way that the challenges and shortcomings can be played down. Some of the key lessons drawn from Hitosa MV RWS system are pinpointed below by thematic findings.

### **a) Community and Social**

- Adopting the demand driven approach has enhanced community participation. The due attention given for women as a main user and emphasis to their membership of the water committee and water management board is essential to the rural water supply service efficiency. However, recently, the declining involvement of women has had an adverse impact on the water use efficiency.
- Large-scale rural piped water supply system can be managed by local community with the necessary and adequate trainings and good working environment.
- Taking local concerns into account and creating an adequate awareness and an agreement prior to the operation period can prevent resentment during the operation phase. For example, the community that live nearest to the spring area still feel that other people were taking their water and they were not going to benefit.

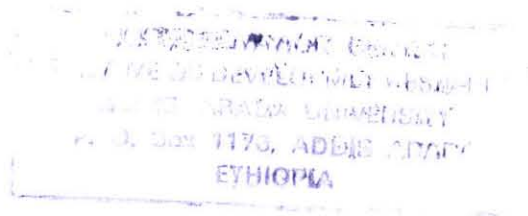
### **b) Financial and Related Issues**

- When a water supply system is developed based on beneficiaries demand, the community has a substantial contribution in terms of cash and labour.
- The community accepted the tariff because the water supply system is developed based on their initiatives, participations and contributions at different stages of project life.
- The community's willingness and affordability to pay for the service improvement is high due to high demand of water and no other water source alternatives.

- Demand-responsiveness alone could not ensure a good financial management in a particular water supply system without implementation of necessary guidelines and manuals.
- It was found that a large scale rural piped water supply system that is managed by the community could cover the operation and maintenance cost. However, it may not necessarily have the financial capacity to cover the major replacement costs or ensure new investment for the growing demand and population pressure.

*c) Technology and Allied Factors*

- A distant rural piped water supply system is a potential option to provide quality service especially for areas where water source is scarce, there is quality problem and the demand is high due to population pressure.
- A water supply through gravity flow technology could serve even hilly and inaccessible rural areas. It is could be cost effective with low operation and maintenance cost and requiring no need of energy. It is also relatively easy to be managed by the community.
- A lack of spare parts supply chain and poor quality is a serious problem for rural water supply service efficiency.
- An overlooking of some of the important technical components, for example, ignoring installation of master water meter at the head of the source makes unable to know the total water production and unaccounted for water.
- An inability to incorporate essential components and not considering program revision of the local livelihood conditions could result in low satisfaction of beneficiaries as well as low water supply service performance. For instance, missing of cattle trough especially in low land area could be one of the causes for pipelines misuse, and poor sanitary conditions around the public tap areas.
- A lack of flexibility on design to take into account the existing conditions for example, towards the end of the villagization program and prior to the construction period, resettled residents had returned to their original settlement area. However, the design was not revised to address the change in situation. Moreover, construction of public taps at marginal position has led to low pressure of water and consequently dried up.



#### *d) Institutions and legal issues*

- Hitosa MV RWS system institutional model that was developed with a due consideration of the local context becomes feasible as a result of establishments of water committee, water management board, water executive committee and water administration office for local water distribution and management. However, the lack of institutional legal entity, deficient of implementing guidelines and manuals are a cause for blurred rights and responsibilities of the water management bodies which further expose for unnecessary interference and weak financial management.
- Election of voluntaries for the water committee and water management board members has significant contribution to organize, to create awareness and to induce the community mobilization; however, the members are reluctantly undertaking their duties overtime which demands adequate and attractive kinds of motivations and incentives. Furthermore, an offer of a lower payment and a lack of providing a package of benefits to the recruited staff can be one of the main causes for their weak performance.
- A shortage of ongoing support to the community managed water supply system (periodical trainings and technical advice), especially, in the operational phase can be one of the causes for the water supply service inefficiency.

#### *e) Environment*

- The absence of adequate and presence of scanty data on the environmental aspect of rural water supply system was a challenge of this study. For example, there is no sufficient and documented information regarding the water source condition, environmental interferences and monitoring of the spring flow. These coupled with poor data management like failure to keep the lists of the beneficiaries could be an obstacle to different assessments and development of short and long term plan.
- Protecting a single water source that serve across many villages could not be realized unless the beneficiaries and the concerned government and non-government institutions work together in synergy.

## CHAPTER SIX

### 6 CONCLUSIONS & RECOMMENDATIONS

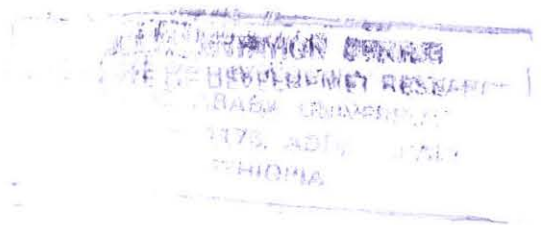
#### 6.1 Conclusion

The research conducted in Hitosa wereda, the Southeast of Arsi Zone in Oromia Regional State, explored and examined key factors that either facilitate or impede the sustainability of Hitosa Community Managed MV RWS system based on the stated objectives. For achieving these objectives, mixed approaches of both qualitative and quantitative research methodologies were employed.

Hitosa MV community managed RWS system has served more than a decade. At present the system serves more than the anticipated population. The study findings indicated that majority of the surveyed population is using the protected spring for domestic purposes. However, unprotected springs and rivers are also an alternative water sources for highland dwellers while midland and lowland beneficiaries are using pond during the rainy season mainly for bathing, utility washing and livestock watering. The water supply coverage of the area is 67 percent. The mean water consumption per capita per day is 15 liter which is less than the system designed per capita level (20 l/c). The study further revealed that more than one-fifth of the public taps, which all found in rural areas, are currently dysfunctional and the majority of the functional are serving partially. Presumably, the water service condition of the study area is under suppressed supply due to dysfunction of public taps, inadequacy of water availability, high population pressure and the raising in demand because of changing in lifestyle of the community. The major findings of the study are concluded below based the assessment discussed in the above sections.

#### ➤ Community and Social Factors

Hitosa MV community managed WS system was developed based on demand driven approach with a great role of community initiation. The contribution of the beneficiaries in terms of cash and labour is great; involved women as a main user and emphasis at all levels and the beneficiaries' have a higher sense of ownership. However, it assured the demand responsiveness,



the puzzle arises where the degree of performance of the water management bodies are gradually weakening. This is due to insufficiency of continuous training, inadequacy of incentive (for WC, WMB and EC) and salary (for WAO), weak practice of transparency, lack of implementing the rural water supply guidelines (blurred rights and responsibilities among them) and manuals and lag of action for operation and maintenance problems. Moreover, the guideline clearly put the service period of the elected board and water committee members though it is rarely implemented in the study water supply system.

### ➤ **Financial and Related Factors**

The water supply system cost sharing arrangements were participatory and the communities had demonstrated their commitments. The existing water tariff is also accepted by the beneficiaries. The mean household income spent on water use (1.25%) is below World Bank reference points for developing countries (5%) despite the beneficiaries are paying almost double and above the price for water vendors.

The income generated from water sale can cover different types of operating expenses and it is the self sustaining WS system. Though there is a suppressed supply which influences customers' satisfaction, beneficiaries' noticeably expressed their willingness and ability to pay for the service improvement.

Even though the water supply system has a good financial performance in terms of income generating, revenue collection and cost recovery, the financial management system is not efficient. This is attributed to lack of implementing the rural water supply guidelines and financial management manuals and regulation, inadequacy of trainings and lack of transparency.

Some of the water supply systems require replacement as the project is close to completing the design period. Moreover, the demand becomes high due to the change in life style and population pressure. However, the major replacement costs and the investment on development of a new source are beyond the financial capacity of the water supply system.

## ➤ **Technology and Technical Issues**

The involvements of community in choice of the technology in the system were limited. This was due to lack of availing a basket of technology. Still, the developed technology is cost effective, the water tariff is affordable, and the system is easily operated and maintained by the community.

The water supply service has adequate number of technicians and technical toolkits. However, the performance of operation and maintenance activities is not satisfactory. This is mainly due to weak implementation of manuals, inadequacy of trainings, lack of good quality spare parts and less motivation of technicians due to unattractive salary. Particularly, lack of appropriate spare part supply chain and weak private sector involvement in this section also make the operation and maintenance activities challenging.

The construction work of the water supply system was accomplished within the budget and ahead of time due to the mutual respect and trust between the WaterAid, government staff and the community. Even though, the performance is appreciable in terms of the given topography of the land and lengthy of the pipeline, there are different technical drawbacks which either occurred during the design or in the system construction phase. This includes overlooking of master water meter at the head of the water source which makes unable to know the total water production and unaccounted for water, overlooking or not considering of program revision in case of cattle trough, construction of public tap relatively far from the dweller settlement, installation of water points at marginal position and frequent low pressure of water especially in lowland areas.

### ➤ **Institutional and Legal Issues**

The system is managed by the Water Management Board that are elected from the water committees of each beneficiary kebeles and the Executive Committee that are selected from the Water Management Board is responsible for the day-to-day follow up and supervision of the water supply system. In turn, the Executive Committee recruits the Administration Office (WAO) staff which is responsible for operation and management of the water supply system.

The employed institutional model of the system is practical. Though the institution is financially autonomous, there is no legal entity. Moreover, the rural water supply guidelines and different working manuals are not implemented yet. Thus, at present condition, the capacity of Water Committee, Water Management Board as well as Water Administration Office is not satisfactory, has blurred the rights and responsibilities of the management as well as the implementing bodies and hence, the power seems centralized in the Water Management Board. Furthermore, inadequate institutional support on the ongoing phase and weak monitoring mechanism has deteriorated the institutional performance.

### ➤ **Environmental factors**

The water supply system has no quality problem. However, the water source yield sustainability is one of the major concerns. This is due to shortage and low pressure of water and dried up of some of the public taps. Investigation carried out at different times to measure the magnitude of the spring flow had varied. The recent study is recommended further assessment and strongly forbidden any expansion work without clearly knowing the source and the demand situations. As the project is also close to completing the design period, expansion of the work beyond the design capacity significantly affects the existing water supply service condition. Regarding the source water protection measures, the activities so far carried out are neither satisfactory nor substantial.

## **6.2 Recommendations**

The performance of Hitosa water supply system is substantial in terms of addressing the local acute shortage of water and managing of a large scale system serving thousands of beneficiaries settled in different villages and towns. However, there are some shortcomings that are considerably influencing the sustainability of the system in order to deliver water supply on sustainable bases. To this end, the implications and results of this study are recommended so as to promote sustainability of Hitosa MV RWS system through mitigating the constraints based on the assessment of the case study and the conclusion so far made above.

### **➤ *Building the Capacity of the Community Management***

The community management model is by far the most widespread approach for rural water supply services; however, it is failed to deliver the expected level of sustainability without properly strengthening based on the specific local condition. In this regard, in order to effectively perform their duties, the capacity of Hitosa water supply system Water Committee, Water Management Board and Water Administration Office should be capacitated through appropriate and adequate trainings relevant to their responsibilities. Moreover, care should be taken to elect the water committee members. An adequate and attractive incentive should be provided to the voluntaries (Water Committees and Water Management Board members) and the new salary scale and different benefits considering the income capacity of the water supply system should be developed for the Water Administration staff so as to retain them and also to attract new qualified workforce.

### **➤ *Improve the Financial Management System***

Financial management manuals and regulations should be implemented to minimize the existing financial management problems. The single entry accounting system has to be replaced by double entry accounting system to generate financial report to the external users. The financial statements need to be also conducted by external an auditor, which is not yet done. Adequate and periodical trainings are essential to the staff to enhance their performance.

➤ ***Mobilization of funds***

Mobilizing of funds for the new source development and to the major replacement work is mandatory to meet the existing demand as well as the growing demand of population pressure. Water Fund, under the Ministry of Water Resources, can be the potential source to facilitate the fund in terms of loan through the regional bureaus. This is on condition that the water supply system has legal personality, managed by water board, have business plan and demonstrate their financial capability.

➤ ***Capacity Building to WAO Technicians***

Operation and maintenance (O&M) is a crucial element for the water supply system sustainability. The activities are intensive in the multi-village water supply system due to lengthy of the pipelines and distribution networks and large number of public taps and private connections users. Thus, in order to overcome the existing O&M problems and enhance the income of the WS system, the WAO technicians should be acquire an adequate and regular training and implement the manuals as well.

➤ ***Developing Sustainable Spare Parts Supply Chain***

Lack of awareness of the outlets and acquiring good quality spare parts are the major constraints in Hitosa the water supply service. These could be alleviated through the establishment of spare part chain with the private sector agencies. This approach is a global and national experience to fill such gaps and it is recognized to be the best and sustainable solution. However, since there are no defined guidelines and strong implementation practices regarding the involvement of the private sector and supply chains mechanism; appropriate capacity building and enabling environment should be established at national as well as at regional level.

➤ ***Installation of Master Water Meter***

Master water meter must be installed at the head of the water supply source outlets. This is important to have a clear and detailed information regarding the magnitude of the spring flow which otherwise neither possible to predict future behavior nor plan for long-term performance

of the system. This is also very essential to understand the extent of water losses (overflows and leakage) which in turn is significant for the overall water supply service performance.

#### ➤ *Building the Institutional Capacity*

The water supply system should secure the institutional legal entity and regulatory framework for positive interaction, benefits and managing unnecessary external interferences. Implementation of the rural water supply guidelines and manuals and regulations are mandatory to mitigate the current blurred rights and responsibilities of the water management bodies. The service term of the Water Management Board and the Water Committee members should be based on the guidelines. Furthermore, the regional and wereda water bureaus need to undertake the facilitator role and create enabling environment including organizing and coordinating workshops and trainings in order to share the best practices and lessons from different empirical experiences.

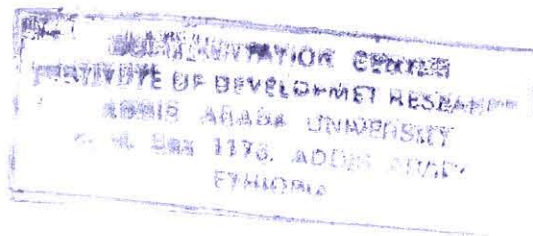
#### ➤ *Study of the water source status & protection of the source*

Conducting a technical detail study on the water source condition is compulsory to examine the current status of the yield flow as well as to plan for future intervention. With regarding to water source protection, the Water Management Board and WAO should design appropriate framework in collaboration with the zone, beneficiary weredas, kebele, watershed management units and other pertinent stakeholders to minimize the possible adverse effect on the water supply service.

### **6.3 Further Research**

Finally, based on the theoretical and related literature reviews and the outcomes of the research findings and gaps, the following thematic areas are suggested for further research. These are:

- ↪ The effectiveness of multi-village water supply schemes;
- ↪ Investment costs and operational performance of multi-village water supply schemes;
- ↪ Analyze the financial viability of motorized and gravity flow multi-village water supply scheme and
- ↪ Appropriate management model for multi-village water supply scheme;



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## ANNEXES

### **Annex 1: Operational Definition of Terms**

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

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

**Distant water source:** refers to the water source found relatively far from the local settlement.

**Executive committee:** in this study context refers to those persons who are democratically elected from the water management board and concerned institution to recruit and supervise the Water Administration Office.

**Gravity flow water supply technology:** refers to a mechanism by which water is supplied to the beneficiaries without using electricity or any other form of energy.

**Multi-village Water Supply system:** refers to a water supply system that serves more than one village.

**Non-functional:** public taps were not giving water supply service for a community during HHs survey.

**Operation and Maintenance (O&M):** refers to mechanism put in place for efficient management and repair of water supply facilities.

**Rural water system:** refers village water services registered and recognized by water department and administered by the beneficiary community.

**Rural Water Supply (RWS):** refers to provision of clean and safe water to rural community through construction of boreholes, protected wells and springs.

**Safe water:** refers to drinking water that meets the requirement of MoWRs drinking water quality standards.

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

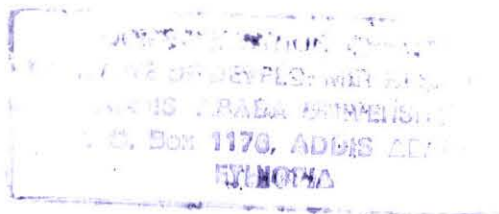
**Piped water systems:** refers to the water supply system that provides water with distribution network.

**Point source:** refers to the water supply system that provides water from the point source and not connected to any distribution network.

**Water Administration Office:** in this study context refers to the responsible body for the day-to-day activities of the operation and maintenance of the water supply service.

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

**Water Management Board:** in this study context refers to those persons who are democratically elected from the water committee members to manage the rural water supply system.



## Annex 2: List of beneficiary kebeles

### I. Lode Hitosa Wereda (Arsi zone)

Total kebele	Rural kebele	Urban kebele	Beneficiaries kebeles
22	19	3	4
Name of the beneficiary kebeles	No. of beneficiary HH	Sample kebele	10% of HH
<b>1. Tolu Yombo</b>		Tulu Yambo: Kuchura	35
1.1 Yambo	232		
1.2 Kuchura	350		
<b>2 Gura Haricho/Ligaba/ (Urban)</b>	180		
<b>3. Medi Bishan</b>			
3.1 Ketebe	256		
3.2 Aren Endema	299		
<b>4. Gulele Boru Hondicha</b>	304		
<b>Total HH beneficiaries in 3 kebeles</b>	<b>1621</b>	<b>Total sample HH</b>	<b>35</b>

Source: Compiled from Hitosa Water Supply WAO, WA –Ethiopia & Beneficiary Wereda Administration Offices, 2010

### II. Dodota Wereda (Arsi Zone)

Total kebele	Rural kebele	Urban kebele	Beneficiaries kebeles
12	10	2	3
Name of the beneficiary kebeles	No. of beneficiary HH	Sample kebele	10% of HH
<b>1. Dodoa Alem</b>		Dodota Alem: Amegna Daba	42
1.1 Lode Adea	240		
1.2 Amgna Daba	420		
<b>1.3 Amgna Qofa</b>	402		
<b>2. Tedecha Guracha</b>			
2.1 Arba Gossa	200		
2.2 Horssis	128		
<b>2.3 Amigna</b>	168		
<b>3. Badossa Betela</b>			
3.1 Betela	316		
<b>3.2 Audi</b>	248		
<b>Total HH beneficiaries in 3 kebeles</b>	<b>2122</b>	<b>Total sample HH</b>	<b>42</b>

Source: Compiled from Hitosa Water Supply WAO, WA –Ethiopia & Beneficiary Wereda Administration Offices, 2010

III. Adama Wereda (E.Shewa Zone)

Total kebele	Rural kebele	Urban kebele	Beneficiaries kebeles
44	37	7	4
Name of the beneficiary kebeles	No. of beneficiary HH	Sample kebele	10% of HH
1. Debulla Sabo	394	Bekoji Dewero: Chaka Dewero	42
2. Hurufa	388		
3. Bekoji Dewero			
3.1 Cheka Dewero	420		
3.2 Bekoji	321		
4. Ejersa Mersa	128		
4.1 Cheka Selassie	168		
<b>Total HH beneficiaries in 3 kebeles</b>	<b>1819</b>	<b>Total sample HH</b>	<b>42</b>

Source: Compiled from Hitosa Water Supply WAO, WA –Ethiopia & Beneficiary Wereda Administration Offices, 2010

IV. Hitosa Wereda (Arsi zone)

Total kebele	Rural kebele	Urban kebele	Beneficiaries kebeles
25	23	2	11
Name of the beneficiary kebeles	No. of beneficiary HH	Sample kebele	10% of HH
1. Boru Lencha		1. Boru Lencha: Wacho Lencha	42
1.1 Wacho Lencha	426	2. Hate Andode: Handode	30
1.2 Gulele hide Beru	603	3. Shaki Sherera: Iteya Shaki	31
2. Sero Anketo			
2.1 Boru Ankete	430		
2.2 Nanu Anketo	329		
2.3 Sero Berarti	230		

<b>2.4 Sero Badossa</b>	185		
3. Guji Habe Badossa			
3.1 Habe Chori	328		
<b>3.2 Guchi Chori</b>	676		
<b>3.3 Badossa Wedecha Bala</b>	118		
4. Deyea Debesso			
4.1 Deyea Qofa/Gebreal	204		
<b>4.2 Deyea Debesso</b>	151		
4.3 Deyea Dodota	115		
5. Guri Debulla			
<b>5.1 Guri Qofa</b>	320		
<b>5.2 Guri Tulicha</b>	100		
5.3 Debulla Bellu	265		
6. Hate Andode			
<b>6.1 Iteya surrounding</b>	259		
6.2 Andode	300		
6.3 Hate tulu	420		
<b>7. Shaki Sherera</b>			
<b>7.1 Iteya Shaki</b>	300		
7.2 Adea Shaki	221		
8. Iteya urban (urban)	2505		
<b>9. Boru Jawi (urban)</b>	884		
10. Boru Chilalo			
10.1 Shorema Antuta	372		
<b>10.2 Adea Antuta</b>	390		
<b>10.3 Boru Aragessa</b>	350		
11. Boneya Edo			
11.1 Ade Mogne	215		
<b>11.2 Boneya</b>	255		
11.3 Gora Jawi	350		
<b>Total HH beneficiaries in 3 kebeles</b>	<b>11301</b>	Total sample HH	103

Source: Compiled from Hitosa Water Supply WAO, WA –Ethiopia & Beneficiary Wereda Administration Offices, 2010

### Annex 3. Water Coverage in Ethiopia, (2004/05 – 2007/8)

No.	Name of woreda	2004/05			2005/06			2006/07			2007/08		
		Rural	Urban	Average	Rural	Urban	Average	Rural	Urban	Average	Rural	Urban	Average
1	Amhara	35	97	42	36.6	80	41.5	42.45	82	48	49	87.8	53.7
2	Oromia	45	85.7	50.3	40.2	87.6	46.5	45.0	90.4	50.9	52	97.9	58.3
3	SNNPR	45	75	47.5	53	64.5	54.0	58.0	66.0	59.0	63.0	72.1	63.6
4	Tigray	35	64	40.4	42.8	50.9	44.3	51.15	60.0	52.8	56.0	72.0	59.1
5	Afar	14.9	41.1	17.3	41.1	73.0	44.0	51.0	73.0	52.98	53.1	77.4	55.4
6	Somalia	5.4	29.3	9.4	21.5	60.0	28.0	23.26	60.0	29.44	32.9	61.6	37.9
7	Benishangule Gumuze	35	89.5	40.3	46.0	66.2	48.0	48.72	85.56	52.33	44.3	93.1	49.3
8	Harari	20.8	34.2	29.1	29.0	21.0	24.0	29.24	21.0	24.13	41	27.5	32.5
9	Gambella	16.8	72.2	27.2	41.4	37.0	40.6	49.43	72.9	53.71	43.9	98.6	54.7
10	Dire Dawa	41	62	56.7	57	72.0	68.2	65.07	72.0	70.21	75.8	72.0	73.0
11	Addis Ababa		93	93		90.1	90.1		94.42	94.42		95.0	95.0
	<b>Country Average</b>	<b>38.66</b>	<b>82</b>	<b>45.59</b>	<b>42.2</b>	<b>78.8</b>	<b>47.3</b>	<b>46.39</b>	<b>82.02</b>	<b>52.46</b>	<b>53.9</b>	<b>86.2</b>	<b>59.5</b>

Source: MoWR, 2010

## Annex 4: Questionnaire for Household Survey

### PART 1: LOCATION

1. Name of the Household Head/Respondent \_\_\_\_\_
2. Wereda \_\_\_\_\_
3. Kebele \_\_\_\_\_

### PART II: HOUSEHOLD DEMOGRAPHIC CHARACTERISTICS (HH head)

4. Sex	5. Ethnicity	6. Language	7. Age (in complete year)	8. Religion	9. Marital Status
1. Male	1. Oromo	1. Oromiffa		1. Orthodox	1. Single
2. Female	2. Amhara	2. Amharigna		2. Muslim	2. Married
	3. Guraghe	3. Guraghegna		3. Catholic	3. Widow
	4. Tigrawai	4. Tigrigna		4. Protestant	4. Divorced
	5. others	5. Others		5. Other	

10. Total Family Size \_\_\_\_\_
11. Total Male \_\_\_\_\_
12. Total Female: \_\_\_\_\_

What is the age distribution of the household members?

13. < 5 years old \_\_\_\_\_
14. 5–14 years old \_\_\_\_\_
15. 15–64 years old \_\_\_\_\_
16. 65 & above  
years \_\_\_\_\_

17. How long did you live in this village?

1. Less than a year
2. 1- 5 years
3. 6-10 years
4. 11-25 years
5. > 25 years

18. Educational level of the household head

1. Unable to read and write (illiterate)
2. Able to read and write
3. First cycle (1-4) complete
4. Second cycle (5-8) completed
5. High school (9-10), complete
6. Collage and above

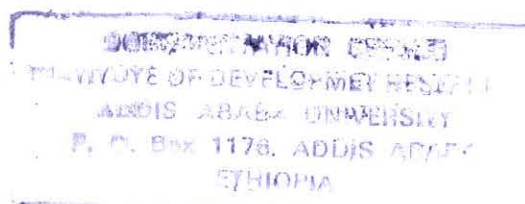
19. Number of male children currently attending school \_\_\_\_\_

20. Number of female children currently attending school \_\_\_\_\_

21. Who among the family member often visits clinic/hospital?

1. Children under 5 years age
2. Young male children
3. Young female children
4. Wife
5. Husband
6. Other members of the family

22. Did any member of your family pass away in the last two years 1. Yes 2. No



	Type of diseases	Code
23. If yes, what is the cause of death - HH head _____	1. Diarrhea/vomit	6. Malaria
24. If yes, what is the cause of death - Spouse _____	2. Cholera	7. Accident
25. If yes, what is the cause of death - Son _____	3. Typhoid/Typhus	8. Other, specify
26. If yes, what is the cause of death - Daughter _____	4. Gastro-intestine	
27. If yes, what is the cause of death - Relative _____	5. Acute Upper Respiratory Infection (A.U.R.I.)	

28. What is your main source of income (put in accordance with their income contribution (1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup> etc.,))

- |   |                          |
|---|--------------------------|
| 1. Farming/agriculture _____  | 5. NGO employee _____    |
| 2. Own business (peaty trade, weaving, carpentry, metal works, traditional healing etc.,) _____ | 6. Daily laborer _____   |
| 3. Government employee _____  | 7. Others, specify _____ |
| 4. Private sector employee _____  |                          |

29. Yearly income of the HH head from different sources \_\_\_\_\_ (in Birr)

**PART III: EXISTING WATER SUPPLY CONDITION**

What is your current main source of water for domestic purposes? (Use code)

*Code*

	Main Source of Water	
30. Drinking _____	1. Piped house connection	7. Borehole with hand pump
31. Cooking _____	2. Piped yard connection-own	8. Handdug well protected
32. Bathing _____	3. Piped connection shared	9. Spring unprotected.
33. Cloth washing _____	4. Piped connection Neighbor's	10. Handdug well unprotected
34. Livestock watering _____	5. Piped Public Fountain	11. River/Stream
35. Utilities washing & others _____	6. Pond	12. Other specify,

36. Do you use unprotected water sources? 1. Yes                      2. No

37. If your answer for Q 36 is Yes, why? The improved water source/because of:

- |                               |                      |                   |
|-------------------------------|----------------------|-------------------|
| 1. low quality                | 4. tariff is high    | 6. Other, specify |
| 2. is far from your home      | 5. lack of awareness |                   |
| 3. is not regularly available | 6. tradition/culture |                   |

If you use unprotected water sources, for which purposes do you mainly use? (Use code)

*Code*

38. Drinking _____	1. Pond
39. Cooking _____	2. Handdug well unprotected
40. Bathing _____	3. Spring unprotected
41. Cloth washing _____	4. River/Stream
42. Livestock watering _____	5. Other specify, _____
43. Utilities washing & others _____	

44. Are you using the improved water source both during 'Bega' and 'Kiremt'? 1. Yes 2. No
45. If your answer is "No" what is the reason? \_\_\_\_\_
46. Who is often responsible to fetch water for domestic purposes in your home? (*Circle one or more as per the respondent*)
1. Adult male                      3. Children female    5. Wife                      7. Other specify  
2. Adult female                    4. Children male       6. Husband
47. What is the distance to the improved water supply system? (*to be estimated by enumerator*):
1. tap inside the house   2. tap inside compound   3. < 100 meter  
4. 100 – 500 meter    5. more than 500 meter
48. What is the estimated time for the round trip to the pipe connection shared, neighbors or public fountain water point?
1. Less than 30 minutes    2. 30 minutes -1 hour    3. > 1 hour
49. What is the distance to other water sources (pond, borehole with hand pump, protected hand dug well, unprotected hand dug, unprotected spring and river/stream)?
1. Less than 100 meter    2. 100 – 500 meter    3. more than 500 meter
50. What is the estimated time for the round trip to other water sources (pond, borehole with hand pump, protected hand dug well, unprotected hand dug, unprotected spring and river/stream)? 1. Less than 30 minutes    2. 30 minutes-1 hour    3. >1 hour
51. How much water do you collect per day from improved water supply system? (*per jerry can*)  
\_\_\_\_\_ (*for public fountain, neighborhood shared users*)
52. What is your trend of collecting water for domestic purposes?
1. Increasing    2. Decreasing    3. There is seasonal difference    4. No change
53. Does the improved water supply system work now? 1. Yes                      2. No
54. If your answer No, when did it become non-functional?
1. < 6 months    2. 6 month – 1 year    3. 1 – 2 years    4. > 2 years
55. If the system is non-functional, what is the frequency of non-functionality?
1. Most of the time    2. Sometimes    3. Other specify, \_\_\_\_\_
56. On average for how long was the system non-functional?
1. < 1 month    2. 1 – 3 months    3. 3 – 6 months    4. > 6 year
57. Does the improved water supply system pipe line have a problem? 1. Yes                      2. No

58. If your answer Yes what is the frequency of the problem?

1. Most of the time 2. Sometimes 3. Other specify, \_\_\_\_\_

59. On average for how long was the water supply pipe line non-functional?

1. < 1 month 2. 1 – 3 months 3. I do not know

60. What do you suggest to improve the water supply pipe line problem?

What is/are the main reason(s) for system non-functionality and pipe line problem? (*Mark according to their severity*).

	Reasons	1	2	3	4	5
61.	Lack/inadequacy of spare parts and tools					
62.	Lack/inadequacy of trained manpower					
63.	Shortage of finance					
64.	Poor management					
65.	Inappropriate technology					
66.	Misuse (breaking of the water supply pipe line to provide water for livestock)					

*Code*

- |               |         |
|---------------|---------|
| 1. Very sever | 4. Low  |
| 2. Sever      | 5. None |
| 3. Medium     |         |

### PART III: COMMUNITY AND SOCIAL FACTORS

67. Who initiated the idea to develop the current water supply system?

1. Community 3. NGO 5. If others, specify \_\_\_\_\_  
 2. Government 4. All in collaboration

68. Who developed the current water supply system?

1. Community 3. NGO 5. If others, specify \_\_\_\_\_  
 2. Government 4. All in collaboration

69. Was the improved water supply service your priority? 1. Yes 2. No

70. If your answer “Yes”, have you participated during the development of the current improved water supply system? 1. Yes 2. No

If your answer “Yes” at which level did you participate?

71. During selection of site location  
 72. Choosing of technologies  
 73. Financial contribution to capital investment  
 74. Provision of labour for construction of system and facilities

If your answer is "No" why did you not participate?

- 75. Not consulted
- 76. Everything was done by Government
- 77. Everything was done by NGO
- 78. Lack of awareness
- 79. Due to shortage/lack of finance
- 80. Due to cultural/traditional barriers
  
- 81. Did women participate in the development of the current water supply system?  
1. Yes      2. No

If your answer for is "Yes" at which level did they participate?

- 82. Selection of site location
- 83. Choosing of technologies
- 84. Financial contribution to capital investment
- 85. Provision of labour for construction of system and facilities

If your answer for is "No" what was/were the possible reason(s) for not being participating?

- 86. Burden of home activities
- 87. Cultural and traditional reason
- 88. Lack of awareness
- 89. Do women at present actively participating in the water supply service activities?  
1. Yes      2. No

If your answer is "Yes" at which level(s) do they participate?

- 90. Setting of water tariff
- 91. Management of O & M
- 92. Physical maintenance and repair activities
- 93. Managerial decision-making power
- 94. Other, specify \_\_\_\_\_
  
- 95. Do you think that the improved water supply system reduces the women's workload?  
1. Yes      2. No
  
- 96. Do you think that water is equally distributed to all beneficiary villages/woredas?  
1. Yes      2. No

- 97. If your answer is "No", what is/are the possible reason(s)? \_\_\_\_\_
- 98. Do you receive support from the government?      1. Yes      2. No

If your answer is "Yes", what type(s) of support do you receive?

- 99. Financial
- 100. Professional
- 101. Technical
- 102. Training
- 103. Other, specify \_\_\_\_\_

104. Is/are there any NGOs that support the improved water supply service?

- 1. Yes (if yes, name) \_\_\_\_\_
- 2. No

If your answer is "Yes", what type/s of support do you receive?

- 105. Financial
- 106. Professional
- 107. Supplying spare parts
- 108. Training
- 109. Other, specify \_\_\_\_\_

110. Do you feel that the improved water supply system is yours? 1. Yes 2. No

111. If your answer is "No" why? \_\_\_\_\_

112. Who is currently managing the improved water supply system?

- 1. Community
- 2. Government
- 3. NGO
- 4. Community and Government
- 5. All in collaboration

113. Do you think that the water administration office adequate capacity to perform their duties?

- 1. Yes
- 2. No

114. If your answer is "No" what is/are the possible reason/s? (*Circle one or more as per the respondent*)

- 1. Lack/inadequate training
- 2. Lack of interest
- 3. Salary is not attractive
- 4. High turnover of staff
- 5. Other, specify

115. Do you think that the water committee adequate capacity to perform their duties?

- 1. Yes
- 2. No

116. If your answer is "No" what is/are the possible reason/s? (*Circle one or more as per the respondent*)

- 1. Lack/inadequate training
- 2. Lack of interest
- 3. Inadequate incentive
- 4. Very busy with other commitments
- 5. Other, specify

117. Do you think that the water management board adequate capacity to perform their duties?

- 1. Yes
- 2. No

118. If your answer is "No" what is/are the possible reason/s? (*Circle one or more as per the respondent*)

- |                             |                                     |
|-----------------------------|-------------------------------------|
| 1. Lack/inadequate training | 4. Very busy with other commitments |
| 2. Lack of interest         | 5. Other, specify                   |
| 3. Inadequate incentive     |                                     |

119. Do you think that the executive water committee has adequate capacity to perform their duties?

1. Yes            2. No

120. If your answer for Q119 is "No" what is/are the possible reason/s? (*Circle one or more as per the respondent*)

- |                             |                                     |
|-----------------------------|-------------------------------------|
| 1. Lack/inadequate training | 4. Very busy with other commitments |
| 2. Lack of interest         | 5. Other, specify                   |
| 3. Inadequate incentive     |                                     |

121. Do you think that all beneficiaries have equal right to the improved water supply source?

1. Yes            2. No

122. If your answer is "No" why? Please indicate any relevant issues that relate to this question.

123. Are you satisfied with the improved water supply service in general?    1. Yes            2. No

124. If your answer is "No" why? \_\_\_\_\_

#### **PART IV: FINANCIAL FACTORS**

125. Who financed the developed MV RWS system?

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

126. Did you participate/contribute to the developed MV RWS system?    1. Yes    2. No

127. If your answer for Q 126 is 'Yes' in what form?

- |                            |   |
|----------------------------|---|
| 1. In Cash _____ (in Birr) | 3. Both in cash _____ (Birr) and labour |
| 2. Labour                  | 4. Other, specify _____                 |

128. If your answer is "No" why?

- |                                      |                               |
|--------------------------------------|-------------------------------|
| 1. Not consulted                     | 3. Everything was done by NGO |
| 2. Everything was done by Government | 4. Lack of awareness          |

129. How much do you pay for water supply connection? \_\_\_\_\_ (in Birr)

130. Do you think the water supply connection fee is fair? 1. Yes 2. No

131. Who set the water tariff?

1. Community 3. NGO 5. All in collaboration  
2. Government 4. Community & Government 6. If other, specify \_\_\_\_\_

132. Is the current water tariff is affordable? 1. Yes 2. No

133. How much do you pay per jerry can from public fountain? \_\_\_\_\_

134. How much do you pay per month from your own connection? \_\_\_\_\_

1. < 10 birr 2. 10 – 20 birr 3. 20 – 30 birr 4. > 30 birr

135. How much do you pay per jerry can from neighborhood connection and water vendor? \_\_\_\_\_

136. Do you regularly pay for the improved water service? 1. Yes 2. No

137. If your answer for Q 136 is 'No' what is/are the possible reason(s)?

*(Circle one or more as per the respondent)*

1. Lack of awareness 4. Billing system is not convenient  
2. Tariff is not affordable 5. Dissatisfaction with the overall service  
3. Dissatisfaction with the service 6. Other, specify

138. Are you willing to pay more the service improvement? 1. Yes 2. No

139. If your answer is "Yes" how much are you able to pay per jerry can? \_\_\_\_\_

140. If your answer is "Yes" how much are you able to pay per month to your own connection?

1. 10 – 20 birr 2. 20 – 30 birr 3. > 30 birr

141. Do you think water fees collected from beneficiaries are well managed? 1. Yes 2. No

142. If your answer is "No" why?

1. Lack of capacity 3. Dissatisfaction with the salary or incentive  
2. Lack of interest 4. Lack of transparency 5. Other, specify \_\_\_\_\_

Do you think that the following expenses cover by the water service income?

143. Minor repair costs 1. Yes 2. No

144. Major repair costs 1. Yes 2. No

145. Salary of water attendants 1. Yes 2. No

146. Technicians salary 1. Yes 2. No
147. Cost of spare parts 1. Yes 2. No
148. Water service expansion activities 1. Yes 2. No
149. What do you suggest to have a better financial management? \_\_\_\_\_

**PART V: TECHNICAL ISSUES**

150. Who selected the technology option for the improved water supply?
1. Community 3. NGO 5. All in collaboration  
2. Government 4. Community & Government
151. Is the technology easily operable & manageable by the beneficiaries? 1. Yes 2. No
152. If your answer is “No” what is/are the reason(s)?  
\_\_\_\_\_
153. Is the technology socially accepted? 1. Yes 2. No
154. Is/are there trained community technician/s that has/have adequate capacity to undertake the repair and maintenance? 1. Yes 2. No
155. If your answer is “Yes” are they properly and timely maintain the system?
1. Yes 2. No
156. If your answer is “No” what is/are the possible reason(s)?
1. Lack of interest to the work 4. Due to poor management  
2. Turnover is high 5. Due to technical complexity  
3. Lack of adequate spare parts 6. Other, specify \_\_\_\_\_
157. Are spare parts available and easily accessible when needed? 1. Yes 2. No
- From where do you get spare parts?
158. Do you purchase spare parts from market? 1. Yes 2. No
159. Are spare parts provided by government institutions at different levels 1. Yes 2. No  
(if yes, please name the institution)
160. Are the spare parts donated by NGOs (if yes, please name the institution) 1. Yes 2. No
161. Are the spare parts supports by government, non-government and also purchase from market?
1. Yes 2. No
162. Are the local private individuals/organization supplying spare parts? 1. Yes 2. No

163. Is the cost of spare parts affordable? 1. Yes 2. No

164. How do you evaluate the overall construction of the improved water supply system?

1. Very good 2. Good 3. Not good 4. I don't know

**PART IV: ENVIRONMENTAL FACTORS**

165. Do you think the existing water supply source is adequate and sustainable? 1. Yes 2. No

166. If your answer is "No" what is/are the possible reason(s)?

---

167. Do you feel that the improved water supply source has quality problem? 1. Yes 2. No

168. If your response is "Yes", what kind of water quality problem do you observe?

1. The test is not good 3. It looks dirty 5. Other, specify \_\_\_\_\_  
2. The odor is not good 4. All

169. Who is responsible to protect the water supply source?

1. Community 3. Community & government 5. All in collaboration  
2. Government 4. NGO (name) \_\_\_\_\_ 6. Other, specify \_\_\_\_\_

170. Is the water supply source fenced? 1. Yes 2. No

171. Is waste (liquid and/or solid) dumping in the water supply source area? 1. Yes 2. No

172. Is the water supply source area used for livestock watering? 1. Yes 2. No

173. Is the water supply source area shaded with trees and bushes? 1. Yes 2. No

174. What is the water supply source yield trend? 1. Decreasing 2. Increasing 3. No change

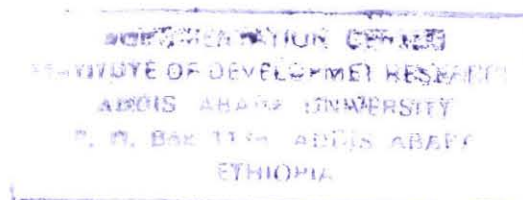
175. Do you think that the water supply source is/are well protected? 1. Yes 2. No

176. If your answer is "No", what is/are the possible reason(s)?

---

177. What is your general opinion about the improved water supply system?

---



## **Annex 5: Checklists for Key Informant Interviews (KII)**

### **I. Government officials: Federal, Regional, Zonal Water Resource Bureaus**

Date of interview \_\_\_\_\_ Name of the organization represented \_\_\_\_\_

Position of the respondent \_\_\_\_\_

1. What is/are the major objective(s) of your organization in relation to rural water supply?
2. What kind of support do you provide to Hitosa MV community managed RWS system?
3. What is your opinion regarding multi-village community managed RWS system?
4. Do you think that implementing MV RWS system is an important decision to RWS service sustainability? When do you recommend such kind of option should be implemented? What is the advantage and disadvantage of MV RWS compared with point water supply system?
5. What is/are the major problem(s) of Hitosa water supply system? (list according to their severity) In terms of :
  - A. Financial issues (tariff, connection fee, penalty, revenue collection, management)
  - B. Community and social factors (participation, demand, satisfaction and compliance-misuse / breaking of pipe line to watering livestock),
  - C. Technical aspects (suitability of technology, O & M, spare parts availability, supply and affordability)
  - D. Institutional and legal issues ( support by GO, support by NGO, level of autonomous) and
  - E. Environmental factors (yield, quality and source protection)
6. Please raise and recommend any issue which either impede or facilitate the water supply system sustainability.

*Thank you for your collaboration!*

## II. NGOs working on Rural Water Supply in the study area

Date of interview \_\_\_\_\_ Name of the organization represented \_\_\_\_\_

Position of the respondent \_\_\_\_\_

1. What is/are the major objective(s) of your organization in relation to rural water supply?
2. Do you supporting Hitosa MV RWS system? What kinds of support did you provide? Are you still support the office? What kind of support do you provide now?
3. Is your organization currently active in the area?
4. Do you think the Hitosa MV RWS system attained the objective? If 'No' why?
5. What is/are the major problem(s) of the water supply system? (list according to their severity) In terms of :
  - A. Financial issues (tariff, connection fee, penalty, revenue collection, management)
  - B. Community and social factors (participation, demand, satisfaction and compliance-misuse / breaking of pipe line to watering livestock),
  - C. Technical aspects (suitability of technology, O & M, spare parts availability, supply and affordability)
  - D. Institutional and legal issues ( support by GO, support by NGO, level of autonomous) and
  - E. Environmental factors (yield, quality and source protection)
6. What is your opinion regarding multi-village community managed RWS system? Do you think that large scale rural pipe water supply system is an important option to RWS service sustainability? When do you recommend such kind of option should be implemented? What are the major advantage and disadvantage of large scale rural pipe water supply system compared with point water source?
7. Please raise and recommend any issue which either impede or facilitate Hitosa MV RWS system sustainability.

*Thank you for your collaboration!*

### III. Community member/PA leader in the study area

Date of interview \_\_\_\_\_ Kebele \_\_\_\_\_

Position of the respondent \_\_\_\_\_

1. When Hitosa MV community managed RWS system developed? By whom?
2. Was the improved water supply service your priority? If 'No' what was your priority?
3. What was the drinking water source before the construction of the improved water supply system? How do you compare the situation of drinking water before and after the construction of the improved water supply system?
4. Did the community participate before and during implementation of the system? At which level(s)? What was the community contribution? (cash, labour)
5. Do you think that the existing water tariff is fair? If 'No' what is/are the problem(s)? Is the tariff consider the poor in your locality?
6. Do you think that water is equally distributed to all villages/ woredas? If 'No' what is/are the problem(s)?
7. Does the community use improved water source for all domestic purposes at all season? If 'Not' Why? What is/are the secondary source(s) of water?
8. Do you think that the water committee, water management board and executive committee are capable to manage the system? If 'No' what is/are the problem(s) describe independently?
9. Are you satisfied with the existing improved water supply service? If 'No' what is/are the problem(s)?
10. What is/are the major problem(s) of the water supply system? (list according to their severity) In terms of :
  - A. Financial issues (tariff, connection fee, penalty, revenue collection, management)
  - B. Community and social factors (participation, demand, satisfaction and compliance-misuse / breaking of pipe line to watering livestock),
  - C. Technical aspects (suitability of technology, O & M, spare parts availability, supply and affordability)
  - D. Institutional and legal issues ( support by GO, support by NGO, level of autonomous) and
  - E. Environmental factors (yield, quality and source protection)
11. Please raise and recommend any issue which either impede or facilitate the water supply system sustainability.

## **Annex 6 Checklists for Focus Group Discussions at different levels**

### **▪ Checklist for Focus Group Discussions with Water Committee**

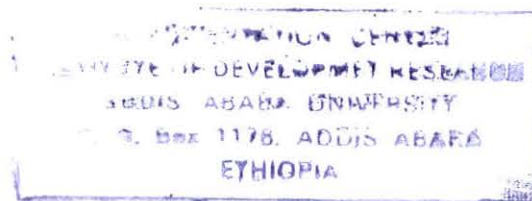
Date of discussion \_\_\_\_\_

Woreda \_\_\_\_\_ Kebele \_\_\_\_\_

1. When was the water committee established? (Before system construction, during system construction, after system construction)
2. By whom were the water committee members selected?
3. How many members does the water committee have?
4. Who decided on the number of water committee members?
5. What is the gender desegregation of committee member and their role and responsibilities? Are all members are working now? If not, how many are not working and what are their main reasons?
6. Does the water committee have legal recognition?
7. To whom is the water committee is accountable? What is your reporting mechanism?
8. Do you have a regular meeting schedule? (monthly, three months, six months, yearly)
9. Does the water committee has the necessary manuals and working guidelines?
10. Do all water committee members well know their roles and responsibilities? (Yes/No), if 'Yes' could you mentions the major once?
11. Do you think that different kebeles/village water committees are closely working? (Yes/No). If no what is the problem?
12. How do you contact the beneficiaries?
13. Do you have a regular meeting with the Water Management Board? What types of issues are mostly raised in the meeting?
14. Who is setting the water tariff?
15. Do you think that the existing water supply tariff is affordable to the beneficiaries? (Yes/No), if no why?
16. Do the tariff consider very poor household in your locality?
17. Do the beneficiaries pay water supply service fee regularly? (Yes/No), if 'No' what is/are the possible reason(s), what measures have you taken to solve the problem?

18. How do you manage the financial resource? Do you have bank account and/or maintain financial record?
19. What types of expenses do you have? Does money collected from water service fees cover the expenses? (Yes/No), if "No" how do you manage it?
20. Do you have adequate trained technicians? (Yes/No). if your answer is "No" how do you manage it?
21. Do you get adequate spare parts when needed? ? If your answer is "No" how do you manage it? Which parts of spare parts are mostly demanded? Do you have a permanent supplier? Is the cost of spare parts affordable? What is the level of private involvement in this area?
22. Do you think that revenue collected from the water service can guarantee for water supply system financial sustainability? If "No" how do you manage it? What is your suggestion?
23. What kinds of support (financial, technical, training and others) do the government and NGOs provide to the water supply service?
24. How does the committee evaluate community participation, women's participation and their contribution at different phase (pre, during, post implementation)?
25. What types of trainings have you taken so far? Who gave you the training? Do you think that the training is adequate in frequencies and types? What types of training do you want in the future?
26. What is/are the major problem(s) of the water supply service? (list according to their severity) In terms of :
  - A. Financial issues (tariff, connection fee, penalty, revenue collection, management)
  - B. Community and social factors (participation, demand, satisfaction and compliance-misuse / breaking of pipe line to watering livestock),
  - C. Technical aspects (suitability of technology, O & M, spare parts availability, supply and affordability)
  - D. Institutional and legal issues ( support by GO, support by NGO, level of autonomous)
  - E. Environmental factors (yield, quality and source protection).
27. Do you think that most problems so far encountered were sufficiently solved? If 'No' why?
28. Please provide any issue which either impede or facilitate the water supply system sustainability.

*Thank you for your collaboration!*



## ▪ Checklist for Focus Group Discussions with Water Management Board

### Members

Date of discussion \_\_\_\_\_

Woreda \_\_\_\_\_ Kebele \_\_\_\_\_

1. When was the Water Management Board established? (before system construction, during system construction, after system construction)
2. What was the criterion to select the member of the Water Management Board? How many members have the Water Management Board? Who decided the number of members?
3. What is the gender desegregation of the Water Management Board and their role and responsibilities? Are all members are working now? If 'No' how many are not working and what are their reasons?
4. Does the Water Management Board have legal recognition?
5. To whom is the Water Management Board is accountable? What is your reporting mechanism?
6. Do you have a regular meeting schedule? (monthly, three months, six months, yearly)
7. Do you have manuals and working guidelines?
8. Do the water management board members well know their roles and responsibilities?
9. How do you evaluate the performance of water committee? Do all water committee closely working? (Yes/No). If 'No; what is/are the problem(s)?
10. Who is setting the water tariff?
11. Do you think that the existing tariff is affordable to the beneficiaries? (Yes/No), if no why?
12. Do the tariff consider very poor household in your locality?
13. How do you manage the financial resource? Do you have bank account and/or maintain financial record?
14. What types of expenses do you have? Does money collected from water service fees cover the expenses? (Yes/No), if "No" how do you manage it?
15. Do you have adequate trained technicians? (Yes/No). if your answer is "No" how do you manage it?

16. Do you get adequate spare parts when needed? ? If your answer is “No” how do you manage it? Which parts of the spare parts are mostly demanded? Do you have a permanent supplier? Is the cost of spare parts affordable? What is the level of private involvement in this area?
17. What kinds of support (financial, technical, training and others) do the government and NGOs provide to the water supply service?
18. How do you evaluate the water committee performance?
19. What types of trainings did you take so far? Who gave you the training? Do you think that the training is adequate in frequencies and types? What types of training do you want in the future?
20. What is/are the major problem(s) of the water supply service? (list according to their severity) In terms of :
  - A. Financial issues (tariff, connection fee, penalty, revenue collection, management)
  - B. Community and social factors (participation, demand, satisfaction and compliance-misuse / breaking of pipe line to watering livestock),
  - C. Technical aspects (suitability of technology, O & M, spare parts availability, supply and affordability)
  - D. Institutional and legal issues ( support by GO, support by NGO, level of autonomous)
  - E. Environmental factors (yield, quality and source protection).
21. Do you think that most problems so far encountered were sufficiently solved? If ‘No’ why?
22. Please provide any issue which either impede or facilitate the water supply system sustainability.

*Thank you for your collaboration!*

## ▪ Checklist for Focus Group Discussions with Water Executive Committee

Date of discussion \_\_\_\_\_

Woreda \_\_\_\_\_ Kebele \_\_\_\_\_

1. When was the water Executive Committee established? (before system construction, during system construction, after system construction)
2. What was the criterion to select the member of the water Executive Committee? How many members have the water Executive Committee? Who decided the number of members? Is women represented in this committee?
3. What are the roles and responsibilities of water Executive Committee? Are all members are working now? If 'No' how many are not working and what are their reasons?
4. Does the water Executive Committee have legal recognition?
5. To whom is the water Executive Committee is accountable? What is your reporting mechanism?
6. Do you have a regular meeting schedule? (monthly, three months, six months, yearly)
7. Does the water Executive Committee have the necessary manuals and working guidelines?
8. Do all water Executive Committee members well know their roles and responsibilities? (Yes/No), if 'Yes' could you mentions the major once?
9. Do you think that the water management board is actively working? If 'No; what is/are the problem(s)?
10. Who is responsible to set the water tariff?
11. Do you think that the existing tariff is affordable to the beneficiaries? (Yes/No), if no why?
12. Do the tariff consider very poor household in your locality?
13. How do you manage the financial resource? Do you have bank account and/or financial record?
14. What types of expenses do you have? Does money collected from water service fees cover the expenses? (Yes/No), if "No" how do you manage it?
15. Do you get adequate spare parts when needed? ? If your answer is "No" how do you manage it? Which parts of the spare parts are mostly demanded? Do you have a permanent supplier? Is the cost of spare parts affordable? What is the level of private involvement in this area?

16. What kinds of support (financial, technical, training and others) do the government and NGOs provide to the water supply service?
17. How do you evaluate the water management board performance?
18. What types of trainings did you take so far? Who gave you the training? Do you think that the training is adequate in frequencies and types? What types of training do you want in the future?
19. What is/are the major problem(s) of the water supply service? (list according to their severity) In terms of :
  - A. Financial issues (tariff, connection fee, penalty, revenue collection, management)
  - B. Community and social factors (participation, demand, satisfaction and compliance-misuse / breaking of pipe line to watering livestock),
  - C. Technical aspects (suitability of technology, O & M, spare parts availability, supply and affordability)
  - D. Institutional and legal issues ( support by GO, support by NGO, level of autonomous)
  - E. Environmental factors (yield, quality and source protection).
20. Do you think that most problems so far encountered were sufficiently solved? If 'No' why?
21. Please provide any issue which either impede or facilitate the water supply system sustainability.

***Thank you for your collaboration!***

▪ **Checklist for Focus Group Discussions with Water Administration Office (Technical Unit, Administration Unit and Finance Unit)**

**A. Technical Unit**

Date of discussion \_\_\_\_\_

1. What are the roles and responsibilities of Technical Unit in the water supply system?
2. How many technicians are there? What is the gender desegregation of the technicians?
3. Do you think that the technicians have adequate capacity to perform their responsibilities?
4. What types of trainings have taken the technicians so far? Who gave the trainings? Do you think that the training(s) is/are adequate in frequencies and types? What types of trainings do the technicians want in the future?
5. Do you think that the technicians perform their duties satisfactorily? If 'No' what is/are the major reason(s)? List according to their severity. (spare parts availability, cost, salary, turn over, poor management etc.,)
6. What is/are the major technical problem in the water supply system? Which of the technical parts do usually failed? What mechanism do you use to communicate information? Do you timely maintain the system? If 'No' what is/are the possible reason(s)?
7. To whom is the Technical Unit accountable? What is your reporting mechanism?
8. What is/are the major problem(s) of the water supply service? (list according to their severity) In terms of :
  - A. Financial issues (tariff, connection fee, penalty, revenue collection, management)
  - B. Community and social factors (participation, demand, satisfaction and compliance-misuse / breaking of pipe line to watering livestock),
  - C. Technical aspects (suitability of technology, O & M, spare parts availability, supply and affordability)
  - D. Institutional and legal issues ( support by GO, support by NGO, level of autonomous)
  - E. Environmental factors (yield, quality and source protection).
9. Do you think that most problems so far encountered were sufficiently solved? If 'No' why?
10. Please provide any issue which either impede or facilitate the water supply system sustainability.

***Thank you for your collaboration!***

## **B. Administration Unit**

Date of discussion \_\_\_\_\_

1. What is the role and responsibilities of Administration Unit in the water supply system?
2. How many administrative staff are there? List by position
3. Do you think that the administrative staff adequate capacity to perform their responsibilities?
4. What types of training the administrative staff has taken so far? Who gave the trainings? Do you think that the training(s) is/are adequate in frequencies and types? What types of trainings does the administrative staff want in the future?
5. Do you think that the administrative staff perform their duties satisfactorily? If 'No' what is/are the reason(s)? List according to their severity.
6. What is/are the major administrative problem in the water supply system?
7. To whom is the Administration Unit accountable? What is your reporting mechanism?
8. What is/are the major problem(s) of the water supply service? (list according to their severity) In terms of :
  - A. Financial issues (tariff, connection fee, penalty, revenue collection, management)
  - B. Community and social factors (participation, demand, satisfaction and compliance-misuse / breaking of pipe line to watering livestock),
  - C. Technical aspects (suitability of technology, O & M, spare parts availability, supply and affordability)
  - D. Institutional and legal issues ( support by GO, support by NGO, level of autonomous)
  - E. Environmental factors (yield, quality and source protection).
9. Do you think that most problems so far encountered were sufficiently solved? If 'No' why?
10. Please provide any issue which either impede or facilitate the water supply system sustainability.

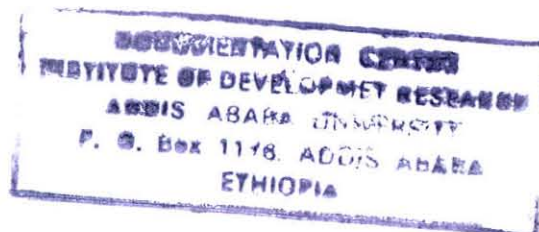
*Thank you for your collaboration!*

### C. Finance Unit

Date of discussion \_\_\_\_\_

1. What is the role and responsibilities of Finance Unit in the water supply system?
2. How many staff is there? List by position
3. Do you think that the finance staff has adequate capacity to perform their responsibilities?
4. What types of training the finance staff has taken so far? Who give the training? Do you think that the training(s) is/are adequate in frequencies and types? What types of training does the finance staff want in the future?
5. Do you think that the finance staff performs their duties satisfactorily? If 'No' what is/are the reason(s)? List according to their severity.
6. What is/are the major financial problem(s) in the water supply system? Accountant/casher, water meter reader and tap attendants.
7. To whom the finance unit is accountable? What is your reporting mechanism?
8. What is/are the major problem(s) of the water supply service? (list according to their severity) In terms of :
  - A. Financial issues (tariff, connection fee, penalty, revenue collection, management)
  - B. Community and social factors (participation, demand, satisfaction and compliance-misuse / breaking of pipe line to watering livestock),
  - C. Technical aspects (suitability of technology, O & M, spare parts availability, supply and affordability)
  - D. Institutional and legal issues ( support by GO, support by NGO, level of autonomous)
  - E. Environmental factors (yield, quality and source protection).
9. Do you think that most problems so far encountered were sufficiently solved? If 'No' why?
10. Please provide any issue which either impede or facilitate the water supply system sustainability.

*Thank you for your collaboration!*



▪ **Checklist for Focus Group Discussions with selected beneficiaries**

Date of discussion \_\_\_\_\_

Woreda \_\_\_\_\_ Kebele \_\_\_\_\_

1. What is your main source of water before the development of Hitosa MVWS system?
2. Who initiated the Hitosa MVWS system? Who finance the Hitosa MVWS system?  
Have you participated during the development?
3. Who selected the water committee? Does the committee represent the beneficiaries?
4. Does the water committee consult MVWS beneficiaries?
5. How do you contact the water committee if you need?
6. Do you think that the water committee is well performing their responsibilities?
7. What is your opinion about the Water Management Board performance?
8. What do you think about the performance of Executive Water Committee?
9. Who is setting the water tariff?
10. Do you think that the existing water supply tariff is affordable to the beneficiaries?  
(Yes/No), if no why?
11. Do the tariff consider very poor household in your locality?
12. Do the beneficiaries pay water supply service fee regularly? (Yes/No), if 'No' what  
is/are the possible reason(s), what measures have you taken to solve the problem?
13. What is/are the major problem(s) of the water supply service? (list according to their  
severity) In terms of :
  - Financial issues (tariff, connection fee, penalty, revenue collection, management)
  - Community and social factors (participation, demand, satisfaction and  
compliance-misuse / breaking of pipe line to watering livestock),
  - Technical aspects (suitability of technology, O & M, spare parts availability,  
supply and affordability)
  - Institutional and legal issues ( support by GO, support by NGO, level of  
autonomous)
  - Environmental factors (yield, quality and source protection).

14. Do you think that most problems so far encountered were sufficiently solved? If 'No' why?
15. Please provide any issue which either impede or facilitate the water supply system sustainability.

▪ **Checklist for Focus Group Discussions with Selected Women Group**

Date of discussion \_\_\_\_\_

Woreda \_\_\_\_\_ Kebele \_\_\_\_\_

1. How do you describe the importance of water for women?
2. Who is mainly responsible to fetch water for domestic purpose in your locality? (wife, adult female, adult male, young female, young male, husband, relatives...)
3. Were the women consulted or participated before and during implementation of the water supply system? (Yes/No). If "Yes", what were the roles/ contributions women in each phase? (cash, labour). If "No", what was/were the reason (s) for not participating/consulting the women?
4. Are women a member of the water committee and a water management board? Are woman represented in the executive committee? Do you think that women are equally and actively participate in their roles and responsibilities? If No what is/are the reasons(s)
5. Do you collect water from the improved source for all domestic purposes at all season? If 'No' what is your alternative water source? Do you think that you are benefited from the improved water source?
6. Do you think that improved water is equally distributed in all villages/wereda? If No what is/are the reasons(s)
7. Do you believe that your opinion is well acknowledged in the water supply service activities? If No what is/are the reasons(s)?
8. What is/are the major problem(s) of the water supply service? (list according to their severity) In terms of :
  - A. Financial issues (tariff, connection fee, penalty, revenue collection, management)
  - B. Community and social factors (participation, demand, satisfaction and compliance-misuse / breaking of pipe line to watering livestock),

- C. Technical aspects (suitability of technology, O & M, spare parts availability, supply and affordability)
  - D. Institutional and legal issues ( support by GO, support by NGO, level of autonomous)
  - E. Environmental factors (yield, quality and source protection).
9. Please provide any issue which either impede or facilitate the water supply system sustainability.

***Thank you for your collaboration!***

## ANNEX 7

### List of beneficiary kebeles, total number of public taps and private connections and status

	Name of the beneficiary kebeles	No. of beneficiary HH	Total No. of public taps	Non-functional public taps	private yard connection	Remark
Lode Hitosa Wereda (Arsi zone)	1. Tolu Yombo					
	1.1 Yambo	232	1			Free of charge
	1.2 Kuchura	350	5	2	12	
	2 Gura Haricho/Ligaba/ (Urban)	180	3		12	
	3. Medi Bishan					
	3.1 Ketebe	256	3		9	
	3.2 Aren Endema	299	4		1	
	4. Gulele Boru Hondicha	304	4	1	10	
	Total HH beneficiary	1621				
	Hitosa Wereda (Arsi zone)	1. Boru Lencha				
1.1 Wacho Lencha		426	5	2	56	
1.2 Gulele hide Beru		603	5			
2. Sero Anketo						
2.1 Boru Anketo		430	5	2	51	
2.2 Nanu Anketo		329	4		4	
2.3 Sero Berarti		230	4	1	36	
2.4 Sero Badossa		185	2		7	
3. Guji Habe Badossa						
3.1 Habe Chori		328	3			
3.2 Guchi Chori		676	4	2		
3.3 Badossa Wedecha Bala		118	5			
4. Deyea Debesso						
4.1 Deyea Qofa/Gebreal		204	4	2	9	
4.2 Deyea Debesso		151	4	2	2	
4.3 Deyea Dodota		115	4	2	14	
5. Guri Debulla						
5.1 Guri Qofa		320			2	
5.2 Guri Tulicha		100	4	1		
5.3 Debulla Bellu		265	3		4	
6. Hate Andode			3			
6.1 Iteya surrounding		259	3		77	
6.2 Andode		300	4	2	14	
6.3 Hate tulu	420	4		24		
7. Shaki Sherera						
7.1 Iteya Shaki	300	4	2	318		

	7.2 Adea Shaki	221	4	1	
	8. Iteya urban (urban)	2505	15		1506
	9. Boru Jawi (urban)	884			276
	10. Boru Chilalo				
	10.1 Shorema Antuta	372	2	1	16
	10.2 Adea Antuta	390	5	1	10
	10.3 Boru Aragessa	350	1		
	11. Boneya Edo				
	11.1 Ade Mogne	215	5	2	8
	11.2 Boneya	255	4	2	4
	11.3 Gora Jawi	350	2		
	Total HH beneficiary	11301			
Dodota Wereda (Arsi Zone)	1. Dodoa Alem				
	1.1 Lode Adea	240	1		
	1.2 Amgna Daba	420	1		
	1.3 Amgna Qofa	402			
	2. Tedecha Guracha				
	2.1 Arba Gossa	200	1		2
	2.2 Horssis	128	2		
	2.3 Amigna	168	1		
	3. Badossa Betela				
	3.1 Betela	316	3		
	3.2 Audi	248	2		
	Total HH beneficiary	2122			
	Adama Wereda (E.Shewa Zone)	1. Debullla Sabo	394	4	
2. Hurufa		388	2		
3. Bekoji Dewero					
3.1 Cheka Dewero		420	4	1	6
3.2 Bekoji		321	2	1	5
4. Ejersa Mersa		128			
4.1 Cheka Selassie		168	2		
Total HH beneficiary		1819	157	30	2496

Source: Hitosa WAO, WA-Ethiopia and Beneficiary Weredas Administration Offices, 2010

## Summary

Total number of public tap	157
Number of public tap in rural areas	139
Number of public tap in urban areas	18
Percentage of rural public tap	88.5%
Percentage of urban public tap	11.5%
Number of private connection in urban	1794
Number of private connection in rural	702
Percentage of urban private connection	71.8%
Percentage of rural private connection	28.0%
Percentage of dysfunctional public taps (all found in rural areas)	21.6%



## Annex 8

The following pictures were taken during FGDs, KII and Observation





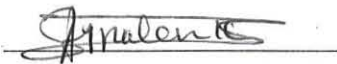
## Declaration

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

Declared by

Name

AYNALEM KASSA



Candidate

Confirmed by

Name

MULUGETA FESSEHA (PH.D)



Advisor

