ASSESSMENT OF THE COMMUNITY MANAGED PROJECTS (CMP) APPROACH IN DEVELOPING RURAL WATER SUPPLY SCHEMES:

A CASE OF PAWE AND MANDURA WOREDAS, NORTH EASTERN PART OF BENISHANGUL GUMUZ REGIONAL STATE, Ethiopia

Effective and sustainable WaSH services

Addis Ababa Institute of Technology

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A CASE OF PAWE AND MANDURA WOREDAS, NORTH EASTERN PART OF BENISHANGUL GUMUZ REGIONAL STATE, Ethiopia

A Thesis by

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Submitted to

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ACRONYMS

BGNRS	Benishangul Gumuz National Regional State
CBD	Community Based Development
CMP	Community Managed Projects
COWASH	Community-led accelerated WASH
EWRM	Earth and Water management
GoE	Government of Ethiopia
GoF	Government of Finland
GPS	Global Positioning System
GTP	Growth and Transformation plan
HDW	Hand Dug Well
IRC	International Rescue Committee
JMP	Joint Monitoring Program
MDG	Millennium Development Goal
MFI	Micro Finance Institutions
MoWE	Ministry of Water and Energy
NGO	Non-Governmental Organizations
O & M	Operation and Maintenance
RWS	Rural Water Supply
SPD	Spring Development
SW	Shallow well
UAP	Universal Access Plan
UN	United Nations
UNICEF	United Nations Children Fund
VLOM	Village Level Operation and Maintenance
WASH	Water Sanitation and Hygiene

WASHCO	Water Sanitation and Hygiene Committee
WHO	World Health Organization
WIF	WASH Implementation Framework
WS	Water Supply
WSDP	Water Sector Development Program
WUGs	Water User Groups

Woreda is the lower Ethiopian government administrative body equivalent to district

Kebelle is an association under Woreda administration

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Finally, I would further like to take this opportunity to express my thankfulness to the CMP supervisors, woreda experts and community representatives in the woredas for their thoughtfulness and unreserved cooperation during the fieldwork.

ABSTRACT

A recent development of the CMP approach, to implement rural water supply projects has been piloted in five woredas of the Metekel zone in Benishangul Gumuz regional state located at the Western part of Ethiopia. The assessment on the efficiency of the approach has been carried out in two woredas of the Northern part of Metekel Zone, namely, Mandura and Pawe woredas.

First, it was checked if efforts have been put in to place and its applicability before evaluating accomplished results. In the second part, effectiveness of the approach was evaluated. In this research, the approach is supposed to effective if implementation is efficient, if the built schemes are going to sustain and if schemes are providing proper and adequate services. Accordingly, a rural water supply system is supposed to be sustainable up on achieving determinants of sustainability. In this research, these aspects are taken as factors that indicate effectiveness, which is a means to measure advancement of the approach towards meeting objectives.

Major findings of the research were, elements of the approach were practiced as required except participating communities in technology option selection and post construction support. From the identified causes, it was recognized that there were no evidences found to articulate inappropriateness of any elements of the approach for the study areas. Finally, the effectiveness of the approach, evaluated using averaging the scores attributed to indicators showed above average value that is, 68.61% and 76.70% for Mandura and Pawe woredas respectively. This is interpreted as its application has shown promising result, which only requires some adjustment and efforts for its complete implementation and better output. And it appeared that more effort is needed to secure spare part availability and improve efficiency of community financing. And in general terms, other factors to be given due consideration include skill and awareness of community, especially in Mandura woreda where the socio economic situation is relatively poorer. Recommendations are made on how to deal with the gaps that has been identified for further accomplishments and stress on implementation procedures, which need focus for proper operation and maintenance so as to assure sustainability of schemes. .

1. INTRODUCTION

1.1. BACKGROUND

Safe drinking water is one of the primary necessities for human beings to survive, live healthy life and be productive. However, large number of the world's population faces shortage of this basic need. Though both urban and rural parts are facing this problem, rural communities still are under worst situation. Especially in developing countries likes Ethiopia, people suffer from lack of safe drinking water and proper sanitation.

Water supply problem in Ethiopia has multiple impacts on people's health, education and nutrition, preventing the country from reaching its development potential [http://www.finland.org.et. 2011]. That is, large part of the population still uses unprotected (unsafe) sources. For this, access to an improved water supply in Ethiopia is generally among the lowest, which was estimated as 37% of total coverage (92% for urban areas and 27% for rural areas) by JMP (Joint Monitoring Program) updated in 2010. Consequently, related problems such as, water born diseases, poor sanitation and lack of hygiene still are the most common cause of illness and death. Women and children also are main victims of this crisis, as girls and women walk long distances everyday to fetch water instead of doing other productive tasks.

Moreover, children die at early age due to unsafe drinking water before developing immune system. According to water aid Ethiopia, 2008, because of poor sanitation practices and consumption of contaminated water, over 100 out of 1000 children die within the first five years of age (cited on Aschalew Demeke, 2009).

To face the crisis, the United Nations set targets accepted by member countries to reduce poverty and ensure sustainable development (UN MDG, 2000). Goal number 7, target 10 of the MDG is set to halve the proportion of people without sustainable access to safe water and basic sanitation by 2015.

However, Peter Harvey and Bob reed argue that, this goal will be much harder to achieve in Africa than in the rest of the developing world due to the low level of the coverage in the base year coupled with high population growth rates in some areas. This is further compounded by the fact that existing services demonstrate limited sustainability throughout the continent.

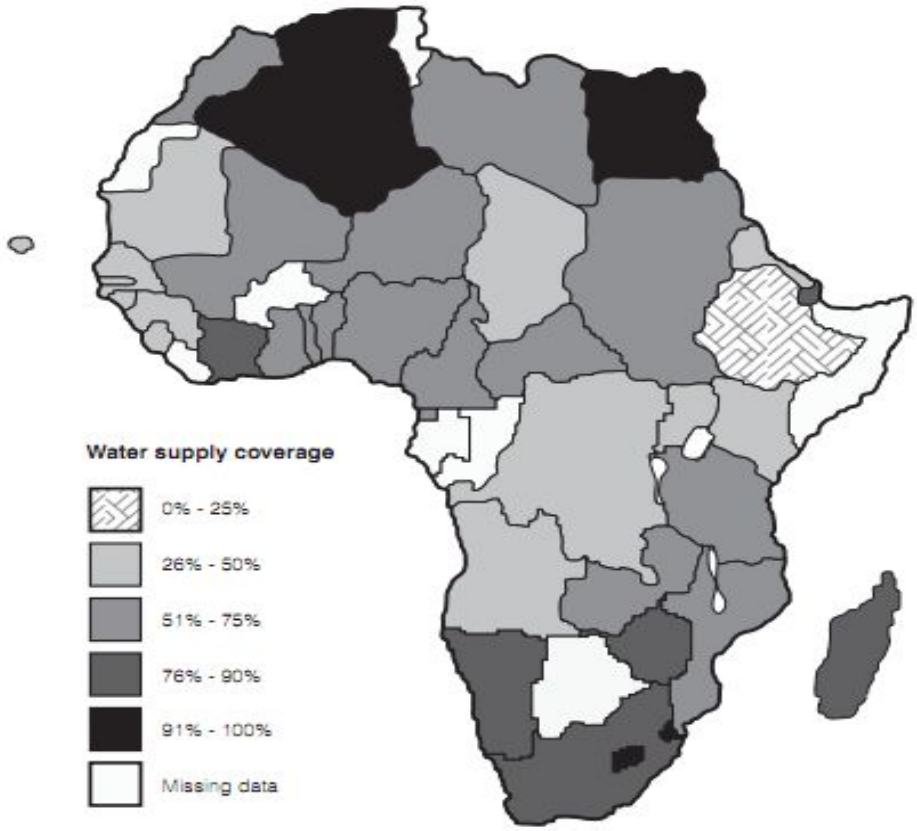


Figure 1: Water supply coverage in Africa (source WHO/UNICEF, 2000, cited in [25])

Moreover, GoE has planned a Water Supply and Sanitation Program that has set targets to be achieved over the 15- year program period starting from the year 2001. Targets are therefore set for the national water coverage to be attained at the end of program period in 2016, in the same manner target for the Urban Water Supply and Rural Ethiopia are also set. They are divided into 3-sub programs divided into three - five rolling years consciously designed to maintain consistency with Government's Five-year plans. The program (WSDP) is therefore divided into short term (2002-2006), Medium-term (2007-2011) and long-term (2012-2016). At the end of the program, period (2016) national water supply coverage will hit a level of 98.0% for rural and 100% for urban settings from its 31% in the base year of the program (2001). The setting of the target indicates that Government has made a conscious decision to meet its commitments for the Millennium Development Goals (MDGs) [19].

Additionally, in 2006, the government of Ethiopia adopted a Universal Access Plan (UAP) at national level to achieve 98% access for rural water supply and 100% access for urban water supply and sanitation by 2012. This plan is based on the redefined concept of access to basic water supply. According to the new definition, the access to an improved water source means the

availability of at least 15 l/capita/day in 1.5 km radius for rural and 20 l/capita/day in 0.5 km radius for urban setting (MoWE, 2010).

To accelerate the implementation of this plan, GoF has been bilaterally working with the GoE. This bilateral program mainly targets at implementing sustainable water supply and sanitation schemes. Therefore, a new kind of community participation approach was introduced in Amhara region as Rural water supply and environmental program, RWSEP in 1994. This approach evolved as CDF (community development fund) progressively between 2003 and 2006 which was later scaled up to community managed approach (CMP). This approach targets to decentralize financial management to the lowest possible level so as to ensure effective fund utilization, empower communities, encourage community participation at every stage and encourage local suppliers.

Additionally, the approach was piloted in Benishangul Gumuz National Regional State as Water supply, sanitation and hygiene program (FinnWASH – BG). The program started by planning stage in 2008, and moved to the next phase of four year implementation program in July (2009-2013), in five woredas of the Metekel zone in Benishangul Gumuz Region. And there is a growing need to incorporate this modality in to the WASH Implementation Framework as a component of one National WaSH Program. Because Ethiopian water resources management strategy, especially the water supply sector focuses on enhancing the integrated and comprehensive management of water resources that avoids fragmented approach.

The National WaSH Program, which is launched by the Government of Ethiopia, to achieve the ambitious goals laid out in the Growth & Transformation Plan (GTP, for the year 2010-2015) for safe water and improved hygiene and sanitation. And it looks forward to how WaSH will be structured, how it will be funded and how it will be implemented when a single Consolidated WaSH account is operational, when coordination structures are in place and when the key sectors and the NGOs are integrated in planning, implementing and reporting one WaSH Program. For the present, the WIF is intended to become the basis of the integrated One WASH Program (MoWE, 2011).

In this study, secondary data sources, working manuals, reviewing designs, field observations, household survey, discussions with woredas and focus group discussion with WASHCOs has been used to assess and evaluate the practiced CMP approach in developing rural water supply schemes in selected woredas of the Metekel Zone. And the primary data collection required ten

days of field work in the woredas of the Benishangul Gumuz Regional State to assess if key issues of the approach has been adhered to in practice and its achievement in meeting targeted objectives.

1.2. DESCRIPTION OF THE STUDY AREA

The project area is located in Metekel zone of the Benishangul Gumuz regional state. The region is located in the northwestern part of Ethiopia and has an estimated area of 50,380 square kilometers with an estimated population of 656,000 people, out of which 89.8% live in rural areas, indicating the very low level of urbanization. [Source: Ethiopian Demography & Health, 2008].

The study zone, Metekel, is the largest zone in the region. The Gumuz, the Shinasha, Amhara, Awi, a subgroup of the Agew, and the Oromo ethnic groups live in the area. The zone encloses seven woredas, Bullen, Dibate, Dangur, Guba, Mandura, Pawi and Wembera.

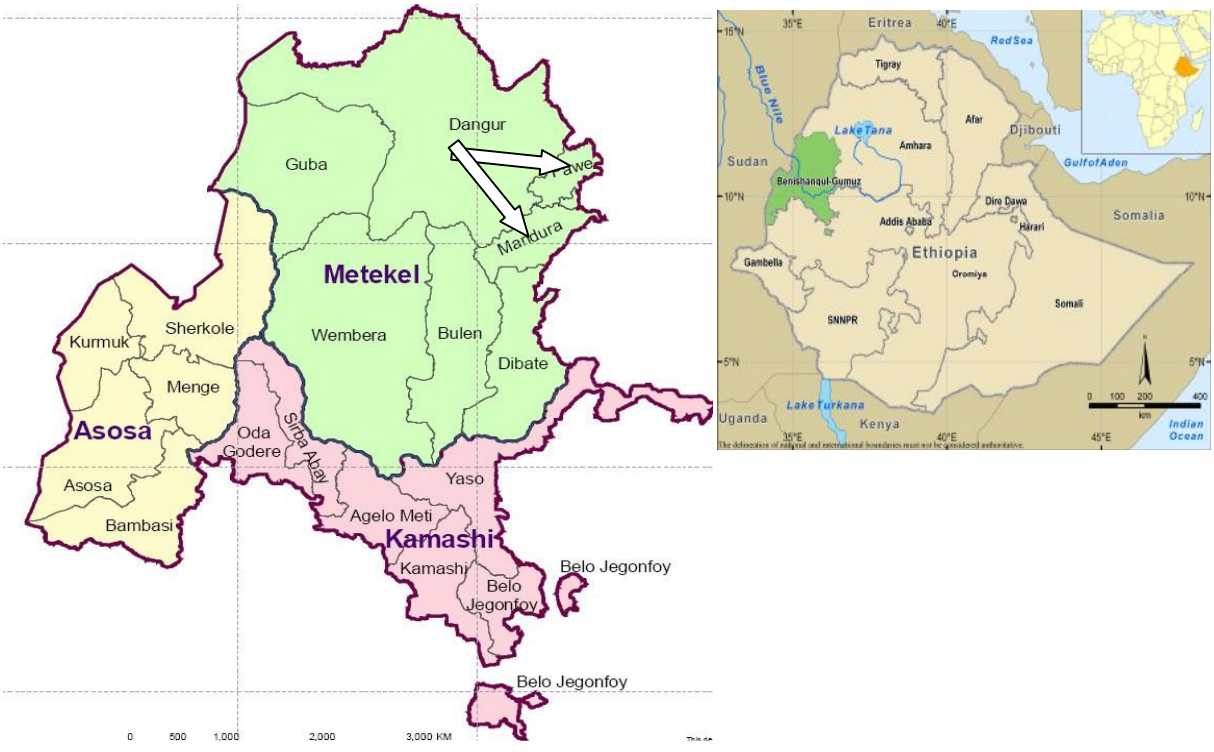


Figure 2: Location and map of Benishangul Gumuz divided in to Zonal administration & Woredas

For this study, selected Woredas are; Mandura woreda with a capital city of Gilgel Beles that has a population of 32,026 and Pawe woreda, with a capital city of Almu and population of 52,376 [12]. These Woredas are among the five Woredas (Bullen, Dibate, Mandura, Pawi and Wembera) where community managed projects approach has been piloted at.

The study Woredas are located in the Beles river basin, where the meteorological, geological and hydro geological characteristics are as described below.

Precipitation:

Precipitation of the area in mm [13]

Statio	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Mandur	2.02	3.53	4.51	54.8	142.33	264.25	374.7	441.11	334.9	121.5	15.7	4.8	1764.35
Pawe	0.27	1.42	11.8	27.8	142.39	290.27	308.4	410.71	215.2	134.4	17.2	1.8	1561.9

Type of aquifer and recharge:

Quaternary volcanic rocks and thick regolith mainly characterize the study Woredas and around 35% of Mandura wereda comprise non-carbonate metamorphic rocks [13]. Volcanic rocks are aquifers with good productivity while the metamorphic rocks have low permeability and hence low recharge.

The above factors together with the topography of the area (slightly undulating terrain type), enhances ground water recharge. And generally ground water is available at shallow depth while most springs are located at periphery areas.

Moreover, Pawe and Mandura have different and distinctive characteristics in various parameters, which will help the research to evaluate the approach under different circumstances. These different parameters and characteristics of the woredas are explained in table 1.

Table 1: Parameters characterizing the selected Woredas

No	Parameters	Mandura	Pawe
1.	Topography	Rugged	Flat to slightly undulating
2.	Geological formation	Thin weathered thickness of Rocks	Thicker weathered layer
3.	Settling pattern	Sparsely populated and gathering through villegization very recently	Denser villages
4.	Origin of residents	Mostly natives (Gumuz)	Came through resettlement programs
5.	Socio cultural condition	Uncivilized and primitive	Relatively civilized and educated
6.	Exposure to developed schemes	Developed VLOM hand pumps are new to the area	Had pre-existing and well-done gravity scheme constructed by Italian company, Salini. (Ali spring and Diga dam)
7.	Hydro geologic setting	Local ground water flow is dominant Ground water level fluctuation is expected to be high due to topography	Recharge from highlands of Amhara and through big rivers like Beles. Expected less ground water level fluctuation Regional ground water flow is dominant
8.	Progress in water supply coverage in the program	lowest	Highest

Table 2: Progress in water supply coverage of the project woredas under CMP

Woredas	Coverage before planning phase	Coverage, June, 2009	Coverage, June, 2010	Coverge, June, 2011	Total change in coverage
Bullen	17%	26%	48%	78%	64%
Dibate	30%	35%	45%	48%	18%
Mandura	37%	44%	50%	52%	15%
Pawe	12%	22%	46%	86%	74%
Wombera	16%	20%	30%	41%	25%

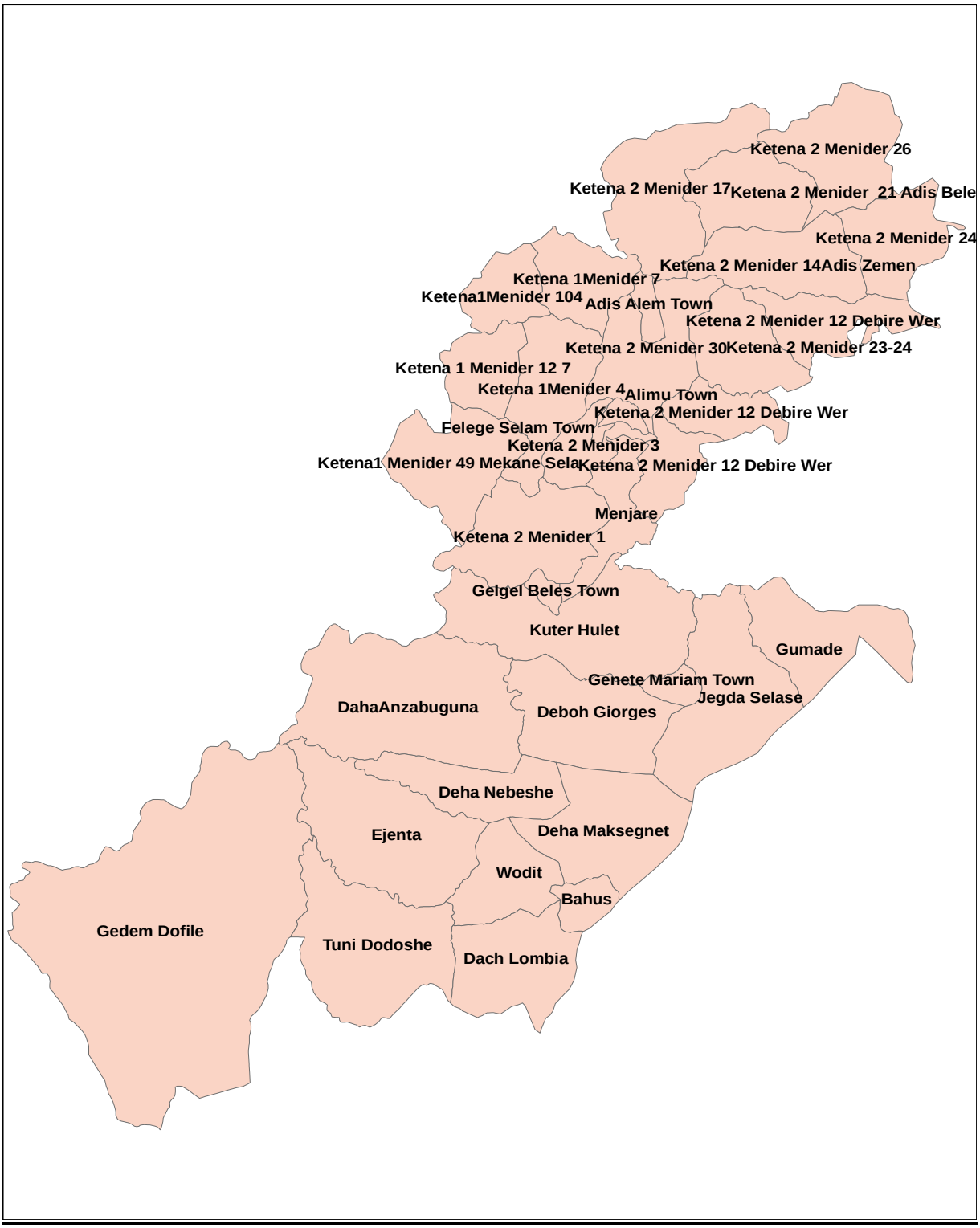


Figure 3: Map of both study Woredas divided in to Kebeles

1.3. PROBLEM STATEMENT

Ethiopia is one of the developing countries suffering from the consequences of poor water supply coverage and especially the rural community had to endure severe problems. In addition to the fact that there is an inadequate financial capacity to implement schemes, most studies reveal that, poor sustainability of developed schemes is the core problem challenging the efforts to improve rural water supply coverage. That is, a number of developed schemes fail to function soon after handed over to the community for use thus holding back coverage from meeting target plans.

The study area is among these rural parts of the country, which experience similar problems. As per the Finn WASH-BG Annual Report, 2010, 37% and 12% of the population in Mandura and Pawe woredas has access to potable water supplies in the year 2008 respectively. Additionally, Water, Mines and Energy Resources Development Bureau's figures of non-functional water points in Benishangul Gumuz show a high percentage of (31%) [12].

Moreover, though financiers and the government have committed substantial funds to improve national water supply coverage and sustainability of schemes through decentralized and participatory management system, effective fund expenditure and ensuring proper operation and maintenance of infrastructure built with these funds remained a challenge [32]. Many reasons can be listed as causes to this problem that are related to planning procedures, implementation process and exit strategy of a project. These issues are more specifically related to technical, social, financial and managerial matters.

The highly decentralized and participatory CMP approach intervention under the bilateral program was outlined aiming at accelerating implementation rate through effective budget utilization and developing sustainable schemes. Moreover, there is a need to incorporate the approach into the one national WaSH program and promote this approach to other donors and NGOs as an optional approach towards improving rural water supply coverage and developing sustainable schemes.

And since the approach has been piloted for five years in the selected woredas of the BGNRS, now it is the time to evaluate its effectiveness, pros and cons in depth under the particular socio-economic condition and natural environment of the study areas. This is because performance of community management models can have different outputs among areas of different socio-economic and environmental settings. This study will therefore, focus on its applicability and results achieved to confirm its suitability and accomplishment under the existing situation in the selected woredas.

1.4. OBJECTIVE OF THE STUDY

a. General objective

The main objective of this research is to assess the performance of CMP approach piloted in Pawe and Mandura woredas of the Benishangul Gumuz regional state, which aims to develop sustainable rural water supply schemes.

b. Specific Objective

The specific objectives of the research work are:

- To assess how elements of the approach have been put in place (its applicability and relevance) to have an effect on its performance
- To measure the effectiveness of the approach in the two woredas and compare it with targets set in the program
- To identify the challenges, gaps and opportunities of the approach under different situations and
- To recommend a way forward

2. METHODOLOGY

Both primary and secondary data were collected for the study. Primary data was collected from selected households using semi-structured interviews for households, focus group discussions with WASHCos (separately with men and women) and formal and informal discussions with woreda experts. The fieldwork was carried out in the program woredas within eight days, employing two enumerators and using two cars to do the survey around the kebelles. Secondary data was also collected from reports, training manuals, scheme designs and literatures.

Sampling Design

- Discussions were held with the CMP supervisors and senior technical experts (one from each woreda).
- Schemes were selected by stratified random sampling to get good representative data. The stratification was based on scheme types (HDW, SPD, SW …) and year of construction.
- Then household survey was done by randomly selecting two respondents at three different distances (500m, 1000m and 1500m) from the water point. Accordingly, six respondents have been surveyed from every sample water point.

Data analysis

Close-ended questions were analyzed using SPSS software. These quantitative data were analyzed using descriptive statistics (averages, frequency, percentages, etc.), charts and graphs. Softwares such as MS-EXCEL and SPSS were used in this research work. The qualitative data description was also used to complement quantitative data.

3. FRAMEWORK OF THE STUDY

- First, it was checked if efforts have been put in place before evaluating accomplished results. Reasons and justifications on its adherence in practice will reveal applicability of the approach or existence of implementation gaps.
- Effectiveness of the approach for each woreda was evaluated based on achieving targeted objectives, which are effectiveness in implementing schemes, achieving sustainability and assuring proper service of the systems to attain the ultimate goal, i.e., poverty reduction (through improving health of the community and reducing time spent to fetch water).
- Accordingly, sustainability was measured up on achieving its determinants.
- The determinants of sustainability considered here are;
    - Appropriateness of sites selected
    - Appropriateness of implemented technologies
    - Protection of water points and
    - Efficiency of community financing O & M
- Some of these indicators of sustainability are divided into sub-indicators, to address technical, social and financial issues.
- And scores were given to indicators and sub-indicators based on information obtained from interviews, discussions and field observations.
- Finally, from the scores of the indicators, averages were drawn to obtain an overall impression of the indicators concerned.

Note: All the parameters were assumed to have equal weights because all factors have an effect on the ultimate objective.

4. LITERATURE REVIEW

4.1. NATIONAL WATER SUPPLY POLICY AND ITS OBJECTIVES

The Federal Democratic Republic of Ethiopia has adopted a national water resources management policy, a water supply & sanitation strategy and a water sector development program, setting sub sectoral objectives on water supply and sanitation, Irrigation and hydropower. The overall objective of water supply and sanitation policy is to enhance the well-being and productivity of the Ethiopian people through provision of adequate, reliable and clean water supply and sanitation services and to foster its tangible contribution to the economy by providing water supply services that meet the livestock, industry and other water users' demands (EWRM).

The overall goal of Water Resources Policy is to enhance and promote all national efforts towards the efficient, equitable and optimum utilization of the available Water Resources of Ethiopia for significant socioeconomic development on sustainable basis.

Detail Objectives include;

- Provision of, as much as conditions permit, sustainable and sufficient water supply services to all the peoples of Ethiopia .
- Satisfying water supply requirements for livestock, industries and other users as much as conditions permit.
- Carry out operation and maintenance of all water supply and sanitation services in a sustainable and efficient manner.
- Promoting sustainable conservation and utilization of the water resources through protection of water sources, efficiency in the use of water as well as control of wastage and pollution.
- Creating sustainable capacity building in terms of the enabling environment, including institutions, human resources development, legislation and regulatory framework for water supply and sanitation.

4.2. RURAL WATER SUPPLY

Rural water supply may be a water system established where the regional water management agency does not have authority or the ability to extend infrastructure (Deverill et al. 2004; Swartz and Ralo 2004, cited in [17]). Rural water supply projects differ from municipal water development, large-scale irrigation works, or hydropower development in that a RWS project is focused primarily on the management of land and water resources for human consumption in rural areas, through the utilization of local institutions (Cairncross 1992; Narayan 1995; Paudel and Gopal 2004; Swartz and Ralo 2004). Moreover, a RWS improvement project is generally an action, by a community and any collaborators to improve the access individuals have to a clean and reliable water source (Lammerink 1998; MacDonald 2005, p. 32). Typically, the main objectives of a RWS initiative are to increase and improve the quantity and quality of water used by a group of people on a continuous basis (Wagner and Lanoix 1959, p. 18; Schouten and Moriarty 2003, p. 18) cited on [17].

Some of the infrastructure features of a RWS system include boreholes, developed springs, hand pumps, raw water mains, elevated tanks, roof rain-water catch tanks, small diversion dams, and gravity powered pumps (e.g., hydraulic rams) (Wagner and Lanoix 1959; Jordan 1980; WASH 1990; Younger 2007). RWS systems are also defined by a type of management and governance, which is often community based and derived from social rules and socially agreed upon modes of operation (Brooks 2002).

4.3. RURAL WATER SUPPLY PROVISION METHODS

Water can be extracted from different sources by various technical means. The supplies can then be delivered to consumers in different ways. Whatever the technical solution adopted, the aim is to make adequate quantities of water, which is safe for human consumption, reasonably accessible to all [6].

Improved technologies include house connection, public standpipe, borehole, protected dug well, protected spring and rainwater harvesting. Unimproved technologies are unprotected well, unprotected spring, vendor-provided water and tanker truck-provided water. It is assumed that if the user has access to an improved source then such a source should be likely to provide 20 liters per capita per day at a distance of no longer than 1000 meters [4].

4.3.1. Shallow wells / Hand dug wells

Although there are many cases of deeper hand dug wells, most are relatively shallow (less than 15 to 20m) and tend to tap water from the uppermost (unconfined) aquifer. Thus are more susceptible to bacteriological contamination and the effects of falling water tables.

There are wide ranges of construction methods and materials that can be used to construct hand-dug wells. Hand dug wells are usually circular because a round well usually produces a great amount of water for least amount of excavation, and a round lining is stronger than any other shape. Acceptable aquifer penetration depths and yields:

i) 2 meters and 20 liters per minute.

ii) 2.5 meters and 15 liters per minute

iii) 3 meters

4.3.2. Deep wells/ Bore Holes

It is a deep vertical hole of small diameter machine drilled (bored) into the earth to ascertain the nature of the underlying strata or to obtain water at deeper depth. Wells are sunk deep in to the ground where significant ground water is available at a deeper depth than shallow wells. The depth of a borehole is normally above 30 meters, most frequently in the range of 60 to 200 m. The completed well typically has plain casing on the upper section through loose or low yielding upper soil layers, and is left with filter/screen in the water bearing aquifers [4].

4.3.3. Spring Development

A spring occurs where the groundwater table intersects the surface. Springs are often the traditional source of water, especially for communities living in hilly areas and thus are already culturally acceptable water supply solution.

The protection of the spring usually involves the construction of a sealed "spring box" which traps the water, provides for some basic filtration and sedimentation through the use of a gravel filter and sump, and, in some cases, provides water storage space to satisfy peak demand. It can be constructed using locally available resources and expertise.

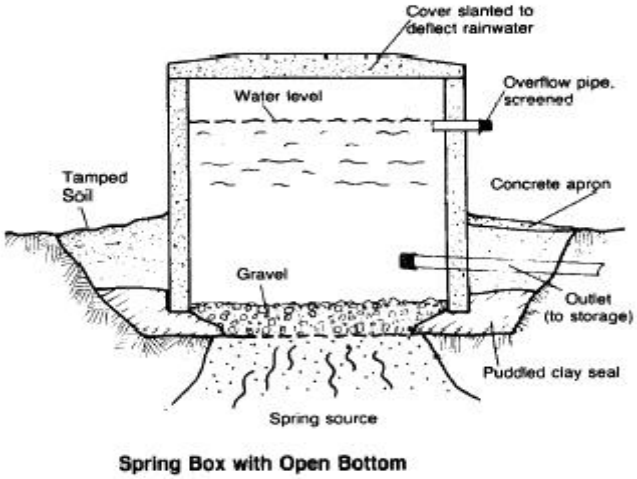


Figure 4: Spring box with open bottom

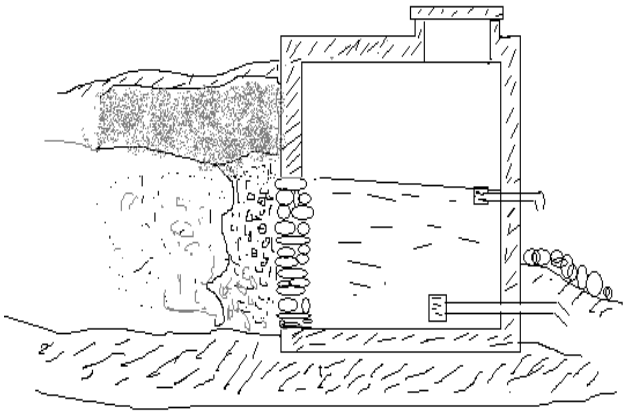


Figure 5: Spring box with open side

4.3.4. Subsurface Dams

Sub-surface dams trap groundwater where it flows close to the surface in valleys or dried-up riverbeds. The water is stored as a shallow aquifer beneath the surface and therefore very little water is lost through evaporation, and there is a natural purification of the water as it filters through the ground. The dam must be constructed across the width of the valley and down to an impermeable layer to be effective. The water is accessed by wells -preferably combined with infiltration galleries -constructed upstream of the dam.

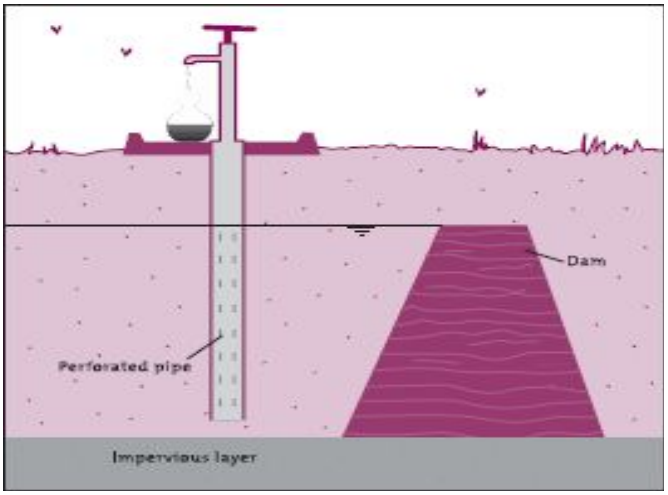


Figure 6: Subsurface dam

4.3.5. Rain water harvesting

Rain water harvesting is a technology used to collect and store rain water for various uses. Techniques used to collect rainwater arise from practices employed by ancient civilizations, which are upgraded and improved through modernization and innovation. Rainwater harvesting system consists of three principal components; the catchments area, the collection device, and the conveyance system. Catchment area can be rooftops, land surface and roads.

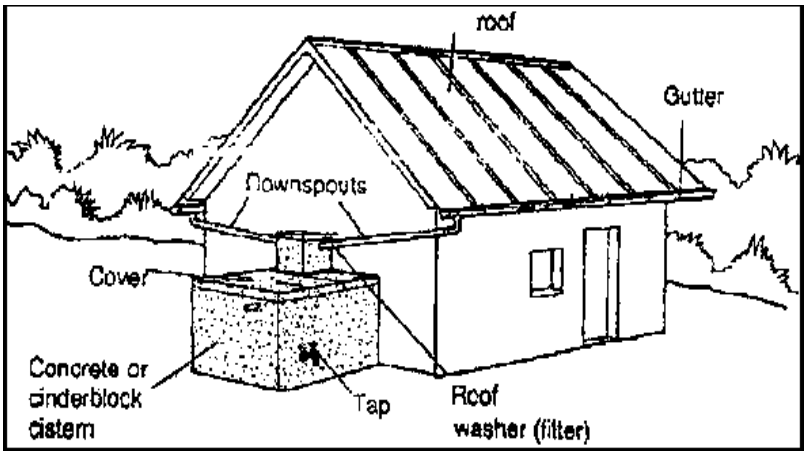


Figure 7: Schematic diagram of roof water harvesting

4.4. SUSTAINABILITY OF RWS

Once a water supply scheme is developed, efforts should be made to sustain the facility and benefits gained. Generally, sustainability of water supply schemes is whether benefits from the service continue satisfactorily until the end of the design life. Benefits include health benefits

through providing improved quality of water and protected source, water delivery to reduce time spent and convenience.

P.A. Harvey and R.A. Reed, 2003, defined sustainable rural water supply as one in which:

- The water sources are not over-exploited but naturally replenished,
- Facilities are maintained in a functional state which also ensures a reliable and adequate water supply,
- The benefits of the supply continue to be realized by all users over a prolonged period of time, and

Sustainability of water supplies is a key challenge, both in terms of water resources and service delivery. The United Nations International Children's Fund (UNICEF) estimates that one third of rural water supplies in sub-Saharan Africa are nonoperational at any given time [20]. Thus, achieving lasting benefits from water supply interventions involves much more than building facilities.

4.5. DETERMINANTS OF SUSTAINABILITY

Three indicators for a sustainable water system appear. These indicators imply that:

a. **Facilities are operational and benefits all the users;** this means that the facilities are (now and in the near future) technically in a good condition as well as the environment around the facilities, so that it always delivers a satisfying color, quantity and quality of water at an accepted distance to all the intended beneficiaries. Consequently, they can benefit from a better health [36].

b. **Facilities are maintained;** this means that most of the spare parts, tools and means to keep the system operational are available in the community that capable and available caretakers know and fulfill their responsibilities, so that facilities are monitored and cleaned regularly and all (preventive) maintenance is carried out [36].

c. **Finances are managed;** this means that a capable and trusted water management committee has been elected by the community and is institutionalized. so that they can set an appropriate tariff system that covers administrative, operation, maintenance and replacement costs (based on the cost-sharing arrangements), so that fees are collected and finances accounted, managed and controlled, so that facilities continue to function over a prolonged period of time [36].

And more generally, enabling a rural water supply scheme to remain operational over the design life is affected by a qualifying list of key determinants or factors. These are interrelated technical, social, environmental, financial and managerial issues upon which failure in meeting any of these can lead to failure of scheme.

- Political factors
- Technical factors including design, performance and maintenance issues,
- Community and social factors including willingness to support projects,
- Institutional factors, including policy and external follow-up support,
- Environmental factors, including the sustainability of the water source, and
- Financial factors, including the ability to cover recurrent costs.

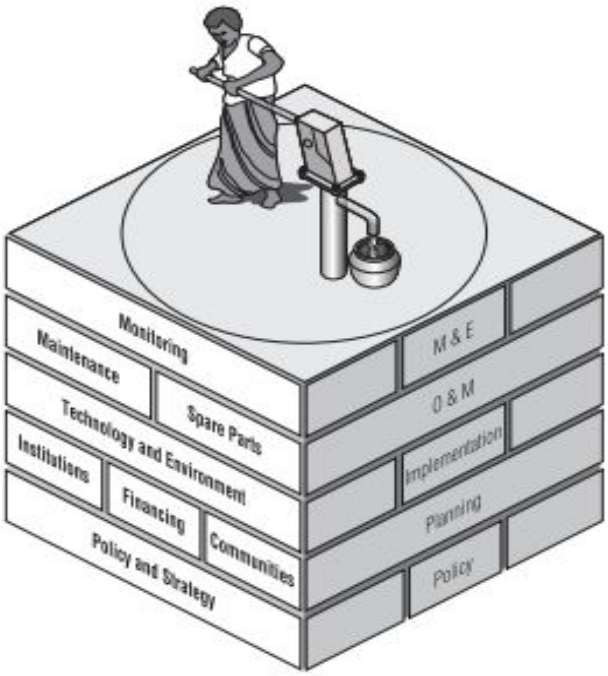


Figure 8: Sustainability Building Blocks [25]

4.5.1. Political factors

Political conditions have been examined as factors which affect sustainability of RWSS. The stability of the national government, the strength of government institutions at all levels, and the extent to which government services have reached all areas of the country are important. The

commitment of the national government to the democratic process and decentralization makes a significant difference [37].

4.5.2. Technical aspects

Technical issues relating to the design and construction of a rural water system are the most obvious determinants of water system sustainability. Poor construction quality or the use of low-grade materials may lead to the failure of the water system before the end of its design life. Similarly, design mistake of schemes, and overestimates of the water sources may cause a system to fail from the outset.

The technical factors, which are likely to influence sustainability, are:

- Technical criteria,
- Skills needed to operate and maintain
- Its capacity to respond to a demand and a desired service level
- Its impact on the environment
- Availability, accessibility and costs of spare parts and maintenance.

4.5.3. Social aspects

The sustainability of a rural water system depends on the willingness of users to provide the necessary time, money and labor to keep the system functioning. This willingness may be affected

by socio-economic factors such as income level, ethnic homogeneity, or the willingness of villagers to work together. More commonly, however, the willingness will depend on consumer satisfaction with the service, usually compared to the previous water source in a community. When communities perceive a significant improvement in water services, they are usually more willing to pay for O&M. Willingness-to-pay is also affected by community perceptions of ownership or sense of entitlement to free services from the government. In brief, all these are the social aspects of sustainability [35].

4.5.4. Institutional aspects

Experience has shown that even a well-constructed water system needs proper institutional arrangements to keep it functioning over time. In order for programs to be successful, there is a necessity for productive partnerships between different sector stakeholders. Several different potential stakeholders may be involved in rural water supply programs [34]. These include:

• External Support Agencies (ESAs);

- National and local government institutions;
- Non-governmental organizations (NGOs);
- Communities and community-based organizations (CBOs);
- Private sector companies and individuals; and
- Non-profit sector organizations

Institutional partnerships for rural water services can involve any of the above stakeholders, and the number and nature of partners will depend on the local context. In order to form sustainable partnerships the following features (adapted from Karasoff, 1998 cited in [34]) are critical:

- A shared vision and mission to provide a framework to guide future actions;
- Common goals that are mutually beneficial to all partners and that can be measured;
- Clear roles and responsibilities that best use the expertise of each partner;
- Shared responsibility and authority for attaining partnership goals;
- Shared decision-making using a process on which all partners agree;
- A joint plan that outlines goals, objectives, outcomes, strategies and measurable indicators (for monitoring); and
- Shared resources committed by all partners.

One effective way in which different stakeholders can work together is to form co-ordination committees at regional or district level. Such a committee is likely to consist of personnel from a variety of local government institutions, which are directly or indirectly involved in or affected by rural water supply, as well as representatives of NGOs, private sector organizations and community groups. Traditional leaders can also have an important role to play, both in representing communities and in ensuring that government is made accountable, and should be included where possible [35].

4.5.5. Environmental Factors

It is obvious that the benefits of a WS project can be sustained only if the water resources are sustained. Each watershed has inherent physical limits to water resource development. Planning should be based on the water yield of a particular watershed and its absorptive capacity to neutralize wastes. Unfortunately, rapidly growing populations are exceeding the local sources of supply in many locations throughout the world. Water sources that are found at some distance (or at great depths) from the users are becoming prohibitively expensive to develop. Water sources

should also be developed so they do not exceed their regenerative capacity; otherwise a basic tenet of sustainability, providing for succeeding generations, is violated.

4.6. PROCESSES WHICH INFLUENCE RWS PROJECT OUTCOMES

4.6.1. National Policy

National policies and strategies need to be developed in a way, which recognizes the service-based nature of water supply and the need for government to play a crucial role, especially in providing support, co-ordination and regulation. There is a range of institutional frameworks and models that can be used for service delivery, and respective governments should be free from external pressure to select the most appropriate options for them. Appropriate legislative and regulatory frameworks that are compatible with government policy must also be developed [25].

4.6.2. Decentralization

Decentralization means diffusion of authority. The dispersal of authority of decision-making to the lower level management is termed as decentralization. The need for decentralization is felt when the business grows in its size which necessitates diversification of activities.

In the water sector, its goal is to achieve more sustainable use of water resources through the close involvement of stakeholders at the local level. To achieve this, decentralization needs to be implemented in a transparent, accountable and participatory manner. Advantages of decentralization include distribution of burden of top executive, increased motivation and morale, greater efficiency and output, diversification of activities, better Co-ordination, facilitate effective control and quick decision-making [33].

4.6.3. Demand Responsiveness

Demand responsiveness is a prerequisite for sustainability of RWSS. It is an expression of their commitment, and a way to make communities responsible for their choices and future tasks. In the beginning, community shows its demand trough the Water Desk or the Water Bureau; then, it must contribute to the initial investment costs, as a way of strengthening their financial responsibility and future willingness to pay. This contribution should represent 5–20% of the total investment costs, which are composed mainly of labor and available local materials. It's also possible to ask for a contribution in cash, that should be at maximum the equivalent of half a year water fees. Anyway, all this must be very clear among the community, because for sure new users will join the water system [34].

4.6.4. Planning with a gender perspective

This implies that the roles and functions of both men and women are clearly defined for management, operation and maintenance, since these might also highlight the need for specific capacity-building activities. Women tend to be more responsible in their tasks, and they use to be more concerned about water problem. The idea of planning with gender perspective does not mean that women have to be the sole responsible of management, but to use the project to empower women, and, in the other hand, women roles to benefit the project [34].

Since women bear the burden of providing water for family demand, most studies revealed that participation of women in the development of water scheme is determinant factor for achieving sustainability. Females can also promptly notice water quality changes and its consequences, as they are responsible to fetch and manage water for domestic use. Men on the other hand are less involved in day-to-day water issues as they leave for work and spend more time away. In addition, it is also known that female participants can raise important ideas for designing a convenient and comfortable structure, which can intern play part in sustaining the system [32].

4.6.5. Community Participation

The term participation is hard to define or as Netshiswinzhe (2000) says, 'it has become an almost meaningless buzzword over the last decade or so'. Authors do agree that the depth/extent of participation influences the sustainability of a water supply service. Like Evans and Appleton (1993. In: Sohail et al, 2005) argue: 'The shift from participation as users of a new service to the participation of the beneficiaries as owners, partners, and managers is thought to be an important contributory factor to the sustainability of a project' (Cited in[36]).

Community involvement is essential throughout the whole RWS project cycle since it is a way to motivate, make responsible and build the capacities of communities in their RWS management tasks and functions. User communities must be granted true decision-making authority. This means that they should be given comprehensive information needed to make informed decisions, without being pressured to follow the preferences of the facilitator. Communities and households should be free to select technology and service levels that suit them. They should also be free to select the most appropriate management system for operation and maintenance (O&M), including the option not to manage themselves [25].

4.6.6. Capacity building and training at all levels

If every partner is expected to fulfill its commitment, it is essential to ensure that it is capable to do it effectively and efficiently; since without adequate and appropriate capacity at all different levels (national, district and local), services are rarely to be sustained.

Therefore, capacity-building needs to include a collection of efforts aimed to (i) improve human skills; (ii) promote institutional reforms; (iii) provide physical and financial resources; and to (iv) develop an appropriate operating environment. The main objectives should be (WaterAid, 2006):

- To strengthen the capacity of all relevant stakeholders in planning, implementing and Managing the project at various levels.
- To support community management of the services delivered.
- To create an enabling environment for the private sector and NGOs to provide water and Sanitation related services.

4.6.7. External Support

Where an overseeing institution to monitor systems regularly visits communities, this reaffirms the need to contribute to O&M. The institution can advise communities on how to make best use of unspent funds through investment, can regulate WASH committees to ensure transparency, and can help to rectify any causes of dissatisfaction with a particular water system.

Quarterly monitoring visits provide an ideal mechanism to identify problems early and find sustainable solutions [25].

4.7. APPROACHES IN RURAL WATER SUPPLY MANAGEMENT

Several approaches have been undertaken since 1980s International Drinking Water and Sanitation Supply Decade in an effort to improve the living conditions of rural communities through access to adequate water [35].

4.7.1. Centralized Approach

Centralized management system refers to a RWSS that is dependent and directed by the central government for management, technical and financial support. It involves private sector organization managing mobile teams, which report to regional head quarters. The regional head quarter handles overall budgets, spare parts, procurement and distribution. Disadvantage of this approach are that it has been associated with high costs. Delays in responding to reported breakdowns due to communication chain and working list of communities to be serviced creates a problem. Other problems include low ownership feeling by communities [35].

4.7.2. Participatory/ Community Management approach

Community management refers to the capability of a community to control, or at least strongly influence, the development of its water and sanitation system. Community management consist of three basic components:

- Responsibility: the community takes on the ownership of and attendant obligations to the system.
- Authority: the community has the legitimate right to make decisions regarding the system on behalf o the users.
- Control: the community is able to carry out and determine the outcome of

its decisions. In many studies, it is believed that, if communities are expected to take responsibility for maintenance, they must also be involved in planning and implementation of projects from the initial stages for a project for the management to be sustainable. That is, they must develop a sense of ownership and understand that maintenance is essential, and is a community responsibility.

The World Bank Development Report 1992 states that people's participation has three main advantages: it gives planners a more thorough understanding of local values, knowledge and experience, it wins support for project objectives and fosters community assistance in local implementation, and it helps resolve conflict over resource use. It also assures community participation also enhances accountability, equity, and sustainability of benefits [cited in 20].

Today, community management is a reputable model for managing rural water supply, because of an acceptance from multiple stakeholders within rural development circles with different agendas and priorities. Most influentially, government's inability to build and maintain water supply infrastructure has been one of the major factors leading to the promotion of community participation (Carter et al, 1999) [cited on 21].

However, P.A. Harvey and R.A. Reed, 2006, question how there can be automatic expectations that community management can be successful in low-income countries, since communities do not generally manage rural water systems in high-income countries successfully. Although it is accepted that some rural communities in sub-Saharan Africa have a history of community co-operation and ownership, which is accordant with the concept of community management, this is

by no means true of all rural communities. The community management model, however, has been applied to communities without such distinction, based on an idealized generalization.

4.8. THE CONCEPT OF COMMUNITY MANAGED PROJECTS (CMP) APPROACH

CMP is a concept presented to systematically think through the complex challenges involved in managing rural water supply systems and how to develop possible alternative pathways towards achieving sustainability.

CMP is a funding and implementing modality for rural water supply and sanitation projects aiming to accelerate implementation rate to facilitate and support GoE achieve the universal access plan on a sustainable basis with communities being capable of managing their water points from planning to replacement investments. Features of the approach include simpler fund flow procedures, create tight local control over unit costs and increase functionality /sustainability of schemes through:

- empowered beneficiaries by transferring resource (fund, skill and information) to the community using micro finance institutions,
- Use of specific controls that allow adoption of highly decentralized and simplified procurement and financial management procedures,
- Using community structures for project management and
- Focusing on capacity building of the private and public sectors

The approach triggers every community in the Program area to develop a WASH plan through promotion works to initiate demand, which means until communities understand the consequence of using unprotected sources and are aware on benefits of using developed sources. As a result, communities should set the need for safe water a priority among other development activities because they are more likely to manage and sustain demanded services more. [12]. If a project that does not fit the needs and is not a priority of the community is implemented, the community will not accept it and it will not sustain.

Communities have to apply for the community Managed Projects fund stating their share of the investment costs and committing themselves for O&M of their WASH facilities. The applicants, through their Water Sanitation and Hygiene Committees (WASHCOs), who are representatives of the beneficiary community, are required to deposit a total of ETB 1,000 as an upfront

contribution for O&M in an account at the sub branch of a Micro-Finance institution Institute and submit the receipt together with their application. Furthermore, in their applications, user communities also pledge that they will take full responsibility for O&M of their facilities in the future.

In addition, the committee should if possible be representative of all user groups. Therefore, the community should select representatives, who have different education and able to read and write, are of different ages, users of the water point, willing and interested, have good reputation and are respected by other community members, are long time residents in the area, unlikely to leave and 40% being female members..

WASHCos should also get in to an agreement with artisans and or contractors and suppliers, procure construction materials, and organize local construction materials and labour.

Community participation has been evolving from agreeing on decisions made to active participation in analyzing problems. The CMP approach further modifies this requiring their full involvement in every stage including procuring services and material. That is, fund will be transferred to communities for procurement of construction materials, contracting with artisans and issuing payment for service through WASHCOs. And this way community will develop sense of ownership which is an important determinant of sustainability of schemes.

Communities should also participate in site selection and technology choice assisted by Water desk technicians. Selected location should optimize potential for adequate water, accessibility to users and proximity from pollutants such as latrines. A trained surveyor from woreda water desk will assist the water point sitting and design.

The surveyor will make a recommendation to the community of the type of water point possible in the area and give a tentative cost estimate. The community can then make an informed decision of going on with the project, considering the inputs expected from them (15 % contribution consisting of both cash and in-kind contribution).

A particular feature of the community managed projects approach is the simplified accounting procedure created by direct flow of fund to communities through microfinance institutions. These funds will be used to procure construction materials and service for implementation of facilities. In addition, communities are also responsible to contribute their share in cash or in kind for the WASH facilities construction. Communities should contribute a minimum of 5% for shallow wells to be fitted with hand pumps or motorized pumps and 15% of the total cost for

hand dug wells and spring developments. In kind contribution can be locally available construction materials, labor, improving access roads and facilitating the work of the drilling crew.

Since funding by government or international organizations for operation and maintenance of rural water supply projects is limited, communities are made to mobilize financial resources through tariff. In the CMP projects, communities are fully responsible for the operation and maintenance of the developed schemes. Communities through WASHCos should secure finance for maintenance of schemes, arranging repairs immediately when schemes fail and coordinate communities to protect water point.

Generally, communities are meant to be focused on a single task, can easily provide very close supervision. And the government shall utilize large pool of available human resources (the community) and thereby increase the efficiency of project management. In turn, the government would then be able to use its more limited staff time for overall supervision and program administration, rather than micro-management of financial and procurement processes.

4.9. PREVIOUS STUDIES ON COMMUNITY MANAGED WS PROJECTS

Different researches have been focusing on how rural water supply and sanitation schemes can sustain to the designed lifetime. Most studies agree that, sustainability of facilities mainly depend on software issues that directly or indirectly affect the hardware itself. In addition, community participation from the beginning and managing their development facilities is an important ingredient for successful and sustaining projects.

Moreover, different studies have also been done to evaluate the performance of projects implemented using the community-managed projects approach in different countries, among these are;

Ryan W. Schweitzer, 2009, Most experts agree that the management of water supply services should take place at the lowest appropriate level and today more and more projects are being designed, implemented, and managed using principles of community participation and community management (IRC Thematic Group, 2005). Decentralization is generally the accepted organizational approach for management in RWS to empower communities and ensure efficiency and sustainability of services; however, the long-term implications and requirements of community management are unknown.

Peter A. Harvey and Robert A. Reed , 2006, in their study on "Community-managed water supplies in Africa: sustainable or dispensable?" they concluded that, "If user communities are to be truly empowered and granted, they should be given comprehensive information needed to make informed decisions, without being pressured to follow the preferences of the facilitator. Communities and households should be free to select technology and service levels that suit them. They should also be free to select the most appropriate management system for O&M, including the option not to manage it themselves. Unless such an approach is taken, use of the term 'community development' in relation to rural water supply will remain rhetoric rather than reality".

Jonathan Isham and Satu Kähköne, 1999, "The evidence in this paper suggests that making water services demand responsive promotes their performance and impact: households are more likely to maintain services that match their demand. To ensure that the household choice is informed, adequate information needs to be provided to users about the cost and maintenance requirements of different service options during the design process. Ensuring that villages have effective mechanisms to monitor household contributions to construction, O&M is an effective

way to promote the performance and impact of community-based water services. Without monitoring arrangements, households have an incentive not to contribute their share, but to free ride on others efforts".

P.A. Harvey and R.A. Reed, 2003, Community 'sensitization' or 'mobilization' is designed to instill a sense of ownership and responsibility, but findings of the research to date suggest that this does not automatically lead to a willingness to manage or finance a water supply over a prolonged period of time. Despite much talk of demand-responsive approaches, this very demand is often artificially generated by the implementing agency. Communities rarely acquire a full understanding of what will be required of them in the long-term if services are to be sustained. Consequently many facilities fall into disrepair soon after installation or as soon as anything goes wrong with the pump.

Ghazala Mansuri and Vijayendra Rao, 2001, also revealed that they found that projects, which rely on community participation, have not been particularly effective at targeting the poor. There is some evidence that community based development projects create effective community infrastructure, but not a single study establishes a causal relationship between any outcome and participatory elements of a CBD project. Most community based development projects are dominated by elites and, in general, the targeting of poor communities as well as project quality tends to be markedly worse in communities that are more unequal.

More specifically, ***Abraham Kebede, 2010***, did a research work to evaluate the implementation and functionality rates of rural water supply projects (significant role of the approach), practiced by a bilateral program between the government of Finland and Ethiopia using the community development approach. In his research work, which took place in Amhara region, he revealed that CDF approach is playing an important role to improve functionality rate, implementation rate, and water coverage. This approach is now up scaled to community managed projects approach, which is the concern of this study.

5. RESULTS AND DISCUSSION

5.1. GENERAL

a. Sampled water points

Eight HDWs were sampled from each woredas where, fifty-four and sixty one wells were built from 2008 up to 2011 in Mandura and Pawe woredas respectively with depth ranging from 5m to 14m. And all the existing springs developed in the woredas were surveyed because there are only few developed springs.

Table 3: General information on sample wells in Mandura

	General information							
			GPS coordinate			year of construction	Type of scheme	Status
no	Kebelle	Gott	X	Y	Elev.			
1	Gilgel Beles Zuria	Wagdi	208699	1233144	1047	2011	HDW with hand pump	Functional
2	Dehan zibaguna	Kusha	207289	1224903	1139	2011	HDW	Functional
3	kutur Hulet	near to school	212476	1228540	1173	2009	HDW	Functional
4	Duha Gubash	Dudre no 2	206803	1218790	1213	2010	HDW	Functional
5	Dehan zibaguna	Djana	208191	1224438	1144	2008	HDW	Functional
6	Dehan zibaguna	Kuraiti	207957	1225112	1151	2010	HDW	Functional
7	Gilgel Beles Zuria	Wehba	207029	1218273	1245	2011	HDW	Unreliable
8	Jigda Silasie	Dafilli	221230	1229796	1359	2011	Spring with Public Fountains	Functional

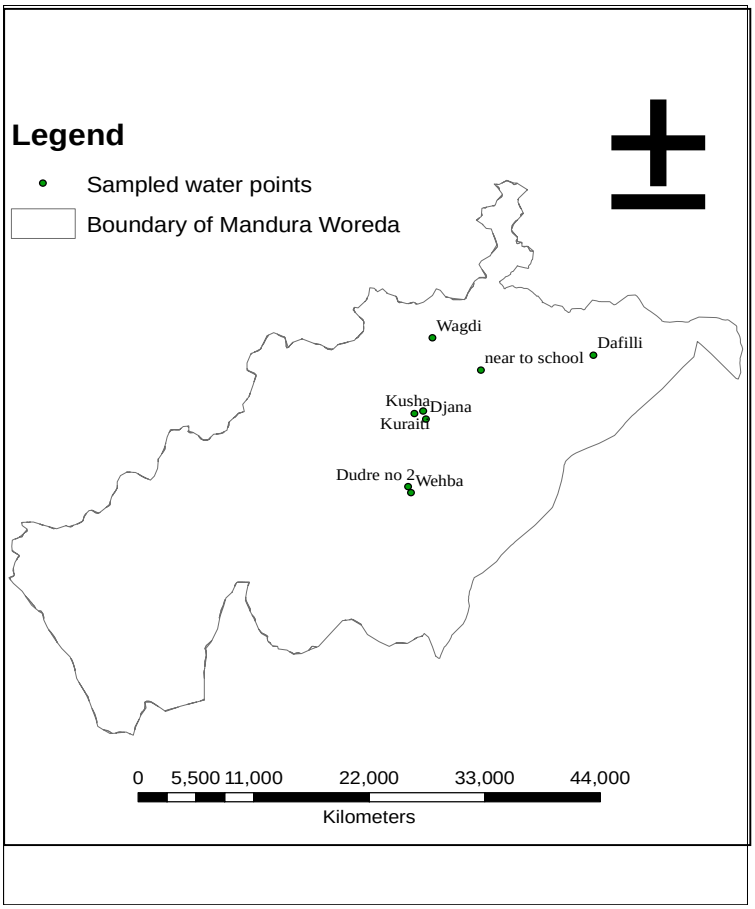


Figure 9: Location of visited schemes, Mandura wereda

Table 4: General information on sample wells in Pawe

	General information							
	Kebelle	Gott	GPS coordinate			year of construction	Type of scheme	Status
			X	Y	Elev.			
1	Ketena2 - V 4	Felegeselam	213480	1244616	1046	2008	HDW with hand pump	Functional with poor yield
2	Ketena 2	Mender 134	216617	1240365	1144	2010	>>	Non functional
3	Ketena 2 Mender 12	Mender 11 (2-3)	225710	1253095	1121	2010	>>	Functional
4	Ketena 2 Mender 30	Mender 30	218193	1251256	1106	2011	>>	Functional
5	Almu A	Addis sefer	215680	1246115	1071	2008	>>	Functional with poor yield
6	Ketena 1 Mender 4	Mender 3	209765	1246068	1043	2011	>>	Functional
7	Ketena 1 Mender 4	Mender 5	212473	1250085	1045	2011	>>	Functional
8	Ketena 2/ 23-45	Mender 45	221524	120162	1131	2011	Gravity Spring	Functional

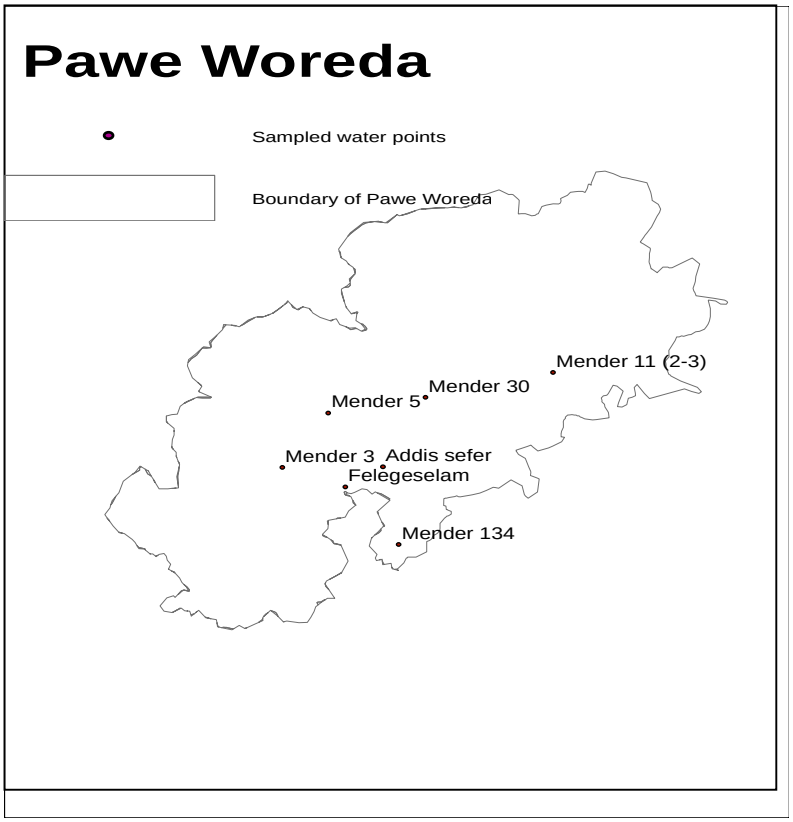


Figure 10: Location of visited schemes

b. Sampled respondents

Distribution of respondents by age, income level, sex, marital status and occupation is described in the tables shown below.

Table 5: Descriptive statistics on socio economic characteristics of respondents

	Number of respondents	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
Age	90	16	75	37.18	12.902
Income	90	2.00	60.00	14.93	12.479

	Sex	**Frequency**	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Female	53	58.9	58.9	58.9
	Male	37	41.1	41.1	100.0
	Total	90	100.0	100.0	
	Marital Status	**Frequency**	**Percent**	**Valid Percent**	**Cumulative Percent**

Valid	Married	87	96.7	96.7	96.7
	Single	3	3.3	3.3	100.0
	Total	90	100.0	100.0	

	Occupation	**Frequency**	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Farming	86	95.6	95.6	95.6
	Laborer	1	1.1	1.1	96.7
	Merchant	1	1.1	1.1	97.8
	Servant	1	1.1	1.1	98.9
	Student	1	1.1	1.1	100.0
	Total	90	100.0	100.0	

	Level of Education	**Frequency**	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Cannot read and write	67	74.4	74.4	74.4
	Primary	15	16.7	16.7	91.1
	Secondary	8	8.9	8.9	100
	Above secondary school	0	0	0	100
	Total	90	100.0	100.0	

5.2. CMP PROTOCOL AND ITS APPLICABILITY

In this topic, main features of the CMP approach will be evaluated if these components of the approach are adhered to in practice as written in the guideline and its applicability.

5.2.1. Management structure

a. Decentralization

The CMP approach requires highly decentralized administrational set up for decision-making and financial flow, which extends from regional to community level through woredas. From the discussion with woreda representatives, main institutions running the procedures in implementing water supply schemes are water bureau and MFI at Regional level, water desk and MFI sub branch at woreda level and community organizations.

From the discussion with CMP implementers at Woreda water desk, regional level water bureau carried out annual planning and monitoring works and local government promoted CMP, approved budget, evaluated applications, provided working material and technical support through CMP technical team and supervisors.

Moreover, the authority of decisions making during planning, implementation and operation and maintenance procedures of the water facilities is given to communities. As per CMP, committee established at water points reinforces water user groups (WUGs) to organize, manage and lead activities and should be elected by WUGs.

From the field survey, all visited water points had responsible committees composed of five members. This provides scheme level management and an opportunity for effective community participation, where strong leadership skill and capacity is created, there will be better chance for the schemes to sustain.

From the household interviews, all respondents confirmed to participate in

- Electing and assigning WASHCOs
- Prioritizing and planning for improved water supply scheme
- Contributing upfront cash
- In kind contribution for investment

WASHCOs also knew their responsibility for:-

- Organizing community participation in planning and implementation
- Contracting and procuring goods and services
- Construction follow up
- Assigning care takers
- Managing operation and maintenance of the service
- Managing fund for operation and maintenance

Financial flow is also managed through decentralized process where investment fund is channeled to community level, while Regional finance bureau and Woreda WASH team can only freeze or transfer fund and monitor utilization.

From the discussions with WASHCos, it was understood that, WASHCOs know their responsibility for the fund allocated for physical construction. In addition, CMP bank accounts exist and all WASHCos responded that they were responsible to issue payments for procured construction materials and services, by withdrawing money from MFI sub branch after woredas approved payment requests.

Moreover, from the discussions held it was understood that existence of responsible management structure at scheme level reduced burden of the local government and created conducive environment for proper implementation. And from the discussions with woreda experts, it was confirmed that government-funding and decision making procedures are bureaucratic and inefficient to develop as many water points in a fiscal year however, through CMP funding, budget utilization increased and more number of water points could be developed every year reaching more communities.

b. Female participation/ Equity

Most studies revealed that participation of women in the development of water scheme is determinant factor for achieving sustainability. This is because women bear the burden of providing water for family demand and they can promptly notice water quality changes and its consequences, men on the other hand are less involved in day to day water issues as they leave for work and spend more time away. In addition, since women are the primary stakeholders in the area of domestic water supply. They are responsible for water at the household level, and can be influential in any decisions regarding communal water supplies. If women actively participate in community management bodies, it ensures that these bodies are effective.

Therefore, the CMP approach follows gender sensitive procedure and emphasizes that applications for funding are not acceptable unless 40% female members constitute the selected water committee. The figure below shows participation of females as WASHCos from field data collected.

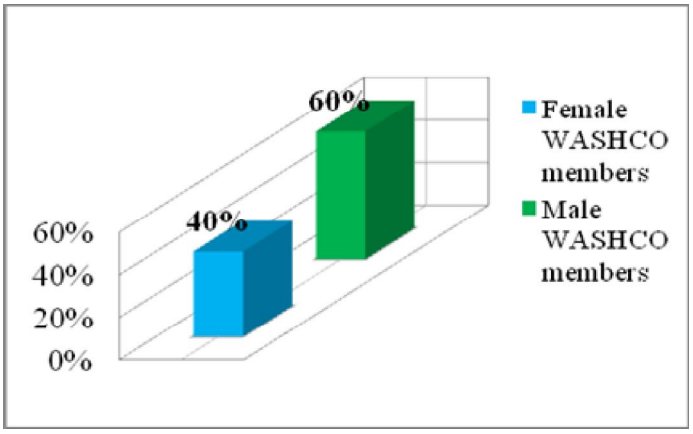


Figure 11: Percentage of female WASHCO members

Additionally, the approach requires female WASHCO members to hold executive posts. However, as per the observations, female WASHCO members are mainly assigned as treasurers and cashiers while only few participants are serving as chairpersons.

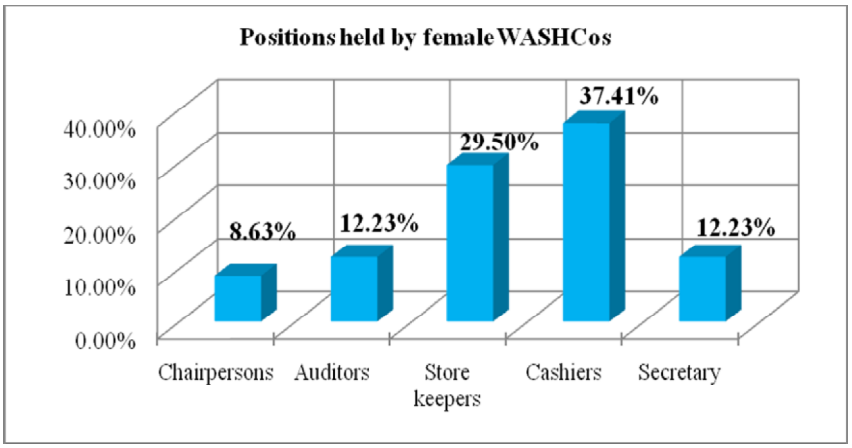


Figure 12: Percentage of positions held by female WASHCO members

Female participants holding chairperson position was only observed at 14.3% of water points. This was because communities do not believe they are capable of handling the responsibility despite the fact that females in the woredas are burdened with unbalanced workload in other day-to-day activities.

Inaddition to being water committee, females are encouraged to participate as artisans and caretakers to maximize the advantage from their participation, however, their involvment is limited.

Table 12: General participation of females in the program

WASHCOs (%)		Artisans (%)		Caretakers (%)	
Male	**Female**	**Male**	**Female**	**Male**	**Female**
64.9	35.1	100.0	0.0	77.4	22.65

Generally, though women are represented in the committee as per the requirement in the approach, they have less active participation in water point management. This is due to unsatisfactory awareness of the community on the fact that the central role of females in providing and managing water services is necessary for sustainability of the systems. Another factor to consider here is that, majority of the workload in households is put on the shoulders of women leaving them with less time for additional activities.

5.2.2. Demand responsiveness

Since one of the requirements of the approach is demand responsiveness, which means, households and individuals must be enabled to make an informed choice on whether they want the development process or not and additionally enabling them to choose whether to participate in the project or not.

From the interviews made, it was understood that promotion works have been done to inform communities on the benefit of using protected water sources so that demand for the service will be created. Demand was created through realization of the benefit of safe water supply from the beginning as respondents recognized improved health, reduced time spent and shorter distance travelled to fetch, which contributes significantly for sustainability of the water service. Additionally, all respondents agreed that lack of safe water supply was a major problem and priority among other developmental activities and applied for fund to construct water supply facilities by presenting kebelle support letter.

Furthermore, from discussion with Woredas, promotion was done smoothly and communities accepted the idea without problem. However, it needed grater effort to get the required numbers of applications from the community in Mandura wereda, due to the sparse nature of settlement. And to reduce this problem, Villegization (gathering and settling residents in to villages) is taking place recently (starting from 2012) to promote the approach effectively.

Table 6: number of applications received from communities after promotion works

Woredas	2008/2009	2009/2010	2010/2011	2011/2012
Mandura	12	35	42	44
Pawe	15	44	44	54

Moreover, CMP approach demands communities to contribute upfront cash before applying for fund, to demonstrate their demand for the service, their capacity and willingness to cover recurring operation and maintenance costs. From the field survey, 100% of the household respondents said that they contributed the required upfront cash of 1000 birr willingly. This shows that all surveyed water points are constructed following expressed demand from the users. And this demand was well established among communities with a clear implication of their choice before projects started.

Fig: Community contributing free labor for well construction

This demand created through realization of the benefit of safe water supply from the beginning leads to willingness of communities to participate in construction and managing the water point and also contributes significantly for sustainability of the water service.

5.2.3. Community participation

Participating communities in activities starting from planning stage enhances ownership feeling among communities and additionally confirms acceptability and appropriateness of systems selected. That is, selecting appropriate location and technology options to provide the required

service level with respect to the physical and social environment affect operation and maintenance needs and consequently sustainability. Which means, when the community is involved in the planning stage of the project, it may provide the local knowledge necessary to avoid using a water source that would be inappropriate for cultural reasons or identifying a water source such as a spring, which may have been unnoticed by outsiders.

Therefore, as per CMP, technical team with two or three experienced Woreda experts and community representatives should decide sites for water point sitting. Additionally, the same procedure should be applied to select technology options. That is, the team should identify feasible options with their respective costs and requirements then present to communities, so that communities will be involved in the choice of their water supply system by making an informed choice based on affordable cost and desired service level.

Therefore, from the field survey, 100% of the respondents answered that community participated in selecting water point locations together with woreda experts. However, all communities responded that they only know the type of technology that is already built. Thus, the woreda technical team did not properly address and present social and financial aspects of technology type selection to communities. This was due to domination of predetermined preference on type of technology.

Though, there still remains work to be done in participating communities in technology option selection, all respondents replied that they own the scheme and are responsible for its proper operation and maintenance.

Additionally, community contribution for capital investment, which is 15% of the total project cost for the construction of spring developments and hand-dug wells is required. Since project started through efforts to create awareness and demand through promotion works, this demand resulted in all communities contributing their share to the initial cost of implementation willingly. Contributions were mainly labor and providing local construction materials while only few beneficiaries contributed cash.

Contributions were generally meant to indicate that communities demand the service which intern is a condition for sustainability. It can also support capital expenditure to build more water points through efficient utilization of locally available resources. In addition, it also creates

ownership feeling among the users, which lays considerable responsibility on the users to look after their facility, and consequently, sustain their water point.

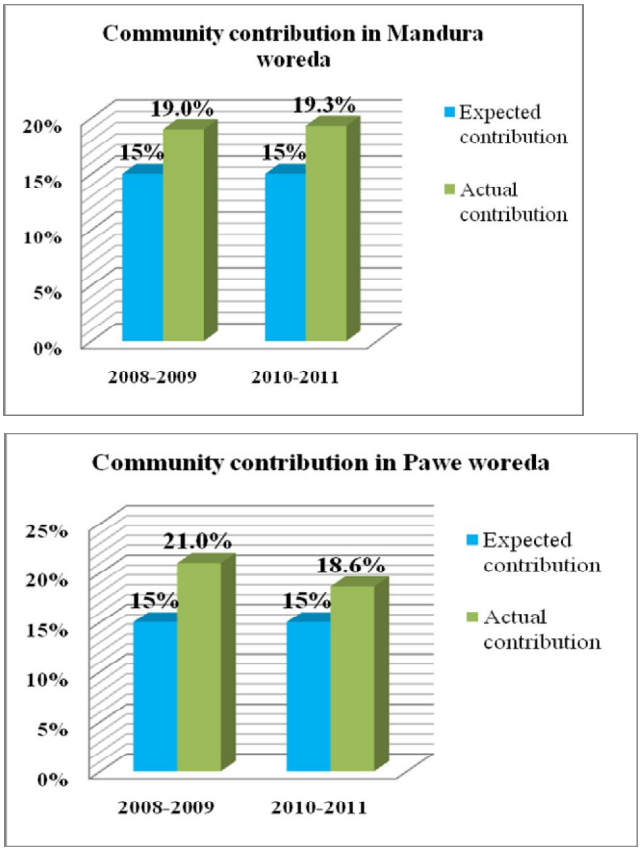


Figure 13: Percentages of community contributions

5.2.4. External support

a. Capacity building and trainings

The CMP approach requires trainings to relevant stakeholders at Woreda and community levels to build capacity for efficient performance and decision-making.

As per the discussion with Woreda technicians, trained Woreda expert by technical assistant team at the zonal and regional offices gave suitable theoretical and practical trainings to Artisans and caretakers. WASHCOs at the surveyed water points also replied that they were trained on managing contracts, financial management, constructions supervision, operation and maintenance of the water schemes. WASHCOs responded that trainings were carried out upon three-day session with a per diem of 47 birr. However, unsatisfactory results were observed on the capacities of WASHCOs and caretakers due to poor literacy rate.

Low literacy rate, i.e., 74% of the respondents being uneducated, contributed significantly for the poor management skill of WASHCOs and hence unsatisfactorily exercising their authority (low literacy rate is higher in Mandura woreda).

Moreover, WASHCOs only at 37.5% of the surveyed water points responded that they could mobilize community and manage application process. And 62.5% responded that woreda technicians were doing most of the works because they have not developed sufficient knowledge and capacity yet.

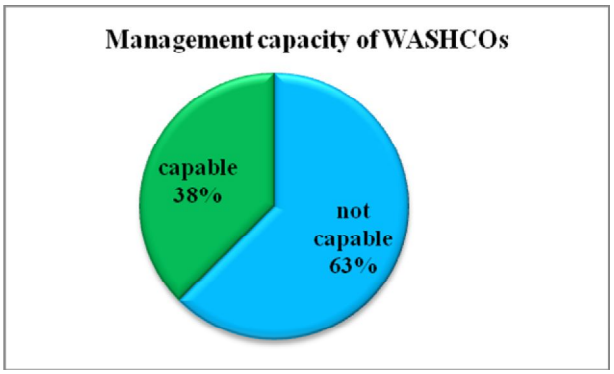


Figure 14: Responses of WASHCOs on their ability in management

b. Post construction support

The CMP approach requires communities to receive assistance from woreda authorities after commissioning. Replies of WASHCOs on the frequency of visits by wereda supervisors after completion of the schemes are displayed in the figure below.

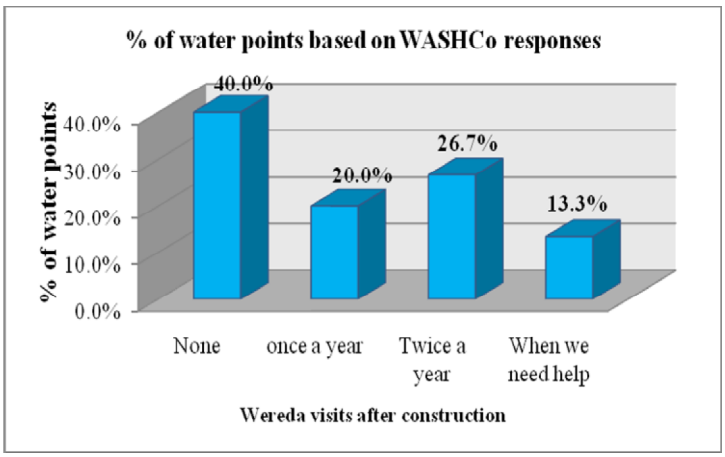


Fig 14: Visits by Woredas after completion of schemes

The graph shows there is no regular and close assistance provided to communities and external support after construction at majority of schemes is not encouraging. This is because there is no clear strategy on how to support communities in operation and maintenance. And without ongoing external support and regular assistance, WASHCos capacity in handling management issues will not be efficient and their motivation to manage their water point will fade with time.

5.3. EFFECTIVENESS OF THE APPROACH

In this research, performance of the approach will be evaluated by the level to which it has achieved its expected targets. Targets of implementing rural water supply schemes by the CMP approach are,

- To play significant role in increasing coverage by building more water points and
- To assure sustainability of the schemes

Therefore, its contribution to increase coverage will be evaluated through its efficiency in implementation (planned versus achieved annual targets). In addition, since sustainability at this stage of the projects does not only refer to current functionality, the degree of accomplishing determinants of sustainability will be evaluated to reflect expected long-term results of the approach. The sustainability determinants considered are; appropriateness of the sites selected, appropriateness of implemented technologies, quality of facilities built and effectiveness of operation and maintenance.

5.3.1. Implementation Capacity

The program targets to help the country in the efforts to reach the UAP by implementing water points through the highly decentralized CMP approach. Therefore, the annual execution plan was considered as eventual goal the program can perform to play a significant role in improving implementation rate and then coverage. Thus, table 6 displays the number of planned versus served number of population in a community in the year 2010/2011.

Table 7: Percent of served population from community schemes with respect to planned

Woreda	Planned number of populations to be served	Actual number of populations served	Percentage of population served
Mandura	10,980	10,230	93.2%
Pawe	6750	12,000	178%

Implementation efficiency of CMP projects is **93.2% and 100%** for Mandura and Pawe woredas respectively. Reasons for the delayed implementation and lower performance of the approach in Mandura woreda were poor provision of working materials, more time taken coaching community on implementation procedures and villegization program, which is taking place to settle the scattered population of Mandura in to villages.

5.3.2. Appropriateness of sites selected

In this research, the CMP is evaluated based on expected outputs to be achieved related to sustainability, one of which is appropriateness of the sites selected. Appropriate site election is an important factor to efficiently use resources and ensure sustainability. That is, sites selected should fulfill technical criteria such as availability of resource and proximity from potential pollutants. In addition, social criteria, such as psychological and cultural acceptability of sites by community can influence appropriateness of sites selected.

a. Technical

Technical criteria such as, expected yield of source and proximity from pollutants should be considered for good selection of water point location because, insufficient quantity of water for the target users and contamination of source from latrines, which are consequences of poor site selection, negatively affect sustainability of schemes or the overall aim of the project.

From the field observations, 25% of the selected sites in Pawe woreda are located at water divide and are functioning unreliably. Additionally, 25% of the selected sites in Pawe woreda seem to be dominated by community preference, where water points are located very near to residential areas with a potential risk of being contaminated by discharge from household latrines. While all water points in Mandura woreda are located at sufficient distance from residential areas and also located near riverbanks and functioning reliably.

Therefore, the score of the approach in meeting technical criteria on appropriateness of the sites selected is the average score of proximity from latrines and reliability of yield, that is, **100% for Mandura and 75% for Pawe**. For this, the main challenge identified is lack of sufficient technical input from hydro geologists with respect to the number of facilities under construction. That is, there was only one hydro geologist at the zonal level whose involvement was very limited during both the site selection and construction supervision.

b. Social

Acceptability of the sites to the community is important factor to be considered during site selection. And acceptability of the location to the users will have a positive input for utilization and sustainability of the systems.

From the interviews made, none of the interviewed beneficiaries raised psychological or cultural reasons against the sites selected. Therefore, this social aspect of appropriate site selection, explains performance of the approach in assuring utilization and sustainability, granting **100%** score for the approach in both woredas.

5.3.3. Appropriateness of implemented facilities

Appropriate technology is fundamental in order to make the community water supply system sustainable. Therefore, while selecting technology type for a specific situation, technical adequacy for the desired level of service, cost required for implementation, availability of spare parts and operation and maintenance requirements with respect to the socio economic situation of the community should be considered.

a. Technical adequacy for desired level of service

Technical criteria in choosing type of water lifting or conveyance technology from wells and springs include;

- Depth of ground water level
- Required discharge for wells
- Elevation of source for spring and
- Yield for springs

From field observation, **all** wells are fitted with the Afridev hand pumps. These pumps meet the technical criteria such as depth from which it can extract water and the discharge required. That is, the selected hand pumps can operate up to a depth of 45m below the ground surface, and the maximum depth of surveyed wells being 19m.

In addition, it can discharge 0.17 l/s to 0.32 l/sec (average 0.25l/s) from different depths, which serves the desired number of users (250 individuals) without queuing. This means, the wells have the capacity to serve the required population with 15 l/c/day, by discharging 0.15 l/min (value

calculated using the formula shown below) if eight hours is available to collect water. However, the minimum duration for fetching water cannot be less than five hours so that the discharge meets demand.

Required yield (l/min) = 1.1 x P x g x W / 60 x H

P = Population

g = Population growth factor 3% for the region (1.03)

W = water usage per person per day (l/c/day)

H = number of hours available to collect water (hrs)

1.1 is used to provide 10% margin error

On spot developed spring yielding 0.7l/s, is serving 300 households in Pawe woreda and spring yielding 1.5l/s developed with gravity distribution system serves 254 households and 1398 cattle in Mandura woreda. Therefore, from the calculation made using the formula shown above the spring in Pawe woreda can only serve the desired population in 19 hours in a day, which is not practical. Therefore, technology selected with respect to adequacy for the desired service level meets the required amount for **all** water points in Mandura woreda and **87.5%** of the surveyed wells in Pawe woreda are appropriate.

b. Availability of spare parts

Choosing type of technology appropriate for an area should consider availability of spare parts. From the interviews with WASHCOs, all respondents, who faced failure of their water points, mentioned lack of convenient spare part supply as the main problem to provide timely maintenance (this data excludes respondents from Mandura woreda where spare part supply is subsidized until now).

Spare part is not readily available to the villagers until now. WASHCOs also reported that transportation cost and time required to buy spare parts is causing difficulty to do immediate maintenance when schemes fail. The nearest spare part distributor is located in Chagni, which is more than 50 kms away from the woredas, where availability is not reliable. In addition, the next option is Bahirdar, more than 150kms away and transportation cost to Chagni and Bahirdar is around 22 birr and 78 birr per person respectively.

c. Skill for maintenance

Selected technologies should fit locally available skill for maintenance because community will be fully responsible for properly running the facilities.

From field observations, all the visited water points were fitted with Afridev type hand pumps, which are village level operation and maintenance. The VLOM types are particularly invented to match available skills in rural areas and springs that can operate by gravity are prioritized and developed. However, despite the fact that well-known village level technologies are prioritized and implemented for the projects; trained caretakers at water points at **75% and 25%** of the surveyed water points in Mandura and Pawe respectively, where disrepair has occurred before, have not developed the capacity to carry out maintenance of hand pumps. This means, WASHCOs have already developed the habit of reporting scheme failure to woredas for maintenance than looking for trained caretakers because they know caretakers are not confident enough to maintain hand pumps. Therefore, significant number of WUGs is still dependent on woredas' technical assistance for corrective maintenance of services. This shows that the trainings provided were insufficient to create capable and skilled caretakers for hand pump maintenance.

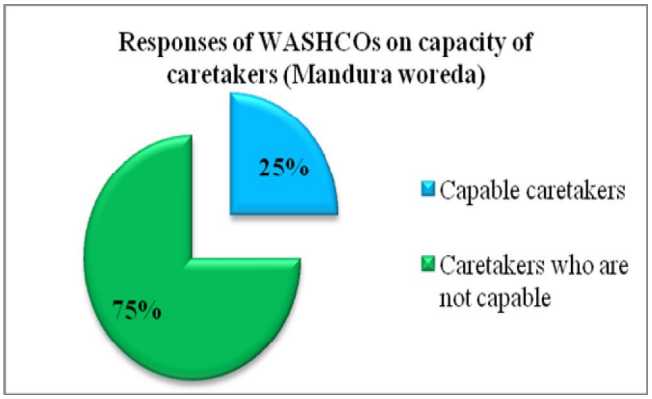


Figure 15: Response of WASHCOs on capacity of caretakers

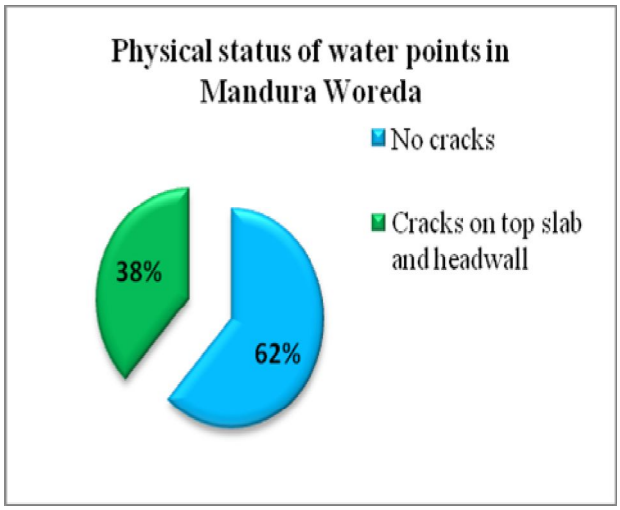
d. Cost and affordability

Since communities are required to share the initial investment costs (through in kind contributions) and fully recover operation and maintenance costs, technologies should be selected in such a way that financial requirement matches communities' ability to pay.

From the secondary data collected, communities at all water points contributed their share for capital investments more than the expected amount (fig 13), and all respondents replied that they contributed the amount required for capital expenditure willingly. Communities contributed, around 19% of the total investment cost while the expected contribution was 15%. Therefore, technology chosen is not beyond the community's capacity to contribute the required sum for initial investment. Additionally, the monthly operation and maintenance cost required for operation and maintenance up to replacement is shown in section 9.2.8 and according to the replies from respondents is not beyond their capacity to pay. Therefore, the technologies selected can be said to be affordable to the community in terms of operation and maintenance requirements. For these reasons, **100%** score is given to the appropriateness of the technologies selected in both woredas.

5.3.4. Quality of built facility

The quality of construction is crucial for sustainability of schemes. Most of the visited schemes are built with good quality except 37.5% of the surveyed hand-dug wells in Mandura and 12.5% in Pawe had cracked slab covers, which can make the well vulnerable to bacteriological contamination if not maintained immediately. The cracks on the headwall seem to be caused due to loose foundation underneath. This shows that supervision from communities and woredas during construction was not adequate.



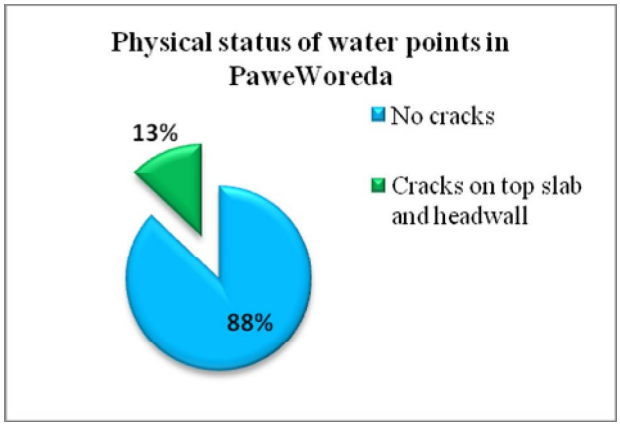


Figure 16: Percentage of water points where cracks were observed

Figure 17: Cracks on head wall and top slab

Another observation with respect to quality of the built structures was that washing slab is located very near to the wells and it is not provided with proper drainage structure at 12.5% of the surveyed water points in Mandura and 25% in Pawe. And since the soil type is very porous, there is probability of ground water contamination from detergents if it is going to be utilized well in the future.

Figure 18: Washing slab located upstream and very near to HDW

Therefore, the average performance of the approach measured with respect to attaining positive output under these sub indicators is **75%** and **81.25%** in Mandura and Pawe respectively.

As per CMP, efforts were made to qualify woreda experts, WASHCOs, artisans and caretakers in water facility construction and supervision. However, emphasis was given to financial issues, procurements and measurements while training WASHCOs and less weight is given to basic knowledge on construction procedures, despite the fact that WASHCOs can provide continuous and closer supervision during construction.

5.3.5. Protecting for water Points after construction

Protection of water sources and facilities after construction is an important factor for sustainability of schemes. From the field observations, **25%** water points in Mandura and **87.5%** in Pawe woredas have employed guards to protect the source from misuse and damage. In addition, in **100%** and **50%** of visited schemes in Mandura and Pawe respectively, fencing work is not properly done or it is non-existent at all.

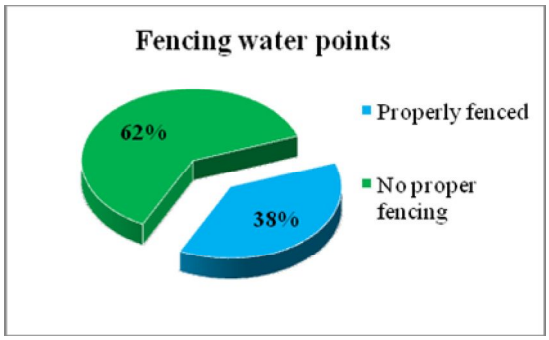


Figure 19: Percentages showing fencing water points

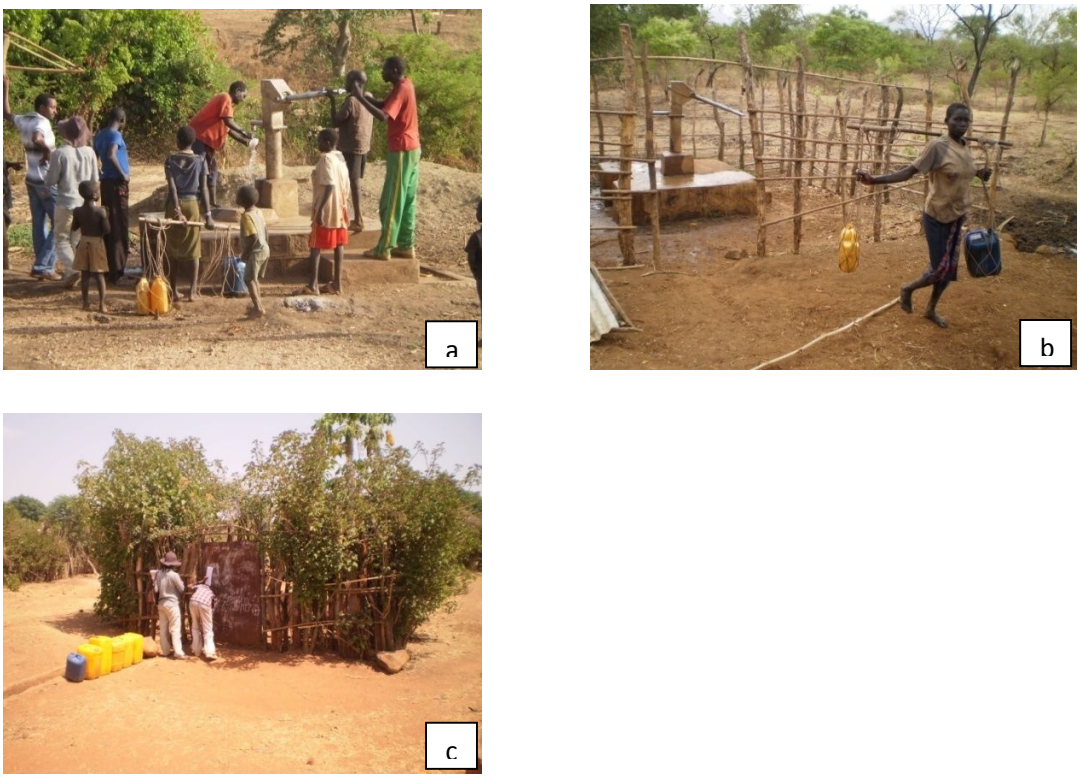


Figure 20: a. Water point with no fence at all, b. poor fencing and c. good fencing respectively

It was also observed that, most of the ditches around water points were filled with mud and not draining spilled water properly. And the table 10 shows percentage of surveyed schemes, which had swampy surroundings, creating breeding sites for mosquitoes.

Table 8: Water points with swampy surroundings

Woreda	**Percentage of surveyed schemes with swampy surrounding**	
	Exists	None
Mandura	25%	75%
Pawe	12.5%	87.5%

Figure 21: Swampy area around well

These water points had no one in charge of cleaning the surrounding and reason that respondents mentioned was WASHCos' inability to coordinate the community.

5.3.6. Effectiveness of community financing for O & M

From literatures, it is impossible to provide everybody with water for free and providing some people for free whereas others don't have access to water is dishonest or might enlarge inequality. In the CMP approach also, communities are expected to fully cover cost for operation and maintenance of their water points. And these costs must be covered effectively and sustainably so that the schemes will function up to the designed period. For this, WUGs should set a realistic tariff, should have appropriate collection system and appropriate storing mechanism.

a. Adequacy of tariff set

The amount set for tariff should be adequate so that community will cover O & M expenses efficiently. The table below shows amounts set as monthly tariff payment at every water point.

Table 9: Tariff at surveyed water points

No.	Woreda	Water point (Gott name)	Tariff set by WUGs at water points (birr)
1	Mandura	Wagdi	1.0
2	Mandura	Kusha	5.0
3	Mandura	near to school	0.0

4	Mandura	Dudre no 2	1.0
5	Mandura	Djana	10.0
6	Mandura	Kuraiti	3.0
7	Mandura	Wehba	0.0
8	Mandura	Dafilli	1.0
9	Pawe	Felegeselam	1.0
10	Pawe	Mender 134	6.0
11	Pawe	Mender 11 (2-	2.0
12	Pawe	Addis sefer	6.0
13	Pawe	Mender 30	3.0
14	Pawe	Mender 3	3.0
15	Pawe	Mender 5	6.0
16	Pawe	Mender 45	3.0

After commissioning facilities, WASHCOs decided flat rate tariff payment system upon meeting with communities at 75% of the surveyed water points in Mandura and at 100% water points in Pawe. The average amount of tariff payment is 2.63 and 3.75 birr in Mandura and Pawe woredas respectively.

Table 10: Descriptive statistics showing tariff set

	N	Minimum	Maximum	Mean	Std. Deviation
Mandura	8	0.00	10.00	2.63	3.42
Pawe	8	1.00	6.00	3.75	1.98

N= number of surveyed water points

On the other hand, actual annual recurring maintenance cost, which is required to keep a hand pump properly functioning up to replacement, is shown in the calculations made in Annex F.

Accordingly, the required annual operation and maintenance cost is 2618.5birr that is, 4.5birr/month/household. The cost for the Dafilli spring is also shown in Annex F, which shows similar amount. However, when compared to this required amount, only **25%** of the schemes in Mandura and **37.5%** in Pawe woredas have sufficient tariff amount for proper operation and maintenance.

Additionally, from the interviews made, the required amount is below the ceiling most users accept as affordable. Generally, communities have poor awareness on the importance of tariff and this led to inadequate amount of tariff set and hence, lesser guarantee for sustainability.

b. Collecting Tariff

From the discussions with WASHCOs, out of those who set tariff, users at **50%** of surveyed water points in Mandura and **62.5%** in Pawe woreda are paying the money properly and they are saving in their bank accounts for future maintenance or directly using the money to pay guards. On the contrary, WASHCOs at 83.3% and 62.5% of water points in Mandura and Pawe respectively, where tariff is set replied that there is no suitable collection mechanism and the tariff set has never been collected properly. The reason given for poor financing of schemes by most household respondents in Mandura woreda, was inefficiency of WASHCOs to organize collection. And 75% of WASHCOs accepted their failure in generating suitable tariff collection mechanism and follow up. Respondents also explained that they would not resist paying the amount set if there is concerned body to enforce and collect payment. while 25% WASHCOs reported that users are reluctant to pay the required amount claiming that they can not afford to pay. On the other hand, reason given by 100% respondents in Pawe woreda was inefficiency of WASHCOs to manage the process. Additionally, data on current amounts deposited in WASHCO's saving account opened at MFIs are displayed in Annex D.

Though there is insufficient payment to cover maintenance costs, maintenance in Mandura woreda has been carried out using temporary and freely distributed spare parts from UNICEF, through the woreda water desk while beneficiaries used reactive financing system in Pawe (which may not always be effective for communities with low economic situation).

Generally, this shows that though projects are demand responsive and upfront cash contribution was requested to confirm community's capacity and willingness to pay, this does not automatically lead to community meeting running costs and direct maintenance costs. However, efficiency of community financing systems also depends on awareness why the payment is crucial and efficiency of enforcing body.

5.3.7. Sustainability of willingness to pay

Services, which rely on the users' financing system to cover ongoing running costs, will only be sustainable if the willingness of users to pay is sustained. Community members who are willing

to finance O&M costs in the initial stages may soon become unwilling to do so. There are a variety of possible reasons for this reduced willingness to pay; lack of transparency in financial issues related to the water management committee and dissatisfaction with water supply (water quantity and time spent to fetch water).

a. Transparency in financial management

Though there is inadequate financial flow due to poor tariff payment and collection mechanism, all respondents replied that there is transparent use of contributed upfront cash and collected money for maintenance.

As per the CMP approach, all households must participate in election of WASHCOs and committee members should represent different groups of the society in terms of gender and socio economic condition. For this, **100%** of the respondents in both woredas agreed that they selected WASHCOs democratically and they were selected for their good reputation. This shows that there was satisfactory participation by communities in organizing management system from the beginning of the project.

Moreover, community participation in establishing the committee has led to the development of thrust and respect among all of the respondents in both woredas, on proper use of contributions and collected tariff, which is an important component to create willingness to pay.

b. Satisfaction with volume of water used

Based on the responses of household respondents, averaged volume of water they fetch at every water point is displayed in table 12.

Table 11: Average volume of water fetched by respondents at every surveyed water point

No.	Woreda	Water point (Gott name)	Average water consumption of respondents (l/c/d)
1	Mandura	Wagdi	10.64
2	Mandura	Kusha	9.94
3	Mandura	Near to school	7.18
4	Mandura	Dudre no 2	11.87
5	Mandura	Djana	8.52
6	Mandura	Kuraiti	12.03

7	Mandura	Wehba	5.63
8	Mandura	Dafilli	11.93
9	Pawe	Felegeselam	10.33
10	Pawe	Mender 134	8.6
11	Pawe	Mender 11 (2-3)	15.58
12	Pawe	Addis sefer	7.87
13	Pawe	Mender 30	15.64
14	Pawe	Mender 3	16.44
15	Pawe	Mender 5	16.53
16	Pawe	Mender 45	17.46

From the data collected, average consumption of beneficiaries at all water points in Mandura woreda is less than 15l/c/d, and out of these, at 62.5% of water points, majority of respondents insufficiently utilize their water points, due to poor hygiene practices. The rest **(37.5%)** complained on the decreasing yield of scheme and insufficient volume.

And in Pawe, average consumption of beneficiaries only at **37.5%** of the water points is less than 15l/c/day and all these beneficiaries are unsatisfied by the volume they fetch. Reasons given by dis-satisfied users were poor well yield especially in the driest months and unavailability of guards.

c. Time Spent

One of the major benefits of improved water supply is reducing time spent to fetch water, which includes round trip and queuing time. Therefore, failing to achieve this criterion within the acceptable limit not only reduces the expected benefit but also causes dissatisfaction of users by the service, which diminishes community's willingness to pay.

According to the interviews made with beneficiary households, responses on time taken for round trip to water points on foot is summarized in table 12.

Table 12: Averaged round trip time of beneficiary respondents at every surveyed water points

No.	Woreda	Water point (Gott name)	Averaged roundtrip time to water points (min)
1	Mandura	Wagdi	14.33
2	Mandura	Kusha	22.5
3	Mandura	Near to school	16.67

4	Mandura	Dudre no 2	12
5	Mandura	Djana	16.8
6	Mandura	Kuraiti	14.2
7	Mandura	Wehba	20.8
8	Mandura	Dafilli	11
9	Pawe	Felegeselam	9.2
10	Pawe	Mender 134	21.8
11	Pawe	Mender 11 (2-3)	18.5
12	Pawe	Addis sefer	13.3
13	Pawe	Mender 30	12.5
14	Pawe	Mender 3	14.2
15	Pawe	Mender 5	16.67
16	Pawe	Mender 45	29.2

Round trip time people have to spend at the visited schemes is less than the acceptable maximum walking time to a water point (30 minute for round trip is considered acceptable). Therefore, 100% score is given to the approach based on fulfilling the criteria of acceptable round trip time.

Additionally, from the household interviews, average queuing time at every water points is as shown in table 14.

Table 13: Averaged queuing time of respondents at every surveyed water point

No.	**Woreda**	**Water point (Gott name)**	**Average Queuing time of respondents (min)**
1	Mandura	Wagdi	7.5
2	Mandura	Kusha	6.67
3	Mandura	near to school	2.5
4	Mandura	Dudre no 2	3.8
5	Mandura	Djana	17.5
6	Mandura	Kuraiti	33.3
7	Mandura	Wehba	55
8	Mandura	Dafilli	9.8
9	Pawe	Felegeselam	190
10	Pawe	Mender 134	125
11	Pawe	Mender 11 (2-3)	105
12	Pawe	Addis sefer	100
13	Pawe	Mender 30	30

14	Pawe	Mender 3	36.7
15	Pawe	Mender 5	64
16	Pawe	Mender 45	170

Therefore, users have to queue for more than 10 minutes to fetch water at 50% of the surveyed water points in Mandura woreda and at all water points in Pawe woreda, (from literatures, waiting time at water points should not exceed 10minutes). Additionally, from replies of household respondents, averages of time spent in queues while fetching water is displayed in table15.

Table 14: Average queuing time of respondents

Descriptive Statistics on average queuing time (minute)					
	N	Minimum	Maximum	Mean	Std. Deviation
Mandura	8	0.00	33.3	17.01	18.30
Pawe	8	30.00	190.00	102.6	58.31

From the information gathered, only **62.5%** in Mandura woreda and **12.5%** in Pawe woreda fetch water without long queuing time. As per the collected data, queuing problem is more evident in Pawe woreda, where users queue for an average time of more than an hour, and this extended time taken at water points caused dissatisfaction with the water service. According to WASHCOs, causes for the long queues include;

- Insufficient well yield (especially in driest months) and
- Water points serving more number of users additional to those considered in design (un served groups which include new comers and users of another water point whose water point is in disrepair). This means, demand for improved service is increasing in both woredas and since coverage with improved access did not reach all communities, users which were not considered in designs and who did not participate in contributions are creating pressure on the built schemes and the community management bodies.

Moreover, WASHCOs replied that they are loosing their interest in their job because of inability to manage the excess number of users.

Figure 22: Longest queue observed at on spot spring in Pawe

As per the observations made, poor catchment protection works and deforestation caused lowering of ground water table, decreasing yield of wells. Additionally, guards are not available most of the time due to low incentive from communities, and they have to leave for other work for most of the hours in a day. As per the CMP approach, catchment management plan and verification on how the community is going to finance payment for guards at the beginning of the project is required. However, these criteria was neither seriously addressed before field appraisal and nor supervised after construction.

The excess number of users at water points cannot be banned, additionally it was observed that, these users are not made to pay for the service due to lack of strong enforcing body and suitable mechanism at the water points. Moreover, managing such situations was beyond the capacity of WASHCOs and there is also unsatisfactory post construction support in both woredas.

Therefore, the score of the approach based on the average time taken for round trip and queuing time, that is, 81.25% in Mandura and 56.25% in pawe woredas. Generally, the overall score for the approach in securing sustainability of willingness to pay so as to sustain the built facilities is the average of the sub indicators which becomes, **81.25%** for Mandura woreda and **72.92%** for Pawe woreda.

5.4. SUMMARY OF PROJECT ASSESSMENT RESULTS

Outputs of CMP approach has been discussed in the previous chapter. Here, summarized results and final (averaged) score of the indicators are displayed in table 17 and table 18.

Table 15: Scores attributed to the approach measuring its performance in Mandura woreda

Factors for Effectiveness	Score	
	Sub indicators	**Indicators**
1. Implementation Capacity		93.2%
2. Appropriateness of sites selected		100%
2.1. Technical	100%	
2.2. Social (acceptability)	100%	
3. Appropriateness of implemented technologies		56.25%
3.1. Technical adequacy for the required level of service	100%	
3.2. Spare part availability	0%	
3.3. Skill for maintenance	25%	
3.4. Cost	100%	
4. Quality of built facility		75.25%
4.1. Cracks	63%	
4.2. Washing slab proximity to well	87.5%	
5. Protection for water points after construction		33.3%
5.1. Guards	25%	
5.2. Fencing	0%	
5.3. Free of swampy surrounding	75%	
6. Efficiency of community financing for O & M		41%
6.1. Adequacy of tariff	25%	
6.2. Collecting tariff	16.7%	
7. Sustainability of willingness to pay		81.25%
AVERAGE SCORE OF ALL FACTORS		**68.61%**

Table 16: Scores attributed to the approach measuring its performance in Pawe woreda

Factors for Effectiveness	Score	
	Sub indicators	**Indicators**
1. Implementation Capacity		100%
2. Appropriateness of sites selected		87.5%
2.1. Technical	75%	
2.2. Social (acceptability)	100%	
3. Appropriateness of implemented technologies		67.19%
3.1. Technical adequacy for the required level of service	93.75%	
3.2. Spare part availability	0%	
3.3. Skill for maintenance	75%	
3.4. Cost	100%	
4. Quality of built facility		81.50%
4.1. Cracks	88%	
4.2. Washing slab proximity to well	75%	
5. Protection for water points after construction		75.00%
5.1. Guards	87.50%	
5.2. Fencing	50%	
5.3. Free of swampy surrounding	87.50%	
6. Efficiency of community financing for O & M		49.0%
6.1. Adequacy of tariff	37.50%	
6.2. Collecting tariff	37.50%	
7. Sustainability of willingness to pay		72.92%
AVERAGE SCORE OF ALL FACTORS		**76.70%**

Note: The scores in the second column of the tables shown above are attributed to the sub indicators from data collected by interviews, field observations and reviewing documents. Then these values are averaged to assign the score to the main performance indicators. Finally, average value drawn from all scores of the indicators shows the overall impression of indicators, which is supposed to measure performance of the approach.

5.5. SUMMERY OF CHALLENGES, GAPS AND OPPORTUNITIES OF THE APPROACH

a. Challenges in implementing the CMP approach

- Difficulty in finding professionals with higher qualifications
- Sparse settlement in Mandura woreda
- Environmental degradation
- Poor literacy rate
- Poor economic status of communities

From reviewing design documents, designs considered the limited capacity of the users to pay for higher level (more reliable) technologies and available skill for operation and maintenance. This was to minimize the risk of developing a water supply project, which demands higher level of operation and maintenance. For example, design and construction of larger systems like the spring in Dafilli, is made only for those communities who can be served by gravitational flow system despite the abundant flow from the source. And an overflow pipe serves the nearby community that could not be reached by gravity.

- Inaccessibility of some sites and remoteness of the areas
- Women bare majority of the work load in households leaving them having less time for active participation

b. Gaps

- Poor emphasis on the importance of hydrogeologists for site selection and construction follow-up.
- Shortage of dewatering pumps
- Efforts for convenient spare part supply arrangement has been slow despite the fact that the issue is critical
- Poor capacity of caretakers is resulting in dependence on the wereda technicians for scheme maintenance.
- WASHCOs' training manual, mainly focuses on financial issues, taking measurement during construction and managing operation and maintenance. Basic concepts on construction quality are not included in the trainings despite the fact that committees can also provide a significant input on the quality of built facility.
- Focus on low cost technologies

Though the identified sources are technically appropriate for the area, the focus on low technologies is holding back the program from reaching all communities in the program

woredas. Because kebeles like Gedem Dafilli and Dach Lombia in Mandura woreda have not yet been reached due to the difficult hydrogeological feature of the area to implement low cost technologies. And from previous studies, around 35% of Mandura woreda comprises aquifer of non-carbonate metamorphic rocks and metamorphic rocks have low permeability and hence low recharging capacity.

Additionally, the focus on low technologies has hindered rehabilitation of existing high yield but poorly functioning sources, such as Ali spring and Diga dam.

- Poor follow up on procedures after construction such as tariff setting, collection and protecting water points.
- Little emphasis on the importance of watershed protection

Rapid ground water table lowering and reduced spring yield is very likely because the natural environment is deteriorating by severe deforestation, which is taking place to provide fuel and agricultural land to serve the increasing population.

Figure 23: Deforestation in the woredas

c. Opportunities

- Efforts made to build capacity of local government agencies are considerable.
- It was understood that, despite the fact that communities' capacity to handle responsibility has not been developed to the required level, the efforts to decentralize decision-making and fund flow to community level have increased the motivation and morale of the communities to develop more water points and also possibility for empowering communities.
- Due to the organized fund flow to community level, woredas felt reduced burden in controlling expenses due to the involvement of the final user, deeply in the process and now have more time to assist projects and reach more communities.

- Wider understanding and awareness on the importance of safe water supply
- Existence of scheme level responsible body focusing on a particular task to efficiently carry out implementation
- The establishment and participation of the WASHCOs from the planning stage of the project has created better ground for participation and skill transfer into the community
- Setting the minimum number of female in the WASHCOs has created an opportunity for them to participate in the whole process

6. CONCLUSION AND RECOMMENDATION

6.1. CONCLUSION

In this study, the CMP approach has been evaluated on how it has been put in place, its applicability and its effectiveness. From the findings, majority of the CMP elements were satisfactorily blended in to the actual situation in the woredas. That is,

- management structures were set in place as required
- It succeeded in mobilizing communities, participating communities in activities and contributions from the beginning of the projects except participating communities in technology option selection
- Efforts to build capacity of the community were made.

There were also no findings, which indicate inappropriateness of the elements of the approach for the study areas. Therefore, it is concluded that the approach is appropriate.

It is also concluded that with the above stated level of implementing the approach and its applicability, the program showed promising result by achieving above average value in the attempt made to measure its effectiveness based on identified indicators showing the level of attaining targets. Moreover, the approach is carrying out encouraging work also creating so many opportunities for the rural community and the country in general facing considerable challenges along the process.

Another conclusion is that the approach is likely to be more successful in future implementation years because there are no basic issues from the components of the approach that are identified as unsuitable or negatively affecting its effectiveness and all the gaps identified are implementation constraints that the approach should deal with.

6.2. RECOMMENDATION

In a random order, the following recommendations are made on how to deal with weaknesses that has been identified in this research for further accomplishments in implementing sustainable water supply systems:

- At least one hydrogeologist should be employed at woreda level
- Critical equipments such as dewatering pumps should be readily available and woredas should have sufficient number with respect to the volume of works executed at the same time
- Main spare parts should be supplied to communities by the program until private sectors emerge.
- WASHCOs should also be given training on basic technical concepts of scheme construction so that their closer presence will also have an input on construction quality
- WASHCOs should be trained on tariff collection mechanisms from permanent and temporary users.
- WASHCOs should get refresher trainings and ongoing support on management issues to keep them motivated.
- Caretakers need intensive and recurrent refresher trainings
- Regular supervision by woreda experts is required on their financial management capacity and organizing communities. Regular visits by local government will also keep the committee members motivated.
- Since number of water points constructed every year is numerous, and communities' educational background and management capacity is poor, it is better to form a team at woreda level who is accountable only for operation and maintenance follow up until communities develop the skill to manage it themselves. The body can advise communities on how to make best use of funds, can regulate water committees to ensure transparency, and can help to rectify any with a particular water system. Quarterly monitoring visits provide a mechanism to advise communities on how to make best use of funds, identify causes of dissatisfaction early and find sustainable solutions
- Additionally, WASHCOs should also be given training on basic technical concepts of scheme construction so that their closer presence during supervision will also have an input on construction quality

- Community awareness on the importance of female participation needs to be developed so that their participation would have a chance to turn into active contributors enabling to take advantage from their roles.
- Lesson should be given to WASHCOs on methods of enforcing payment for temporary users also.
- Communities should be oriented on how the payment is crucial from the beginning of the project for efficient operation and maintenance, additionally support from local government is required in addition to demand responsiveness of projects and efforts to create ownership feeling.
- Catchment protection works should be promoted together with woreda agricultural desk and follow up is required on its implementation. Coordinated efforts with woreda agricultural desk is essential prevent degradation of natural resources.
- In this study, the CMP is evaluated based on the extent of achieving efficient implementation and sustainability of schemes. However, the major and ultimate goal of the approach is improving health of a community, which could not be possible without proper sanitation and hygiene practice. Therefore, further study is recommended for the complete understanding on overall achievements of the CMP in achieving its ultimate target.
- Additionally, further study is recommended to compare the performance of the approach with other modalities practiced in the areas and also with practices in other regions, to have a clearer image on its applicability and draw more ingredients for the advancement approach.

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ANNEX

Annex A : List of constructed schemes in the woredas in the four-year implementation period

No	Woreda	Year of construction	Number of scheme	Status
Productive wells				
1	Mandura	2008-2009	12	Productive
		2010-2011	43	Productive
2	Pawe	2008-2009	12	Productive
		2010-2011	51	Productive
Abandoned wells				
1	Mandura	2008-2009	5	Abandoned
		2010-2011	16	Abandoned
2	Pawe	2008-2009	3	Abandoned
		2010-2011	6	Abandoned

Annex B: List of all water points constructed by Finn –WASH in both woredas

MANDURA 2008-2009

No	Kebele	Gott	Scheme type	Depth
1	Dabuh	Georgis	HDW	5.0
2	D/Anzebaguna	Dezina	HDW	5.0
3	Jigda	Dafili	HDW	6.0
4	Gumadi	Kanagami	HDW	6.0
5	Gumadi	Addid Alem No.2	HDW	6.0
6	G/beles	Biyangua	HDW	6.0
7	Dabuh	Ankusa	HDW	6.0
8	Fotomanjari	Metoaleka fasika	HDW	6.0
9	Fotomanjari	Echichaya No.2	HDW	8.0
10	Edida	Around school*	HDW	8.0
11	Edida	Zeberaruk	HDW	13.0
12	Jigda	Enjibera	HDW	14.0

MANDURA 2010-2011

No	Kebele	Gott	Scheme type	Depth
1	Gilgel Beles Zuria	Wodaguna	HDW	4.5
2	Dabuh Giorgis	Kuisa	HDW	4.5
3	Bahus	Dushniba	HDW	5.0
4	Wudit	Chihugua	HDW	5.0
5	Kuter 2 (Edida)	Adigo jirit sefer	HDW	5.0
6	Dach Lumbia	Dangur	HDW	5.0
7	Duha Makesegnit	School	HDW	5.0
8	Bahus	Dabuh	HDW	5.1
9	Duha Makesegnit	Sahi got	HDW	5.5
10	Jigida Silasie	Sanklit gott	HDW	6.0
11	Duha Makesegnit	Gejew sefer	HDW	6.0
12	Duhanz Baguna	Kurate& Desanbe	HDW	7.0
13	Wudit	Chambuga	HDW	7.0
14	Kuter 2 (Edida)	Abadebasu sefer	HDW	7.0
15	Dabuh Giorgis	Wuba	HDW	7.0
16	Bahus	School	HDW	7.0
17	Duhanz Baguna	Kusha kutire-2	HDW	7.2
18	Jigida Silasie	Enjibara gott	HDW	7.5
19	Bahus	Bizrakani	HDW	7.5
20	Duha Gubash	Wohiba kutir-2	HDW	7.5
21	Kuter 2	Jirit sefer	HDW	7.5
22	Kuter 2 (Edida)	Andarge Sefer	HDW	7.7
23	Gilgel Beles Zuria	Wogdia	HDW	8.0

24	Dikul	School	HDW	8.0
25	Dikul	Dikul kutir 1	HDW	8.2
26	Wudit	Kumba	HDW	9.2
27	Wudit	Simiya	HDW	10.0
28	Jigida Silasie	Gichehiya kutir-1	HDW	10.5
29	Jigida Silasie	Omoza	HDW	10.6
30	Duha Gubash	Dezina	HDW	10.6
31	Jigida Silasie	Gichehiya kutir-2	HDW	11.0
32	Bahus	Gudi sefer	HDW	11.0
33	Duha Makesegnit	Dibgottina gott	HDW	11.0
34	Fotomanjarie	Wondbil	HDW	11.0
35	Gumadie	School	HDW	11.0
36	Duhanz Baguna	Bole sefer	HDW	11.5
37	Duhanz Baguna	Kurate-kutir-1	HDW	11.8
38	Dafili	Qumba kutir-2	HDW	12.0
39	Gilgel Beles Zuria	Biangua	HDW	12.4
40	Dafili	Qumba kutir-1	HDW	13.0
41	Gilgel Beles Zuria	Balkuta	HDW	13.4
42	Gilgel Beles Zuria	Ankussa	HDW	15.3
43	Jigida Silasie	Dafili	GS	

PAWE 2008-2009

No	Kebele	Gott	Scheme type	Depth
1	Almu-1	Addis sefer**	HDW	9.0
2	Ketena2 V-30 site 2	K2V31	HDW	9.0
3	Ketena-2 V134	Village-132	HDW	10
4	ketena-2 V23/45	K2V45	HDW	10
5	Ketena1 V-7	Village-7	HDW	10
6	Ketena2 V-7	Hamusit**	HDW	10.0
7	Ketena-2 V134	Village-131	HDW	12
8	Ketena2 V3	medhin	HDW	12
9	Ketena-2 V4(felege selam)	Village 4	HDW	13
10	Ketena1 V-7	Village 6	HDW	13
11	ketena-2 V23/45	K2V9	HDW	16
12	ketena-2 V23/45	K2V23	HDW	17

PAWE 2010-2011

No	Kebele	Gott	Scheme type	Depth
1	Ketena 1 Mender 4	Mender 30	HDW	6.0
2	Ketena 1 Mender 127	Mender 127	HDW	6.0
3	Almu40	40 Betoch	HDW	7.5

4	Ketena 2 Mender 134	Mender 131	HDW	8.0
5	Ketena 2 Mender 134	Mender 132	HDW	8.0
6	Ketena 2 Mendere 12	Mender 11 z-1	HDW	8.0
7	Ketena 1 Mender 17	Mender 8	HDW	8.0
8	Ketena 1 Mender 104	Wadelo	HDW	8.0
9	Abat Belese	Megenteya	HDW	9.0
10	Ketena 2 Mender 17	Mender 9	HDW	9.0
11	Ketena 2 Mender 23/45	Mender 9	HDW	9.0
12	Ketena 2 Mender 2	Mender 2	HDW	9.0
13	Ketena 1 Mender 104	Barber gott	HDW	9.0
14	Ketena 1 Mender 104	Mender 105	HDW	10.0
15	Semen Sefer	Farmer Sefer	HDW	10.0
16	Ketena 2 Mender 21	Mender 20	HDW	10.0
17	Ketena 1 Mender 127	Mender 101	HDW	10.0
18	AlmuSar	Sar Sefer	HDW	10.0
19	Ketena 1 Mender 4	Mender3	HDW	10.3
20	Ketena 2 mender 26	Mender 26	HDW	11.0
21	Ketena 2 Mender 134	Mender 131	HDW	11.0
22	Ketena 2 Mender 12	Mender 13	HDW	11.0
23	Ketena 1 mender 49	Mender 46	HDW	11.0
24	Ketena 2 mender 17	School	HDW	11.0
25	Ketena 2 mender 14	Mender 16		12.0
26	Ketena 2 mender 7	Hamusit	HDW	12.0
27	Mender 49	Mender 49	HDW	12.0
28	Ketena 1 Mender 4	Mender 5	HDW	12.0
29	Mecaneselam	Mender 51	HDW	12.0
30	Ketena 2 Mende 28/29	Mender 28	HDW	12.0
31	Felege Selame	Mender 4	HDW	12.0
32	Ketena 2 mender 26	Mender 26 school	HDW	12.0
33	Ketena 1 mender 4	Mender 5 school	HDW	12.0
34	Ketena 2 mender 17	Mender 8 school	HDW	12.0
35	Abat beles	Tach Sefer	HDW	13.0
36	Almu	Meskerem Hotel	HDW	14.0
37	Ketena 2 Mender 23/45	Mender 23	HDW	14.0
38	Ketena1 Mender 4	Mender 4 Clinic	HDW	14.0
39	Ketena 2 Mender 14	Mender 14	HDW	15.0
40	Ketena2 Mender 12	Mender 12 Health	HDW	15.0
41	Ketena 2 mender 30	Mender 30	HDW	15.6
42	Mecaneselam	Mender 46	HDW	15.6
43	Ketena 2 mender 127	Mender 127 School	HDW	15.6
44	Ketena2 Mender 23/45	Mender 10	HDW	16.0
45	Ketena 2 Mende 12	Mender 11 2-3	HDW	16.0
46	Ketena 2 Mender 30	Catholic Sefer	HDW	17.0

47	Ketena 2 mender 134	Mender 134 school	HDW	17.0
48	Ketena 1 Mender 49	Mender 48	HDW	19.5
49	Ketena 2 Mender 134	Mender 134	HDW	19
50	Ketena2 Mender 23/45	Mender 45	SP	

Annex C: List of abandoned wells

Abandoned wells in Mandura

year of const.	No	Kebele	Gott	Scheme type	Depth
2008-2009	1	Jigda	Enjibera*	HDW	6.5
	2	D/Anzebaguna	Dezina	HDW	8.3
	3	Dabuh	Ankusa*	HDW	12.0
	4	Edida	Around school*	HDW	14.0
	5	Jigda	Dafili	HDW	17.6
	No	**Kebele**	**Gott**	**Scheme type**	**Depth**
2010-2011	1	Bahus	Gudi sefer	HDW	3.0
	2	Bahus	Dabuh	HDW	5.8
	3	Duhanz Baguna	Bole sefer	HDW	7.0
	4	Diul	School	HDW	7.0
	5	Bahus	School	HDW	8.0
	6	Duha Makesegnit	Gejew sefer	HDW	8.3
	7	Dikul	Dikul kutir 1	HDW	9.5
	8	Dafili	Qumba Kutiir 1	HDW	11.0
	9	Wudit	Simiya	HDW	11.0
	10	Bahus	School	HDW	11.4
	11	Dafili	Qumba kutir-2	HDW	12.0
	12	Wudit	Simiya	HDW	12.0
	13	Bahus	Dushniba	HDW	14.2
	14	Duha Makesegnit	School	HDW	14.5
	15	Bahus	Dushniba	HDW	14.9
	16	Duha Makesegnit	School	HDW	15.0

Abandoned wells Pawe

	No	Kebele	Gott	Scheme type	Depth
	1	Alemu	School	HDW	8.0
2008-2009	2	Ketena1 V-17	Village-8/9*	HDW	10.0
	3	Ketena2 V-30-site 1	K2V30*	HDW	11.0
	4	Ketena 1 mender 49	Mender 51 school	HDW	11.0
	5	Ketena 1 Mender 4	Mender 32	HDW	12.0
	6	Almu	tele*	HDW	13.0
2010-2011	7	Ketena 2 Mender 21	Mender 21	HDW	13.0
	8	Ketena1 Mender 7	Mender 7 school	HDW	18.0

Annex D: Current amounts deposited in WASHCO's saving account opened at MFIs

No	Woreda	Kebelle	Gott	Type of scheme	Frequency of failure	Tariff	Age of scheme (year)	Saving at MFI
1	Mandura	Gilgel Beles Zuria	Wagdi	HDW	Twice a year	1.0	1	1000
2	Mandura	Dehan zibaguna	Kusha	HDW	Never	5.0	1	1000
3	Mandura	kutur Hulet	near to school	HDW	Never	0.0	3	1000
4	Mandura	Duha Gubash	Dudre no 2	HDW	Never	1.0	2	1400
5	Mandura	Dehan zibaguna	Djana	HDW	once since commissio	10.0	4	1000
6	Mandura	Dehan zibaguna	Kuraiti	HDW	Never	3.0	2	1000
7	Mandura	Duha Gubash	Wehba	HDW	Once in two years	0.0	3	1000
8	Mandura	Jigda Silasie	Dafilli	SPD	only once	1.0	1	1000
9	Pawi	Ketena2 – V/4	Felegeselam	HDW	three times	1.0	4	1780.35
10	Pawi	Ketena 2	Mender 134	HDW	Three times in	6.0	2	1000
11	Pawi	Ketena 2 Mender 12	Mender 11 (2-3)	HDW	Never	2.0	2	2153.45
12	Pawi	Ketena 1 Mender 4	Mender 30	HDW	Never	6.0	1	1000
13	Pawi	Almu A	Addis sefer	HDW	Twice in three years	3.0	4	1364.45
14	Pawi	Ketena 1 Mender 4	Mender 3	HDW	Never	3.0	1	1563.50
15	Pawi	Ketena 1 Mender 4	Mender 5	HDW	Never	6.0	1	1000
16	Pawi	Ketena 2/23-45	Mender 45	SPD	never	3.0	1	1144.10

Annex E: Annuity factors, $AF_{n,r}$

Number of years, n	Interest rates, r								
	1%	2%	3%	4%	5%	6%	8%	10%	12%
1	0.990	0.980	0.971	0.962	0.952	0.943	0.926	0.909	0.893
2	1.970	1.942	1.913	1.886	1.859	1.833	1.783	1.736	1.690
3	2.941	2.884	2.829	2.775	2.723	2.673	2.577	2.487	2.402
4	3.902	3.808	3.717	3.630	3.546	3.465	3.312	3.170	3.037
5	4.853	4.713	4.580	4.452	4.329	4.212	3.993	3.791	3.605
6	5.795	5.601	5.417	5.242	5.076	4.917	4.623	4.355	4.111
7	6.728	6.472	6.230	6.002	5.786	5.582	5.206	4.868	4.564
8	7.652	7.325	7.020	6.733	6.463	6.210	5.747	5.335	4.968
9	8.566	8.162	7.786	7.435	7.108	6.802	6.247	5.759	5.328
10	9.471	8.983	8.530	8.111	7.722	7.360	6.710	6.145	5.650
11	10.368	9.787	9.253	8.760	8.306	7.887	7.139	6.495	5.938
12	11.255	10.575	9.954	9.385	8.863	8.384	7.536	6.814	6.194
13	12.134	11.348	10.635	9.986	9.394	8.853	7.904	7.103	6.424
14	13.004	12.106	11.296	10.563	9.899	9.295	8.244	7.367	6.628
15	13.865	12.849	11.938	11.118	10.380	9.712	8.559	7.606	6.811
16	14.718	13.578	12.561	11.652	10.838	10.106	8.851	7.824	6.974
17	15.562	14.292	13.166	12.166	11.274	10.477	9.122	8.022	7.120
18	16.398	14.992	13.754	12.659	11.690	10.828	9.372	8.201	7.250
19	17.226	15.678	14.324	13.134	12.085	11.158	9.604	8.365	7.366
20	18.046	16.351	14.877	13.590	12.462	11.470	9.818	8.514	7.469
21	18.857	17.011	15.415	14.029	12.821	11.764	10.017	8.649	7.562
22	19.660	17.658	15.937	14.451	13.163	12.042	10.201	8.772	7.645
23	20.456	18.292	16.444	14.857	13.489	12.303	10.371	8.883	7.718
24	21.243	18.914	16.936	15.247	13.799	12.550	10.529	8.985	7.784
25	22.023	19.523	17.413	15.622	14.094	12.783	10.675	9.077	7.843
26	22.795	20.121	17.877	15.983	14.375	13.003	10.810	9.161	7.896
27	23.560	20.707	18.327	16.330	14.643	13.211	10.935	9.237	7.943
28	24.316	21.281	18.764	16.663	14.898	13.406	11.051	9.307	7.984
29	25.066	21.844	19.188	16.984	15.141	13.591	11.158	9.370	8.022
30	25.808	22.396	19.600	17.292	15.372	13.765	11.258	9.427	8.055

Annex F: **Operation, maintenance, and replacement cost calculations**

Table 17: Annual maintenance cost

Pump component	**Replacement period (year)**	**Cost (birr)**	**Annual cost (birr)**
O-ring	1	5	5
U-seal	0.5	7	14
Bobbin	1	12	12
Rod hanger assembly	1	125	125
Valve assembly	8	106	13.25
Plastic bush bearing	1	40	40
Plunger	8	210	26.25
Total annual maintenance cost			**235.5**

For operation cost, payment for guards is considered. And from the current experiences fee for guards is a maximum of 2 birr/month /household, that is, **1200 birr** per year.

Additionally, to calculate annual cost of replacement, annuity factor is read form table on Annex E as 7.606, And annuity, $A=C_o/AF_{r,t}$= 9500/7.606 = 1249 birr

Therefore, the required annual operation and maintenance cost is 2618.5birr that is, 4.5birr/month/household.

For spring developments at Dafilli

Annuity required for replacement is A=604,903.49/7.606=6627.48birr/year

And annual operation cost is

- Fee for guards =1200x5=6000birr at all the five public fountains,
- Annual chlorine requirement = 1.5mg/liter x50, 000litres x 4times/year = 300000mg =0.3kg/ year. Hence, annual disinfectant cost =100birr/kg x 0.3kg = 30 birr

Annual maintenance cost is

From engineering design report by Niras/Orgut, March 2011, maintenance cost is calculated as;

For pipe lines = 0.2% of the pipe line investment cost

For reinforced concrete reservoir =0.75% of the reservoir investment cost

For other civil works (public fountains, etc) = 0.5% of civil works investment cost

Accordingly, the annual operation and maintenance expenditure of the scheme components and including replacement =15,454.81 birr. This becomes 3.25birr/month/household

Annex G: Questionnaires and checklists for primary Data collection

CHARACTERIZATION OF ***WATER POINT*** STRUCTURES, BASED ON SUSTAINABILITY INDICATORS (TECHNICAL, SOCIAL, FINANCIAL, INSTITUTIONAL AND ENVIRONMENTAL ISSUES) AFFECTING THEIR FUNCTIONALITY, UTILIZATION, QUALITY AND IMPACT ON THE ENVIRONMENT

OBSERVATION CHECK LIST/ physical condition

General:

1. Location

   Kebelle _____

   Gott Name _____

   GPS coordinate: X- coordinate _____Y- coordinate _____Altitude: _____
2. Year of

   construction_____
3. Type of water

   source_____

   HDW

   Shallow well

   Spring Development

   Deep well

   Others
4. Type of water lifting/ distribution

   Rope pump

   Hand pump

   Motorized pump

   Other _____
5. Type of distribution system

   On spot

   Gravity

   Other _____
6. Type of power supply source for the pump _____
7. Functionality of water source

   1=Non-functioning at all

   2=Functioning with some problems

   3=Well functioning without any disrepair

8. If the observed functionality is '1', the main disrepairs are: _____
9. If the observed functionality is '2', the main disrepairs are: _____
10. Additional facilities:

    0=No additional facilities at all

    1=Animal troughs 2=Washing stand 5=Irrigation system

    3=Shower room 4=Guard house

    Others_____

Technical:

Source Location:

1. Proximity from area of residence of users/ Distance from the nearest household_____
2. Proximity from latrines _____
3. Proximity from the nearest agricultural lands _____
4. Is the area flood prone? Y/N

   If yes, is source protected from flooding and erosion? Yes/ No

Storage:

1. Type of storage /reservoir material _____
2. Condition of well or other storage components cracks/ leakage _____

Pump:

1. Type of pump _____
2. Pump condition _____
3. Type of power supply _____
4. Condition of the power supply _____
5. Discharge (l/sec) _____

Other components at source

1. Head wall condition, good/cracked
2. Apron condition, good/cracked
3. Slab cover condition, good/cracked

Distribution system (if any):

1. Type of pipe material _____
2. Construction, properly buried/ exposed _____
3. Leakage, Y/N

Out let:

1. Is it easy to access and operate for children and disabled? _____
2. Does it provide convenient container placing? _____
3. Is queuing observed?

   Is it sufficiently distributing the water (number of taps Vs no. of users?)

Environmental issues

1. Condition and existence of drainage facilities

   Good/

   Filled with mud

   Does not exist

   Other _____

2. Is catchments rehabilitation done?

   0=No 1=Yes

3. Surrounding of the water supply source:

   1= Not clean at all

   2= somewhat clean

   3= Very clean

Q TO HOUSEHOLDS

General

1. Respondent: Household member
2. Age of the respondent _____years
3. Sex of the respondent _____
4. Marital status of respondent _____
5. Occupation for living _____
6. Monthly income of the household _____
7. Number of family members in the household including the head _____
8. User of water point located at: _____
9. Type of the user's water point : _____

CMP

1. Check if user communities fulfilled all necessary requirements upon applying.

1.1. Was lack of safe water the main problem? 1. Yes 2. No
If no, What is your priority? _____
If no, why? _____
1.2. Did you participate in establishing WASHCo? 1. Yes 2. No
If no, why?
Did not attend, why? _____
No one asked
Newcomer
1.3. Were you willing to contribute for the water point to be constructed? 1. Yes 2. No
If no, why? _____
If the answer is unwillingness, give reasons.
- Service level
- Perceived benefits
- Price
- Perception of ownership
- Transparency of financial management

Other _____
1.4. Did you contribute the required amount of contribution while applying? 1. Yes 2. No
If no, why? _____
1.5. Do you own latrine? 1. Yes 2. No
If no, why? _____
1.6. Have you ever been served before from other developed water point? 1. Yes 2. No
Is it still functional? 1. Yes 2. No

2. Check if community participated in planning.

2.1. Do you know another source of water, which you prefer? 1. Yes 2. No

If Yes,

2.1.1. What is your preference?
2.1.2. What is your reason for not favoring the developed source?
2.1.3. Did you present your preference during planning? Yes/no
If yes, why did they decline your idea? _____
If no, why? _____

2.2. Is there any other water point **location** you would prefer than the current one? 1. Yes 2. No

If yes, what is your suggestion? _____
Did you raise this during site selection? _____
What was the response? _____

3. How did community participate in implementation
   - 3.1. Did you participate in **decision making** during construction of the water point? Y/N
     - 3.1.1. If yes, what kind of decisions? _____
     - 3.1.2. If no, why? _____
   - 3.2. Were your thoughts and suggestions considered and respected during construction?
     1. Yes 2. No
     a) If no, what do you think is the reason? _____
   - 3.3. Would you be willing to contribute for upgrading the existing service?
     - 3.3.1.1.1. If yes, end of Q.
     - 3.3.1.1.2. If no, why? _____
4. Check community's participation in O & M of the scheme.
   - 4.1. Do you pay for the water service?
     - 4.1.1. If yes,
       a) What is the charge (per m^3)? _____
       b) What is your attitude toward the costs? Affordable/ not affordable
       c) Do you know how the tariff money collected used? Y/N
       If no, why? _____
       d) How much is the largest affordable price for you? _____
   - 4.2. Have you ever been asked to contribute additional money for maintenance?
     - 4.2.1. If yes,
       a) When was it? Before/ after breakdown
       b) Were you willing to contribute? 1. Yes 2. No
       If No, why? _____
   - 4.3. Existence and performance of operators and caretakers
     - 4.3.1. Does this water point have guard (operator)? Yes/ No
     - 4.3.2. Is the operator available all the time? Yes/ No
     - 4.3.3. Does the water point have trained caretaker? Yes/ No
     - 4.3.4. Do you think that the trained caretakers are always available to maintain the system whenever there is failure? Yes/ No
     - 4.3.5. Do you think that the caretakers are capable of maintaining any system failure? Y/N
       If no, why? _____
5. Existence and performance of WASHCos
   - 5.1. Do you think WASHCos have good reputation and are respected? 1. Yes 2. No
   - 5.2. Do you trust them in doing the work? 1. Yes 2. No
   - 5.3. How frequent do you meet with WASHCo to discuss on financial issues? _____
   - 5.4. Are the issues discussed during meetings clear and understandable? 1. Yes 2. No
   - 5.5. Do WASHCos work transparently? 1. Yes 2. No
     If no, explain _____
   - 5.6. How is female WASHCO members' activity different from men**?** _____

Characterization

Technical

1. How much water (in litter) do you fetch from the water point in one day? _____
2. For what purposes do you use the water? _____
3. Is it enough for the household demand?
   - 3.1. If yes, end of Q.

3.2. If no, what is the reason for not fetching more water?
3.2.1. If it is restriction at the water point, what is it?
Time restriction/rule on volume of water fetched
Reason for restriction _____
3.2.2. Other (specify) _____

4. Do you find it easy / comfortable to operate the water point components/ pump? Yes/ No
If no, which part causes problem? _____
5. Is there frequent service discontinuation of facility?
5.1. If yes, what is the reason? _____
5.2. If no, end of Q.
6. Is there long service discontinuation due to repair periods? Yes/No
If yes, why?
Spare part
Caretaker not available
Other _____
7. Do you still use unimproved water source? Yes/No
If yes,
a) For what purpose? _____
b) Why? _____
8. How long you used to spend traveling to get water from traditional sources (round trip, minutes)? _____
9. How long do you travel to fetch water from the improved water point in average (round trip, minutes)? _____
10. How long do you stay in a queue to get water from the water point (minutes)? _____
11. Did health of your family improve after you start using the improved source? Yes/No
If no, why? _____

Social (awareness)

1. How frequent do you use the improved water source? _____
1.1. If always, end of Q.
1.2. If other, why?
- Was not asked
- Being poor
- Being old
- Low reliability of scheme
- Location of scheme
- Other _____

2. Do you feel that you are responsible to operate, protect and maintain the system? Yes/No
If no,
Why? _____
Who do you think should be responsible? _____

QUESTIONNAIRES TO WASHCOs

General:

1. Location of the sample water point managed by the WASHCo member
   Kebelle _____
   Gott Name _____
2. Year of construction _____month _____year
3. Type of water source
   HDW
   Shallow well
   Spring Development
   Deep well

Characterization

Technical

1. Who selected the technology type? _____
2. Who built the facility?
   Private contractor
   Trained Artisans
3. How frequent does the system fail?
   a) Frequent (specify the frequency) _____
   b) Rare (specify the frequency) _____
   c) Never failed up to now
4. If the water point has problem during survey why is it not maintained /repaired? _____
5. Which parts usually cause problem /failure? _____
6. What is the reason for failure? _____
7. How long in average does it take to maintain a pump or other component? _____
   If more than one day, what is the reason?
   a) Lack of budget
   b) Lack of skilled technicians
   c) Availability of spare parts
   d) Others (specify) _____
8. Does the discharge and pressure meet level of Service required (to avoid queuing) Yes/ No
9. Was the water from this water point tested for quality? 1. Yes 2. No

   14.1. What was the result? _____

15. Any measures taken to overcome the quality problems at source? Yes/No

   15.1. If no why? _____

   15.2. If yes,

   - What kind of treatment? _____
   - When was it done? _____

Social

1. Is there a rule restricting access to water at this water point? Yes/No

If yes, describe the restriction _____ (Quantity of water, hours of service ...)

Financial

1. Who financed for capital expenditure? _____
2. Has there been financial shortage while implementing the scheme?
   If yes, what is the reason? _____
3. Have you set tariff? _____
4. What is the amount? _____
5. How do you collect it? _____
6. Do all users pay the required amount? Yes/ No
   If no, why? _____
7. Has there been financial shortage for O or M? 1. Yes 2. No
   If yes,
   - What is the reason? _____

Environmental

1. How is the water point surrounding cleaned?
   Regularly
   Sometimes
   Never
2. If regularly/ sometimes, who is cleaning the water point surrounding? _____
3. If sometimes or never, why?_____
4. Does the water source dry in any time of the year? Yes/ No
5. If yes, at what time of the year does it dry? _____

CMP

1. How many numbers of households are benefitted from this water source? _____
2. How is communities' level of participation explained in general?
   2.1. How did community participate in implementation?
      2.1.1. Did they participate in decision making during construction of the water point?
         a) If yes, How?
            Approving the contractors' work for payment
            Other _____
         b) If no, why? _____
      2.1.2. Had there been any problem in contributing the required amount for constructing the scheme? Y/N
         a) If yes, what is it? _____
   2.2. How did communities participate in O & M?
      2.2.1. Do communities pay for water? Yes/No
         a) If yes,
         e) What is the charge? _____
         f) How do you collect it? _____
         g) What is your attitude towards the costs? _____

h) How is it used?

If saved in bank, how much did you save until now? _____

b) If no, why? _____

2.3. Existence and performance of operators and caretakers/ local mechanics

2.3.1. Are there operators and caretakers for this water point? Yes/ No

2.3.2. Did operators and caretakers get training? Yes/ No

2.3.3. Does the water point have guard? Y/N

If yes, is guard available all the time? _____

If not available what is the reason? _____

How much do you pay the guard? _____

If there is no payment, why don't you pay? _____

2.3.4. Are caretakers able to maintain failures? Yes/ No

If no, why are they unable to maintain? _____

2.3.5. Are caretakers always available? Y/N

If no, why? _____

2.3.6. Do you pay caretakers? Y/N

a) If no, do they complain? Y/N

b) What is their complaint about? _____

3. Composition of WASHCo in managing activities?

3.1. Are you users of the water point? Yes/ No

3.2. Are you willing and interested in managing the scheme? Yes/ No

If no, why? _____

3.3. How long have you been resident in this area? _____

3.4. How many female members do you have in the committee? _____

3.5. Why is the involvement of women important? _____

4. Performance of WASHCos

4.1. Did you get training in contracting artisans, contractors or suppliers (procurement)? Yes/ No

4.2. When did you get the training and how long did it take? _____

4.3. Were the trainings relevant and helpful? Yes/ No

If no, what was the problem? _____

4.4. Have you ever delegated facilitators to contract artisans, contractors or suppliers? Y/ N

If yes, why did not do it yourself? _____

4.5. Had there been any problem in procuring construction materials? Y/ N

If yes, explain. _____

4.6. Had there been any problem in organizing working construction materials and labor supply from the community? Yes/ No

If yes, explain. _____

4.7. Do you think you can maintain community support for the system? Yes/ No

If no, why? _____

4.8. Are you willing to continue in this responsibility as WASH committee? Yes/ No

If no, what is your reason? _____

5. Can we say communities are managing the project funds through WASHCo

5.1. Did you withdraw money to issue payment to artisans? Yes/ No

From where/how do you receive the money? _____

If no, why? _____

5.2. Did you issue payment to suppliers of construction material? (and pump) Yes/No
If no, why? _____

5.3. Has there been any time that you haven't paid suppliers for material? Y/N
If yes, why? _____

5.4. Do you/WAHCos/ meet with the community to discuss financial issues? Y/ N
If yes,

5.4.1. How frequent? _____

5.4.2. Who attends meetings? _____

5.4.3. How is communities' capacity to understand financial issues? _____

6. Participation and facilitation of district level WASH team in planning, implementation, O&M.

6.1. Is the fund required from upper levels available all the time? Yes/ No

If no, why? _____

6.2. Did wereda technicians give technical assistance in site selection? Yes/ No

6.3. How many times do wereda representatives supervise WaSH facilities during construction? _____

6.4. How many times in a year do wereda members supervise WASH facilities after construction? _____

6.5. Do you think the wereda councils are willing to support you in your work? Yes/ No

Annex H: Large springs in the study area

Ali spring is located in Pawe woreda, which have been developed with gravity distribution system to serve large community. And it is only partially functional at the moment due to damaged distribution system and non functional reservoirs.

Diga dam also located near Pawe woreda has also a big potential for water supply to the downstream community in the woreda, which does not have treatment plant and is not functioning at present.

Abatachin spring is located in Mandura woreda and supplies water to towns in the woreda, Gente Mariam and the Zonal capital Gilgel Beles town. According to Girma Adissu, 2010, more than 75 percent of the water of the two towns comes from this spring and both towns still have water shortage.

Dam from Ali spring

Diga Dam near Pawe

Annex H: Developed springsin the study woredas

Fig: Spring box and outlets

Fig: Storage reservoir

Fig: Reservoir from spring, Pawe

Fig: Public fountain at Dafilli

Annex I: Photos from fieldwork

Interview with female WASHCO, Mender 45, Pawe Woreda

Picture taken with WASHCO members at Wagdi Gott, mandura woreda

Picture taken with WASHCO members at Felegeselam Gott, Pawe Woreda

Children operating hand pump, Mender 03, Pawe

Visiting water point developed at Dudre no. 2, in Mandura Woreda

Discussion with WASHCO members

Discussion with female WASHCO member at Kusha Gott in Mandura Woreda (with the help of translator)