academicJournals

Vol. 10(9), pp. 292-306, September 2016
DOI: 10.5897/AJEST2016.2132
Article Number: 04AF23059936
ISSN 1996-0786

http://www.academicjournals.org/AJEST

African Journal of Environmental Science and Technology

Full Length Research Paper

Comparison of community managed projects and conventional approaches in rural water supply of Ethiopia

Beshah M. Behailu[1]*, Arto Suominen[2], Tapio S. Katko[1], Harri Mattila[3] and Gashaw Yayehyirad[4]

[1]Department of Civil Engineering, Tampere University of Technology, Tampere, Finland.
[2]Community-Led Accelerated WASH (COWASH) Project, Addis Ababa, Ethiopia.
[3]Bioeconomy Research Centre, Sustainable Development, HAMK University of Applied Sciences, Hameenlinna, Finland.
[4]Addis Ababa Institute of Technology (AAiT), Addis Ababa University, Addis Ababa, Ethiopia.

Received 29 April, 2016; Accepted 18 July, 2016

This study aimed to compare Community Managed Projects (CMP) approach with the conventional approaches (Non-CMP) in the case of Ethiopia. The data collection methods include a household survey (n=1806), community representative interviews (n=49), focus group discussions with district water experts (n=48) and observations of water systems (n=49). The data were collected from seven districts of two regions of Ethiopia. The study shows that CMP have a better platform to involve the community than non-CMP. In terms of reducing distances to water points, all approaches succeeded. However, the intended amount of water supplied is not achieved in all the cases: only 25% of CMP users and 18% of non-CMP users are able to get water according to the national standard, 15 L per capita per day. Fee collection in the approaches has a high disparity in favour of CMP. To keep long-lasting services, three requirements need to be particularly fulfilled: quantity, quality and accessibility.

Key words: Long-lasting services, rural water supply, Community Managed Projects (CMP), conventional, Ethiopia.

INTRODUCTION

The past few decades have significantly intensified the efforts to improve the coverage and access to potable water supply and sanitation worldwide. Yet, the situation has not been improved substantially in the Sub-Saharan countries. The access to water supply in the region only increased from 48% in 1990 to 64% in 2012 (WHO and UNICEF, 2014). Several factors such as population growth, climate change (Howard et at., 2010), high rate of

*Corresponding author. E-mail: beshah.behailu@tut.fi, beshahnb@gmail.com.

non-functional schemes (Harvey, 2008) and the lack of cost recovery systems or their ineffectiveness (Harvey, 2007) have contributed to the insufficient coverage of water supply, sanitation and hygiene (WASH) in the region.

Yet, national governments or donors alone cannot address the water demands of the alarmingly increasing population and the multi-faceted challenges of the sector in developing countries. Therefore, involving the user community is vital for long-lasting services. The participation of the community should be included in the planning and implementation the systems, contribution and utilization of investment funds, as well as operation and maintenance of the systems. Empowering of the users is essential since it is difficult to obtain adequate attention to repair and upgrade failed systems in countries with scarce resources. Thus, participating users from the beginning of a project is crucial in sustaining water service delivery (Rautanen et al., 2014). In the sustainable services, delivery quantity, good quality and a reasonable distance to water points are key monitoring indicators (UN, 2003). Moreover, the existence of the services mentioned above will boost the involvement of the users in the system management.

In addition to low success in improving coverage, non-functionality of systems has posed additional challenges in the sector. Many studies estimated that non-functionality of rural water supply schemes could reach 60% in sub-Saharan Africa (Harvey, 2008; Jones, 2011; Taylor, 2009). The causes of the service breakdowns could be under the technical, social, environmental or economic categories (Brunson et al., 2013). However, the technical and economic aspects usually override to shadow the others. For instance, financing is assumed to solve the problem of water supply. Of course, with money, a physical asset can be implemented; however, it will not bring a long-lasting result without the community involvement. Users are immediate stakeholders of a project and they could facilitate the achievement of functional schemes by tackling system-retarding factors. The customs of a community determine the process of change in institutions (North, 1990), in combating non-functionality. Contextualizing institutions with the local situation and involving users can increase credibility and the chance of institutional changes. Moreover, during implementation of new systems, paving ways for post-construction management is prominent in reducing non-functionality. Thus, to address water supply, it is crucial to deal with both implementation and post-implementation management.

In Ethiopia, four implementation approaches have been used in the rural water supply and sanitation sector. The first is the Woreda (District) Managed Project (WMP) approach that is administered and managed by the district water office. The second is the Non-Governmental Organization Managed project (NGO-MP) approach that has similar nature with WMP in most cases – centralized administration. The third is the Community Managed Projects (CMP) approach, which decentralizes power to the community level; the user community controls the financials as well as project management. The last one is the self-supply approach, which is implemented by individual households or a group of a few households with only technical support from external actors (WIF, 2013).

WMP and NGO-MP projects are independent water supply implementation approaches owned by Government and Partner organizations, respectively. CMP is a bilateral project that is operated by the government of Ethiopia with technical assistance from the government of Finland. In the project, both countries have contributed cash for investment and capacity building.

WMP and NGO-MP have been practiced for long since the establishment of water sector development in the country and in this paper they referred to it as conventional approaches and represented by Non-CMP in this paper. However, CMP have evolved from Community Development Fund (CDF) in 2011 to finance projects in more decentralized ways (Behailu et al., 2015). Therefore, this paper aimed to compare CMP and non-CMP (WMP, NGO-MP) approaches in the context of long-lasting WASH services in Ethiopia. The self-supply approach is not included in this study as it is still in its initial stages.

The background of the research area

This study was conducted in Ethiopia, the second most populous country in Africa. The country has nine ethnically demarcated regions (Figure 1) and two administrative cities. According to the World Population Review (2016) estimate, the population of the country is approximately 99 million, out of which 84% live in rural areas (CSA, 2010). The study was carried out in two northwestern regions of Ethiopia; namely, Amhara and Benishangul-Gumuz (Figure 1), with the populations of 17.22 million (rural 15.11 million) and 0.78 million (rural 0.68 million), respectively (CSA, 2010). In the Amhara region, 36 districts were using the CMP financial mechanism in June 2012 (in 2013, the number increased to 40 districts in Amhara, and in 2014 to 72 districts in the country). The population of the districts varies from 35,000 to 2,250,000 in the study area.

The number of people served under a water supply system depends on the nature of sources and technologies used. For instance, deep wells could support more people than spring development. Moreover, hand-dug wells and shallow wells with hand pump are able to serve fewer residences than any other sources. Since the majority of water systems in the rural Ethiopia are hand-dug wells and spring developments, the

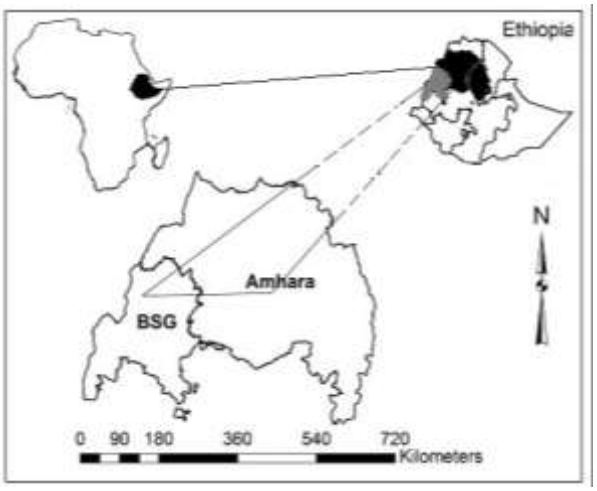

Figure 1. The map of the study area (drawn by the first author).

average population over a water point could reach 250 people (the equivalence of 50 households).

National standards

World Health Organization (WHO) has set minimum standards for per capita water supply (20 L) and distance to travel to collect water (1 km) (WHO and UNICEF, 2000). The government of Ethiopia has adopted a gradual improvement policy to reach these levels. Therefore, for the period from 2010 to 2015, per capita demand in rural areas was designated to be 15 lpcd (liters per capita per day and in a radius of 1.5 km (UAP, 2011). Moreover, a draft of the second growth and transformation plan (GTP2) has proposed 25 lpcd in a radius of 1.0 km for rural residences (GTP, 2015). In this paper, the former national standard is considered for analysis, since the research was carried out before the launch of the new plan, GTP-2.

Committee

Improved water sources are managed and operated by communities' representatives called WASHCO (short for WASH Committee). It consists of five to seven members depending on the approach. In this committee, a 50% involvement of women is mandatory as they are the ones who mainly suffer from the water and sanitation problems. In CMP, three out of five WASHCO members must be women. However, the composition and number of WASHCO members depend on national and regional interest. The role and responsibility of the committee do not vary between CMP and non-CMP except for the arrangements of training and degree of empowerment.

METHODOLOGY

This study was conducted with both qualitative and quantitative approaches. Despite the difficulty in integrating the results of qualitative and qualitative data in mixed method, it is more practical to investigate a pragmatic nature of a social development, both from the perspective of service providers and producers (Bryman, 2006; Creswell, 2013). Thus, this approach is termed as a pragmatic approach and it is vital in studying the nature of different water and sanitation implementations and perceptions of the receiving community on the output (Bryman, 2006).

Methods employed in data collection were household surveys, focus group discussions and observations. The household survey was designed to collect information from the users. In the survey, users were asked about family size versus daily water use, distance travelled, queuing time, water quality perceptions, users' role in the implementation of the water scheme, water fee payment, the reliability of sources, feelings about the water schemes, and the trust that users have toward WASHCO members and their performance. The focus group discussions were done with water committees and district experts. Moreover, the focus of site observation is to synchronize the findings obtained by the other two methods with practical practices, accordingly the strategy of site observations was selected from the selected water schemes.

Data was collected from two regions of Ethiopia: namely Amhara and Benishagul-Gumuz regions. The reason for selecting these regions was the prior implementation of Community Managed Projects Approach (CMP) well in advance to the data collection period of this study. Data collection from Amhara region was done between December 2013 and June 2014, and from Benishangul-Gumuz between November and December 2012. Sampling process cascaded down from districts to water supply schemes and then to households to implement the above mentioned research methods. Thus, it has three stage sampling in agreement with the multilevel mixed methods sampling described by Teddlie and Yu (2007) (Table 1).

In the first stage of the sampling, districts were selected. Criteria of the selection were the presence of projects implemented by different approaches of CMP and Non-CMP. The second stage of sampling was selecting clusters of households based on the water supply schemes. Collected data can be used as individual household behavior and investigate perception of the users on implemented schemes (as a group of users), sticking to the scheme based clustering was considered appropriate in this study (Deaton, 1997). The cluster was also made for CMP and Non-CMP schemes to assist the comparison of the approaches.

The third stage of household sampling was also in agreement with Deaton (1997), selected with simple random technique from a fresh list prepared by water committee of the respective schemes. The reason for making the fresh list was the absence of organized record of users at each water supply scheme. In this sampling, at least a third of the households from a water supply scheme were surveyed with a repeated visit to missed households in the previous visit.

Moreover, the data collection process had two categories. The first one was conducting surveys of the selected households by the trained enumerators and the second was group discussions with district water offices staff, water committee and site observation by the first author. The data collection was made in district bases and all the above data collection processes were done in parallel. The first author was in the same district where data collection was active to facilitate the household survey and follow up the process while

Table 1. Sampled water schemes and households.

District	Number of water schemes	Surveyed households (CMP)	Surveyed households (Non-CMP)	Total households
First stage	Second stage		Third stage	
Dega Damot	20	102	52	154
Guangua	27	256	116	372
Fogera	32	212	12	224
Misrak estie	27	88	128	216
Dibate	25	142	61	203
Mandura	17	108	190	298
Pawi	31	312	27	339
Total	179	1209	597	1806

doing the side discussions and visits.

In addition to the household survey, focus group discussions were conducted with water committee (n=49) and district water offices of staff members (n=48). Moreover, field observations were made for water supply schemes where the focus group discussions were conducted (n=49). In the data collection, 179 water schemes were addressed. The schemes were implemented by different organizations such as Non-CMP (including Catholic Church, CISP Ethiopia, Comunita' Volontari Per II Mondo (CVM), Salini, UNICEF, CARE, Tikuret Legumuz, Tana Beles from local and international NGOs, Government implemented projects) and CMP. The analyses of the data are as follows:

1. The reported distance travelled is based on personal estimates. Since the users were unable to report the precise distance from their home to the water sources, they were asked to report estimate of the water scheme into the visible direction so that the enumerators made their estimates.
2. Time spent to collect water was estimated on the basis of many different questions. There were several questions that contributed for the calculation of time spent. These include the number of trips per day, waiting time at sources, and travel time from house to source and source to house for a single trip and calculated time for all trips per day. Finally, the sum of these is considered as time spent collecting water.
3. The water use was calculated from indirect inquiries. Family size, the number of the trips per day, and the type of container and its volume was considered during the interviews. Based on these elements, the per capita demand was analyzed using SPSS software.
4. For community involvements under each category of the implementation approach, the users were asked if they were involved in the participation components. The users were considered involved if at least 50% of the responses from the same system confirmed their participation.

RESULTS AND DISCUSSION

Long-lasting services

The 1987 Brundtland Commission's definition of sustainability has a broader prospect in the time frame. However, in water supply and sanitation, putting a system into operation and maintaining its service at least for the design life of the facilities is challenging since some parts of the facilities may wear out earlier than others. Thus, replacing and repairing are inevitable to maintain the systems to serve the communities. However, the need for sustainability is crucial to WASH services, and operating systems in full capacity in the design period is top priority. Therefore, this paper prefers to use the phrase long-lasting services rather than sustainability.

Long-lasting services include both the physical and service functionality of the water supply and sanitation facilities. This study found two key elements that are necessary to maintain long-lasting services; adequate services and proper management (Figure 2).

Adequate service implies sufficient quantity, good quality and reasonable distance to water points. The systems that cannot fulfill any one of these conditions may fail due to conflicts caused by water shortages, be abandoned as a result of poor water quality, or unprotected sources may be used instead of travelling a long distance. Appropriate quality control activities are valuable during pre-implementation of the schemes in providing enough and desirable quality of water at a reasonable distance (Figure 2). The critical activities, which are deemed to be executed during the pre-implementation phase, were identified during the fieldwork. These activities include: sound planning, proper site selection, good design, supervision and construction monitoring. All these factors are required to be user-inclusive and drive for genuine community participation. These factors facilitate the user community engagement in the post-implementation management of the WASH schemes.

For proper management, external supporters should assist the users in fee collection, protecting systems from damage, operating, maintaining and rehabilitating until the community has developed a capacity to do these activities itself (Careter et al., 1999; Harvey, 2007). According to the discussions with the district staff members, some service breakdowns are due to repairable faults and misuse. This implies that sufficient support is not rendered to improve the capacity of the

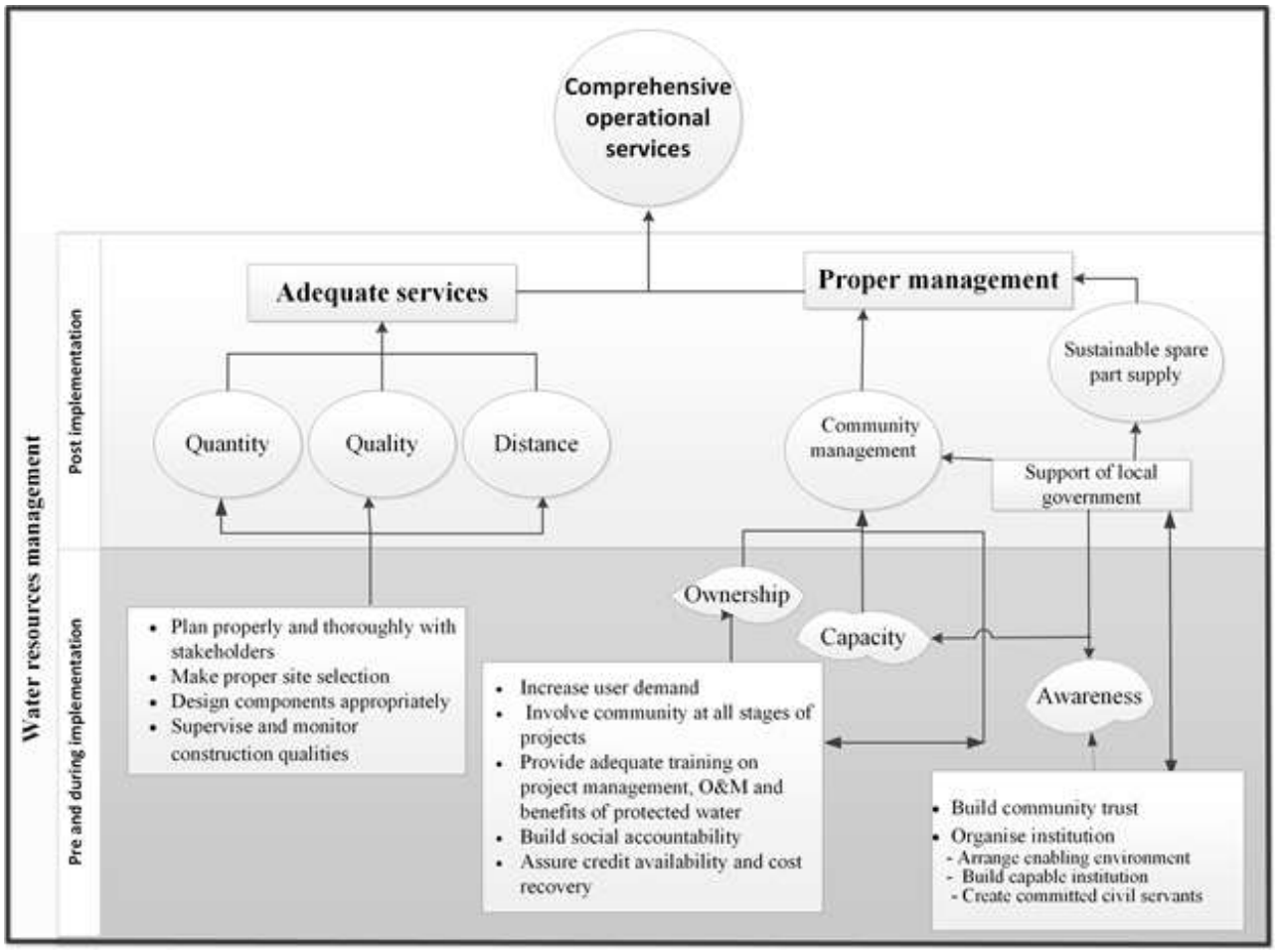

Figure 2. Framework for long-lasting services (by the first author).

user community, and so thoughtless mistakes lead to system failure. To mitigate the problem, user awareness and responsibilities in relation to the protection and management of the system should be established. Yet, it is obvious that a rural community cannot take care of the overall management without the support of the local governments, private actors and NGOs. These external supporters should establish an enabling environment for post-implementation management activities.

Provision of spare parts by Governmental Organizations (GOs) and Non-Governmental organizations (NGOs) is weakening the business opportunities of private suppliers. Based on the discussions with private spare part suppliers in two districts (Foger and Guangua) where suppliers exist, both users and suppliers were unhappy with the situation. The private suppliers were highly disappointed by the involvement of GOs and NGOs in the business, whereas the users complained about prices of private suppliers. The spare parts supplied by the organizations are neither sufficient nor do they encourage private suppliers. Since the organizations offer the spare parts with lower costs than the market price, users prefer to rely on them. In this respect, the private business owners are forced to wait a long time until the donation has been consumed. As a result, when they do find the right market they sell their goods at higher prices to compensate. The users, on the other hand, feel inconvenienced regarding the costs when compared with the lower cost of donated spare parts. This imbalance affects the operation and maintenance activities of the water supply services in the study area.

Developing a more sustainable spare part system and community management is prominent in achieving long-lasting services; however, the appropriate role of local people and private suppliers must be taken into account. The local governments and external supporters have to enhance the technical and managerial ability of the community by building capacity and awareness and developing an ownership feeling at grass roots level (Figure 2).

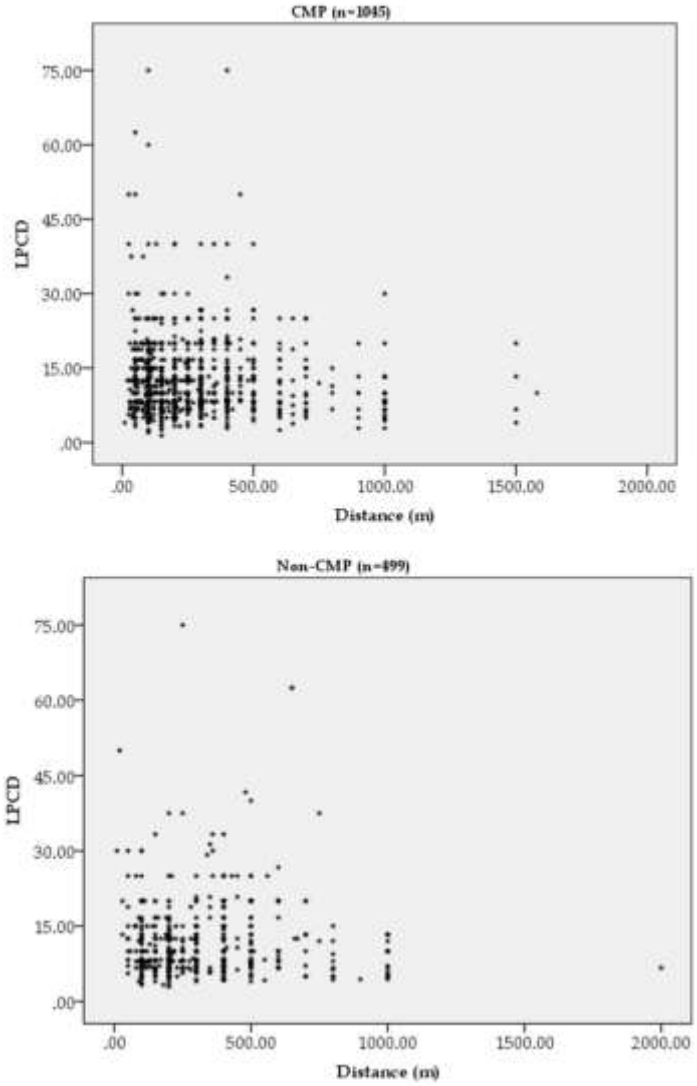

Figure 3. Water use (lpcd) versus travel distance (m) for CMP and non-CMP approaches.

Quality, quantity and distance as service indicator

Water quantity and distance to water sources

The quantities of water available at water points and the travel distance to fetch water determine the interest of people in using protected sources. If the distance is too long, or the available water supply is not adequate for daily consumption, the probability of users resorting to unprotected sources is high. The concept of a reasonable distance varies from country to country based on local conditions. For instance, fetching water from a distance of 0.5 km is a luxury in the rural Africa; luxury in countries with a developed economy is somewhat different (Caircross and Valdmanis, 2006). Moreover, the UN recommendation for a reasonable distance is 0.2 km for urban dwellings (UN, 2000). Currently, the provision of water within a radius of 0.5 km in urban and 1.5 km in rural areas (UAP, 2011) are the short-term targets in Ethiopia. In addition, travel distance alone cannot ensure the intended outcome out of water services. If the yield of sources is too low to support all users, women and girls must wait for their turn at the sources. They sacrifice their productive time, schooling and social life in general. Therefore, the benefits hoped to be gained by improving water systems (Harvey, 2008) are unlikely realized.

Figure 3 shows that the average distance to improved water sources is 278 m (standard deviation 228 m) and

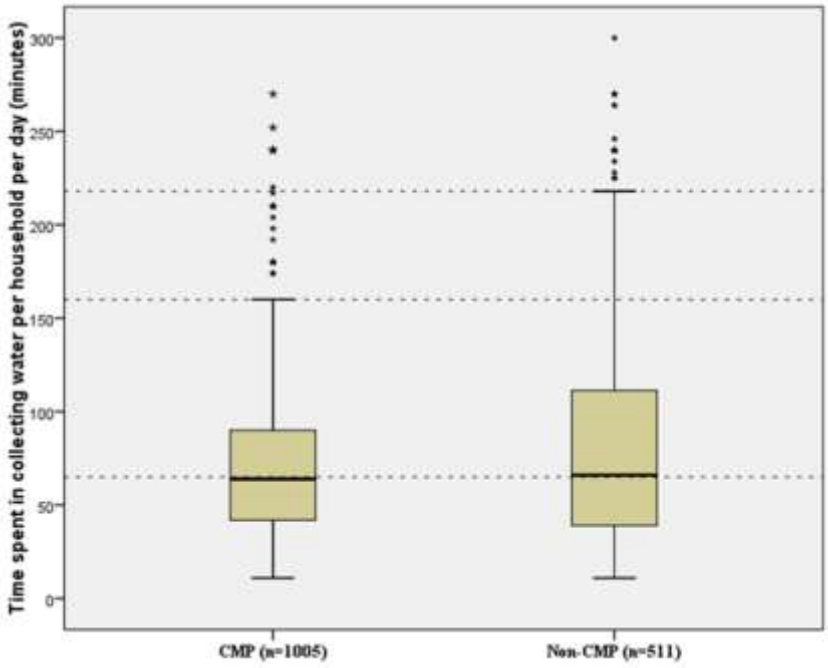

Figure 4. Time spent collecting water per household per day under non-CMP and CMP approaches (* = Outlier values; n is the number of households).

313 m (standard deviation 281 m) in the case CMP and non-CMP, respectively. In terms of the GTP-1 standard, maximum recommended distance to water sources is 1.5 km both for the schemes of CMP and non-CMP approaches. However, the daily water demand target of the country has not been achieved by the approaches, they have performed right in terms distances to water points. Only a few people consume over 20 lpcd as recommended by the UN. The pattern of consumption in Figure 3 indicates that the majority of the surveyed households consume between 10 and 15 lpcd regardless of the distance travelled to water points. Moreover, 82% of users who consume below 15 lpcd are traveling less than 400 m and 95% of them are in the range of 800 m. Contrary to the conclusion by Mellor et al. (2012), water quantity at source affects daily consumption more than the distance travelled. Therefore, distance is a secondary variable in determining the daily consumption of water when compared with the yield of sources in the study area.

As shown in Figure 4, the first two quartiles of the surveyed households spent less than sixty minutes collecting water both in the non-CMP (WMP and NGO-MP) and CMP users, whereas the fourth quartile is significantly different for both categories. In this quartile, CMP users spent up to three hours while non-CMP users could need four hours per day. In fact, the difference in collection time is observed in the upper quartile, which is due to a number of users per water point. The average household size is 42 for CMP and 56 for non-CMP. The spent time refers to a round-trip travelling time including waiting time at the water source for all trips in a day.

In developing economies, the existence and functionality of water supply schemes usually seem to take precedence over supplying an adequate amount of water. If a scheme is working and has some kind of water flow, the users under the scheme are considered adequately served. In Ethiopia, most official figures on water supply coverage are based on the assumption that all users under a functional scheme are satisfied at least to regarding national standard. Such reporting, however, hides the deficiency of service even under functioning schemes. For instance, only 18% of non-CMP users and 25% of CMP users are getting at most 15 lpcd as shown in Figure 5. This corresponds quite closely with the finding by Rautanen et al. (2014) in Nepal. In the study area, the situation is even worse in the dry season when the wells run short of water. According to the survey of 66 water schemes, 83% experienced water shortages for 2.2 months per year on average.

One of the factors affecting water supply service is overpopulation. This means that the number of users on a water supply system is beyond its carrying capacity. This kind of situation can be due to extra users being made aware of the water point after its construction or constructed systems failing to provide adequate service to all users. These cases were observed during the fieldwork in the study area. It is obvious that knowing the

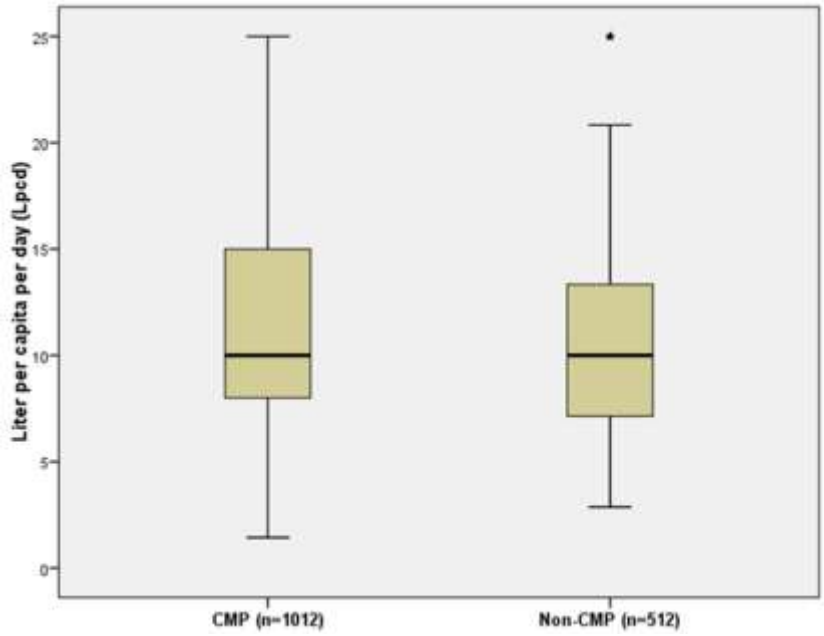

Figure 5. Water use under CMP and non-CMP approaches (* = Outlier values; n is the number of households).

size of the likely number of users during the planning stage is significant to design an adequate scheme. In the study area, the household is the unit of the population with the assumption of five people per family. Even though the five people family size is the national average, it is difficult to consider this figure for small-scale projects as it varies from place to place: in some areas, especially in the rural, the family size is much higher than the national average. Thus, household-based population representation and immigration into a community for different reasons are a few of the factors that overburden water systems. Immigrants may be seeking permanent residence or may just need to find water due to a service breakdown in neighbouring water schemes. Therefore, insufficient access to adequate water discussed above is not only because of lack of efforts in the sector, but also a lack of proper planning with local situations.

Another factor that contributes to the inadequate quantity of water supply is the yield of water sources. This factor depends on the technique and capability of yield determination before designing a system. In this aspect, local government (district) staff members, who had possible contact with such projects, have limited capacity to determine the yield, particularly for groundwater sources. This is not to undermine the individual; rather, institutions at the district level are not supporting the provision of skilled staff to carry out the yield determination. The number of beneficiaries needs to be determined before the project to estimate the yield of the sources that is enough for them. In the case of the hand-dug wells, excavating to a depth that is sufficient to harvest the required amount of discharge is a solution. On the other hand, during spring development, neither the number of beneficiaries nor the yield is determined by the technical staff. This is because no household can be excluded from using a developed spring which they used to getting water from, and the yield of spring sources cannot be significantly improved. However, in the case of non-CMP, limiting the size of the beneficiaries of a water system is not an issue at the beginning of the projects, they serve all based on proximity. In this case, it is very difficult to achieve the quantity requirement.

Water quality

In the sub-Saharan region, 75% of improved water supply systems are not piped (WHO/UNICEF, 2014). The dominant schemes are hand-dug wells, protected springs and private wells. Similarly, the hand-dug wells with hand pumps and spring developments are common in the rural parts of Ethiopia, as they are simple technologies and affordable for sparsely settled rural communities. In the recent plans, hand dug wells and shallow wells have taken the line share in terms of number and budget allocation (OWNP, 2014; GTP, 2015). Thus, the water quality of these schemes depends on the protection of sources from animal interference, anthropogenic activities upstream of sources and stagnant water around a system; avoiding the point and non-point contamination

Table 2. Additional facilities to protect sources from contamination.

Approach	Functional Drainage	Fences	Cloth washes facility	Cattle watering through
CMP (n=90)	50%	73%	43%	30%
Non-CMP (n=45)	51%	66%	13%	9%

CMP- Community Managed Projects approach; Non-CMP- WMP project and NGO managed project.

of sources is crucial. Furthermore, quality problems that arise from the geological formation of an aquifer, such as arsenic and fluoride in the water, cannot be solved by the mentioned protection measures. In fact, fluoride is a serious problem for approximately 14 million Ethiopians in the central rift valley. Keeping this in mind, the study investigated the perception of the sample households and the provision of platforms to accommodate water quality issue by CMP and non-CMP.

As per the field observations and discussions with WASHCOs, water quality is mostly maintained in the study area by chlorination at the beginning of the system use (for hand pump wells). Otherwise, it depends on WASHCO members' consciousness and access to the district water office. Altogether, 39% of the water points visited (n=49) were applying chlorine every six months, while the rest did it once a year, biannually, or never after the first application right after completion of the system construction. The problems with this practice are that the application of chlorine in large quantities may alter the taste of the water at the beginning and that after the chlorine depletes the wells will be without chlorine for long periods. Moreover, neither of the implementation approaches has accounted for the hydrogeological contamination into their actions. They mainly focus on the water quality problem of the human and animal interferences. In this regard, both CMP and non-CMP have shown the same performance in providing adequate drainage facility and fencing the systems as indicated in Table 2. However, the approaches have differences in providing additional facilities, including cloth washing basins and cattle watering troughs.

The water quality issues are the same with all implementation approaches because of two important factors. First, the groundwater is assumed to have less contamination in rural areas. Second, the knowledge-ability in the community concerning water quality is poor: in some parts of surveyed areas, the traditionally flowing water has been considered potable if it tastes good and is clean to the eyes. The people of the study area were observed to use unprotected water although they have a protected source, especially in the highland areas where there are plenty of springs in the rainy season. Some communities are more concerned with water supply projects securing their water requirement during dry periods than what is the primary objective of protected sources. Similar attitudes were observed commonly during the fieldwork at various places. This finding enforces the point by Caircross and Valdmanis (2006) who stated that the end users prioritize their accessibility to water sources over the health benefits of water supply schemes.

Community Involvement

As shown in Figure 2, the other key element needed to maintain a long-lasting water supply system is proper management. The prerequisite for realizing this target is to have strong community management and sustainable spare parts supply. This requires an interaction of external agents, like local governments, donors, partner organizations, etc., as well as the user community being involved in the implementation of water supply projects. The user communities may be eager to have the services; yet, they may not pay attention to the post management. On the other hand, the other stakeholders, external agents are expected to develop the sense of ownership of the water schemes to the communities, to capacitate for management, operation and maintenance of the water supply systems.

In principle, successful community management is achieved through community participation. According to Doe and Khan (2004), the participation could be in the service establishment, community meeting attendances, and ownership of services and community coherence. Furthermore, participation also contributes to the sense of ownership of systems. The clearer the vision of the participating community, the more the sense of ownership increases. According to Arnstein (1969), the ladder of citizen participation has eight levels that generally fall into three categories such as nonparticipation, tokenism and citizen's power as shown in Figure 6. The worst level, in this regard, is manipulation in which users reported as participated without their involvement and the ideal one is citizen control. In the citizen control, users have full authority to do or not to do things based on their preference. The others are intermediate indicators that gradually improve from the worst to the best scenario. Thus, Arnstein's classical ladder is used here to assess the WASH implementation approaches in Ethiopia. Based on the participatory discussions made with government employed staff (n=80) in Amhara region, community participation in CMP fell on the citizen power of 72% and

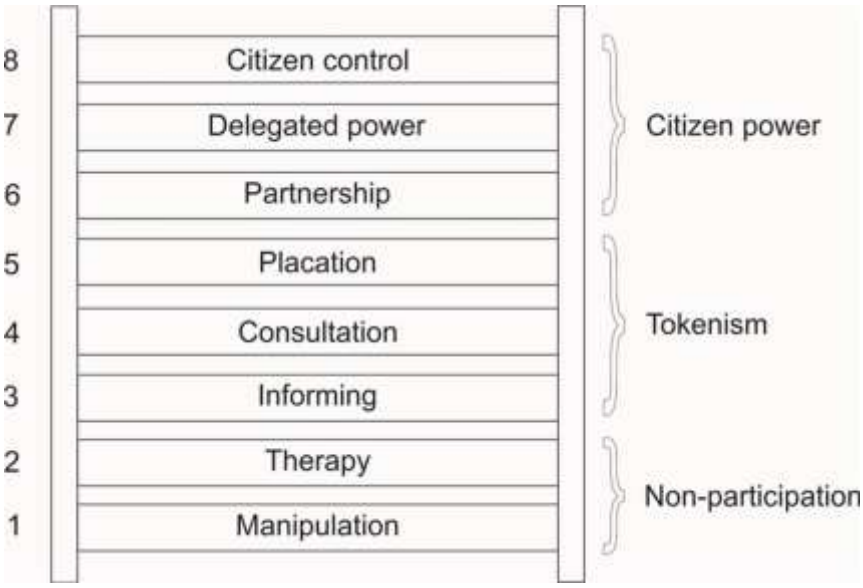

Figure 6. Ladder of citizen participation (Arnstein, 1969).

tokenism of 23%, whereas non-CMP placed between tokenism and non-participation (42 and 42%, respectively). In the discussion of the evaluation, the experts dominantly pointed out the reasons to assess the approaches in the mentioned way, based on the nature of community involvement in many aspects of a project.

Systematic involvement of users in all stages of a project cycle can ease the management process and result in a sense of ownership. In the Ethiopian context, community participation is a formal requirement for the implementation of public projects. Formally, the community should cover at least 10% of the project in kind, in cash, in labour or a combination thereof (UAP, 2008, p45). The same principle also applies to each approach in the country. However, the ways of implementation vary. Based on the experts' discussion, in non-CMP users seem to be manipulated, superficially consulted without their opinions showing up in the outcome, based on the participation ladder in Figure 6. The reasons are the same in both cases. The users' lower interest in participation may be due to their thinking that Governments and NGOs have enough resources to embark on the projects without the support of the community or the lack of awareness and appropriate consultation. In any case, the sense of ownership is debatable. The purpose of community involvement is to ensure a sense of ownership of the water supply systems. Yet, the level and ways of community involvement have an impact on the degree of sense of ownership among the users.

Another problem affecting effective community participation, for all approaches, is the multi-sectoral burden. For example, in the rural Ethiopia, citizens are asked to work for soil conservation, road construction, watershed management, community policing and attend frequent political meetings and other activities besides tending to their own business. Participation in all these activities is mandatory for community members since the by-laws of the local administration penalize non-participation. As a result, participation may easily be considered a burden. Therefore, community participation in water and other sectors to meet the 10% requirement is usually not successful in terms of creating an ownership feeling. The government has the power to push a community to participate, and the NGOs have the incentive to pay them for their participation. Both pretend to participate in order to meet the required level of participation (according to the view of the experts), whereas in reality, achieving genuine community participation requires an absolute involvement. In fact, since in CMP the members of the community request for the project themselves, they know the requirement of their participation. Thus, the ownership feeling in CMP is unique as compared to other approaches. Still, the communities need attention after the project completion.

The household survey (n=1806) revealed that there are disparities among different approaches to pre- and post-implementation support. As shown in Table 3, only a few of the approaches made the community involved in problem identification, site selection, consultation of the users on design options, and technology selection. The rate of participation in labour and cash is the same despite the differences in the timing and motivation of the contributions. Although, the differences are quite narrow,

Table 3. Community involvement in water supply and sanitation projects under different implementation approaches. The check mark (√) indicates that at least 50% of the respondents are involved in the various tasks.

Implementer	Non-CMP*									WMP (N=52)	CMP (N=1062)
	Catholic Church (N=48)	CISP (N=55)	CVM (N=12)	Salini (N=20)	UNICEF (N=48)	CARE (N=96)	SLM (N=45)	Tikuret Legumuz (N=12)	Tana Beles (N=32)		
Problem identification										√	√
Site selection	√				√	√					√
Design											√
Technology selection											√
Service level					√	√					√
Cash	√	√	√	√	√	√				√	√
Labour	√	√	√	√	√	√	√		√	√	√
Local material provision	√	√	√	√	√	√	√		√	√	√
Committee election				√	√	√	√		√		√
Procurement											√

*Organisations in the first nine columns are NGOs; CISP- A Canada based NGO; CVM - Comunita' Volontari Per II Mondo; CMP- Community Managed Projects approach; Non-CMP- WMP project and NGO manged Project; SLM – Soil and Land Management – a GTZ project; WMP- Woreda Manged Project.

the practicality and impact of participation are strong inCMP. The main difference between the CMP and non-CMP approaches is scheme handover. CMP works by empowering the community from the beginning so that the project assists the community in order to make them feel the project is their own; hence, no handover in CMP, whereas, Non-CMPs celebrate scheme handover after implementation. In the case of CMPs, users' committee elections and training take place before implementation. In the other approaches, including the district-managed projects, caretaker training and committee elections occur after implementation and during scheme handover.

Institutionalization and capacity building

A capacity building is the core component of long-lasting services. Thus, local staff and the community need to have the capacity and a compatible institution to run systems even in the absence of external support. Thus, the two basic requirements for the GOs and NGOs involved in the sector are to develop water systems and build the capacity to extend the services beyond the projects.

Many NGOs and governmental organizations have tried to create long-lasting services by incorporating the capacity building into the development of water supply schemes. Yet, very few have been successful and able to produce a true sense of development in the sector by doing physical construction and capacity building hand in hand. From this point of view, the CMP financial mechanism can be seen as a positive example among the approaches used in Ethiopia. Initially, Rural Water Supply and Environmental Programme (RWSEP)– the predecessor of CMPs was a conventional approach applying the government's financial mechanism. RWSEP was able to reshape itself through experiences to support the poor communities genuinely. Currently, the CMP approach is dependent on both technical and financial support.

In CMPs, a series of capacity building activities are performed at different levels of government to enhance smooth implementation and financing of rural water supply and sanitation. The project trains CMP technical staff out of regional and district government employees. The regional CMP technical staff members provide support in the form of capacity building, technical assistance, monitoring and supervision of district level staff members. The process of the capacity building is then cascaded down to the community level.

Functionality and effective implementation

In the study area, schemes are considered

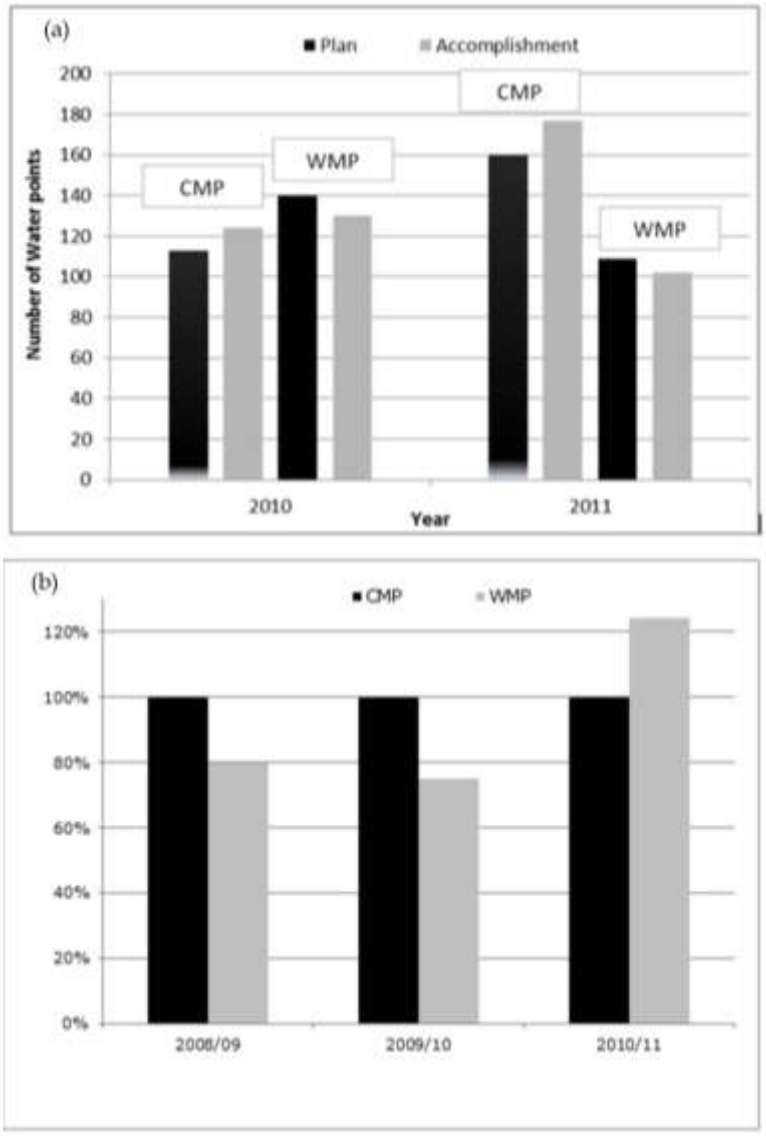

Figure 7. (a) Accomplishment versus plan, (b) annual fund utilization rates of CMPs and WMPs (Source: Tesfaye, 2012).

functional if they possess water regardless of its amount. However, the national targets of per capita demand and distance to water systems are seldom taken into account. Thus, the functionality of water schemes cannot guarantee that they provide adequate services. According to other studies made by different researchers in the same research project, the functionality rate ranges from 94 to 98% for schemes implemented using the CMP approach and from 84 to 92% for those implemented using a non-CMP approach (Mebrahtu, 2012; Sharma, 2012; Tesfaye, 2012). The results show that the CMP approach provided better protection and management than the non-CMP approach. However, these functionality rates the actual services communities obtain. In both cases, approximately 25% of users under functioning water systems is satisfied with the national standard (15 lpcd).

Figure 7a shows that the CMP approach produced, at least, the number of planned water points while the WMP approach performed worse than planned. Moreover, in the case of the CMP approach, the implementation rate beyond the planned schemes indicates the efficient use of funds. In the two explored years, more water points were constructed with the allocated budget than planned. The efficiency of the CMP approach is also manifested by the fund utilization rate as indicated in Figure 7b. It was

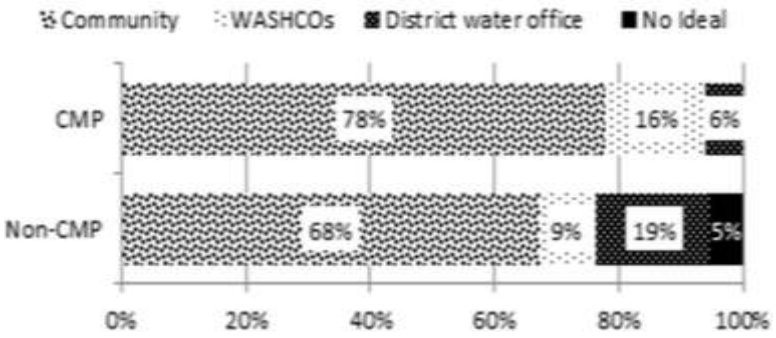

Figure 8. Perception of responsibility for scheme management in the CMP and non-CMP approaches.

almost 100% each year, while in WMP, it varied from 75to 80%. The 124% rate for District Managed Projects (WMP), which was realized in the third year, indicates that schemes started in the previous years were finalized in the third year, which increased the fund utilization rate of the year of completion. Thus, CMP is more effective and efficient than other approaches in utilizing funds and implementing plans.

Tariff collection

Water fee collection was observed to be quite different in CMP and non-CMP approaches. About 74% of the CMP respondents pay for their water (in addition to the operation and maintenance deposit made during project application) versus 43% of the non-CMP respondents. From this, it can be deduced that the communities in CMP approach are devoted to keeping their system operative. The national policy is to collect water tariffs to cover the O&M costs. The average tariff is 3.2 ETB (the standard deviation of 1.8 ETB), which is close to 0.13 euros per household per month. Since the number of households using a water point is 50 on average, the money collected through tariffs (160 ETB) is not enough to cover the O&M costs including the salary of the guards. CMP has proposed a minimum of 1,000 ETB as required for operation and maintenance of a system per year, excluding the salary of a guard; an average cost of a maintenance is 245 ETB according to Guangua district data (n=458). For non-CMP, the average tariff is 1.5 ETB (1.1 ETB), which is about half of that collected by CMPs.

The users in CMP approach seem to show the purpose of the collected tariff. Nearly 72% of CMP and 24% of non-CMP users responded that the money collected was used to cover maintenance costs and the salaries of the guards. However, 28% of the CMP users think they are paying a water tariff only to cover the guard's salary. In CMP, relatively modest awareness training about the purpose of the proper O&M could improve their performance better than in the other approaches. Nevertheless, although the CMP approach is better in collecting tariff, the amount collected is not satisfactory to deposit for further component replacement of water supply systems.

The survey included the question "Who is responsible for protecting the water scheme?" to assess the perceptions of management by respondents and the result shown is in Figure 8. Service recipients of both CMPs and Non-CMPs assigned the first priority to the community that takes care of the water system (78 and 68%, respectively); second priority was assigned to WASHCOs in the case of CMPs and the District Water Office in the case of Non-CMPs (16 and 19%, respectively).

Conclusions and policy implications

The sustainability of water supply systems requires a series of actions for long-lasting services that can be ensured through proper maintenance and replacement of parts and systems. This means that after implementation, continuous investment is needed to keep the system operational and to repair any damages. In this regard, the communities that own the systems are responsible. Therefore, user groups should realize the importance of water points, and they should be trained to work with determination to keep the system functioning for as long as possible by replacing parts and systems when necessary.

To get the users genuinely involved, the services provided or produced should convince users that they are benefiting from the water system. For example, the distance to source and the quantity and quality of water should be within acceptable limits. Otherwise, community management will not work and cannot lead to the desired outcome. All implementation approaches used in Ethiopia have succeeded at least in attaining the target of reducing the travel distance to fetch water. However, the

country is a long way from providing an adequate quantity and quality of water. Therefore, much remain to be done in the sector.

As explained above, system management is assumed to be the responsibility of the community in all approaches. Yet, the success of community management depends particularly on the level of users' involvement in the project, and the way communities organize their activities and create a sense of ownership. Different approaches cause different behaviours as concerns community participation. Non-CMP is administering investment funds in the same manner. The project management responsibility is on the staff of the organizations, and the procurement process is also governed by the regulations of organizations– a process which takes weeks and even months to execute. Work is also contracted out to external contractors. These approaches are characterized mostly by delays in construction and a distant relationship with the user community. However, CMPs have recently delegated almost all their responsibilities to the communities. The project managers and procurement and contract officers of CMPs are community representatives. Moreover, the contractors are also artisans trained out of community members themselves. Therefore, execution of plans and the use of funds are more effective in CMPs than other projects due to the smooth financial flows and procurement process.

The difference between the senses of ownership felt by the users is clear in relation to the two categories of approaches (CMP and non-CMP). In the case of non-CMP approaches, the communities blamed the implementers for service breakdowns and the locations of water points. Moreover, the user committees are ineffectual or even non-existent. Water points implemented by CMPs are another issue. Although, all users do not pay a monthly fee, they usually contribute large sums when there is a system breakdown, and are also keen to protect their water system. However, the expectation that CMPs would collect a monthly water charge and deposit it in the local Micro Finance Institution is rarely realized. Therefore, this aspect needs to be given due attention in the future.

Conflict of Interests

The authors have not declared any conflict of interests.

ACKNOWLEDGEMENTS

Scholarships from Maa-ja vesitekniikan tuki ry and CIMO in Finland, logistical support from the COWASH project in Ethiopia for fieldwork and the support from the Academy of Finland (no. 288153) are gratefully acknowledged.

REFERENCES

Arnstein SR (1969). A ladder of citizen participation. J. Am. Institute Plan. 35(4):216-224.

Behailu BM, Suominen A, Katko TS (2015). Evolution of Community Managed Water Supply Projects (CMP) from 1994 to the 2010s in Ethiopia. Public Works Management and Policy 20(4):379-400.

Brunson LR, Busenitz LW, Sabatini DA, Spicer P (2013). In pursuit of sustainable water solutions in emerging regions: a Review paper. J. Water, Sanit. Hyg. Dev. 3(4):489-499.

Bryman A (2006). Integrating quantitative and qualitative research: how is it done? Qual. Res. 1:97-113.

Caircross S, Valdmanis V (2006). Water supply, sanitation, and hygiene promotion. In Jamison D. T. Breman TG, Measham A R, Alleyne G, Claeson M, Evans DB, Jeha P, Mills A, Musgrove P, 2nd eds, *Disease Control Priorities in Developing Countries*, World Bank, Washington DC. pp. 771-792.

Creswell JW (2013). Research design: Qualitative, quantitative, and mixed methods approaches. Sage publications.

CSA (2010). *Population and housing census report*, Ethiopian Centeral Statistics Agency, Addis Ababa, Ethiopia, accessed at: www.csa.gov.et/newcsaweb/images/documents/surveys/Population%20and%20Housing%20census/ETH-pop-2007/survey0/outputInformation/reports.html (12 April 2016).

Deaton A (1997). The analysis of household survey: A Microeconometric Approach to Development Policy. Published for the World Bank, The Johns Hopkins University Press, Baltimore and London.

Doe SR, Khan MS (2004). The boundaries and limits of community management: Lessons from the water sector in Ghana. Community Development Journal. 39(4): 360-371.

GTP (2015). Growthe and transformation Plan (GTP-2) for water sector, Ministry of Finance and Economic Development, Addis Ababa, Ethiopia.

Harvey PA (2007). Cost determination and sustainable financing for rural water services in sub-Saharan Africa. Water Policy 9(4):373-391.

Harvey PA (2008). Poverty Reduction Strategies: opportunities and threats for sustainable rural water services in sub-Saharan Africa. Progress Dev. Stud. 8(1):115-128.

Howard G, Charles K, Pond K, Brookshaw A, Hossain R, Bartram J (2010). Securing 2020 vision for 2030: climate change and ensuring resilience in water and sanitation services. J. Water Clim. Chang. 1(1):2-16.

Jones S (2011). Participation as citizenship or payment? A case study of rural drinking water governance in Mali, Water Altern. 4(1):54-71.

Mebrahtu M (2012). Assessment of the CMP approach in developing rural water supply schemes, Benishangul-Gumuz Region, Master's thesis, Addis Ababa Uniersity. Accessed at: www.cmpethiopia.org/page/454 (20 November 2015).

Mellor JE, Watkins, DW, Mihelcic, JR (2012). Rural water usage in East Africa: Does collection effort really impact basic access? Waterlines 31(3):215-225.

North DC (1990). Institutions, institutional change and economic performance. Cambridge University Press.

OWNP (2014). One WaSH National Program: Program Operation Manual (POM) for the Consolidated WaSh account, Ethiopian Ministry of Water and Eneryg, Addis Ababa, Ethiopia, accessed at: www.cmpethiopia.org/content/download/1285/5790/file/CMP (10 March 2016).

Rautanen S, van Koppen B, Wagle N (2014). Community-driven multiple use water services: Lessons learned by the Rural Village Water Resources Management Project in Nepal]. Water Altern. 7(1):160-177.

Sharma N (2012). CMP in implementing rural Water supply in Amhara region, Master's thesis, Tampere University of Technology, Tampere, Finland, accessed at: www.cmpethiopia.org/page/454 (20 November 2015).

Taylor B (2009). Addressing the Sustainability Crisis – Lessons from research on managing rural water project, Dar es Salaam, Tanzania.

Teddlie C, Yu F (2007). Mixed methods sampling a typology with examples. J. Mixed Methods Res. 1(1):77-100.
Tesfaye Y (2012). A comparative study on woreda managed and CMP rural water supply projects, Master's thesis, Indira Gandhi Open University, Addis Ababa, Ethiopia, Accessed at: www.cmpethiopia.org/page/454. (20 November 2015).
UAP (2008). The Ignition of mass mobilization on universal access plan for water and sanitation program, Ethiopian Ministry of Water and Eneryg, Addis Ababa, Ethiopia, accessed at: ww.cmpethiopia.org/media/universal_access_plan_mass_mobilization_strategy (15 July 2015).
UAP (2011). Revised rural water supply – UAP, Ethiopian Ministry of Water and Eneryg, Addis Ababa, Ethiopia, accessed at: www.cmpethiopia.org/media/rural_water_supply_universal_access_plan_uap_i (13 September 2015).
UN (2000). Charting the progress of populations, United Nations Population Devision, New York, United Nations, accessed at: www.un.org/esa/population/pubsarchive/chart/2.pdf (16 October 2015).
UN (2003). Indicators for Monitoring the Millennium Development Goals, United Nations Development Group, New York, United Nations, accessed at: http://mdgs.un.org/unsd/mdg/Resources/Attach/Indicators/HandbookEnglish.pdf (12 April 2016).
WHO and UNICEF (2000). Global Water Supply and Sanitation Assessment 2000 Report, World Health Organisation and UNICEF, Geneva/New York, Switzerland/USA.
WHO and UNICEF (2014). Progress on drinking-water and sanitation – 2014 Update, World Health Organisation and UNICEF, Geneva, Switzerland.
WIF (2013). Federal democratic republic of Ethiopia the WaSH Implementation Framework, Addis Ababa, Ethiopia accessed at: http://www.cmpethiopia.org/media/signed_wash_implementation_framework_scanned (January, 2016)
World Population Review (2016). Ethiopia population 2016, accessed at: http://worldpopulationreview.com/countries/ethiopia-population/ (12 April 2016).