Ex-Post Project Evaluation 2012: Package I-7
(Ethiopia, Tanzania, Guinea)

November 2013

JAPAN INTERNATIONAL COOPERATION AGENCY

Binko International Ltd.

EV
JR
13-21

Preface

Ex-post evaluation of ODA projects has been in place since 1975 and since then the coverage of evaluation has expanded. Japan's ODA charter revised in 2003 shows Japan's commitment to ODA evaluation, clearly stating under the section "Enhancement of Evaluation" that in order to measure, analyze and objectively evaluate the outcome of ODA, third-party evaluations conducted by experts will be enhanced.

This volume shows the results of the ex-post evaluation of ODA Loan projects that were mainly completed in fiscal year 2010, and Technical Cooperation projects and Grant Aid projects, most of which project cost exceeds 1 billion JPY, that were mainly completed in fiscal year 2009. The ex-post evaluation was entrusted to external evaluators to ensure objective analysis of the projects' effects and to draw lessons and recommendations to be utilized in similar projects.

The lessons and recommendations drawn from these evaluations will be shared with JICA's stakeholders in order to improve the quality of ODA projects.

Lastly, deep appreciation is given to those who have cooperated and supported the creation of this volume of evaluations.

Month 2013

Toshitsugu Uesawa

Vice President

Japan International Cooperation Agency (JICA)

Disclaimer

This volume of evaluations, the English translation of the original Japanese version, shows the result of objective ex-post evaluations made by external evaluators. The views and recommendations herein do not necessarily reflect the official views and opinions of JICA. JICA is not responsible for the accuracy of English translation, and the Japanese version shall prevail in the event of any inconsistency with the English version.

Minor amendments may be made when the contents of this volume is posted on JICA's website.

JICA's comments may be added at the end of each report when the views held by the operations departments do not match those of the external evaluator.

Ethiopia

Ex-Post Evaluation of Grant Aid Project

"The Project for Water Supply in Southern Nations, Nationalities and Peoples' Regional State"

External Evaluator: Yumiko Nakamura, Binko International Ltd.

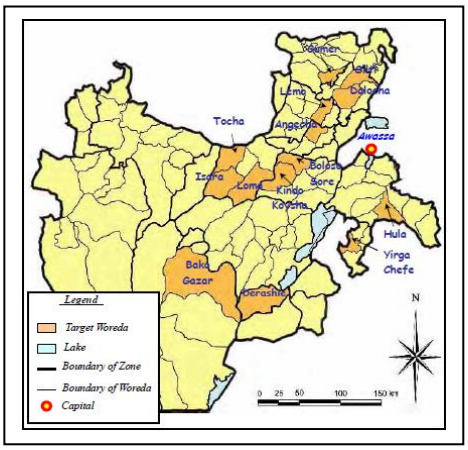
0. Summary

This project aims to provide the residents of 106 villages in 14 woredas[1] of 10 zones in Southern Nations, Nationalities and Peoples' Regional State (SNNPRS hereafter) with access to safe drinking water. The project constructed water facilities and set up Water and Sanitation and Hygiene Committees (WASHCOs hereafter) in order to continuously run and maintain those water facilities[2]. The objective of this project is highly relevant to the country's development policy, development needs, as well as the ODA policy that Japan upholds. The percentage of people provided with water access by the project remains at 61% of the target value because the functioning rate of water facilities was 66%. However, the intended effects in the project are observed such as that water facility users noted that water related diseases had decreased and opportunities to effectively utilize time for daily activities had increased by reduced water-fetching workload. Thus the effectiveness and impact of the project are fair. The project cost was lower than planned; yet the project period exceeded the plan due to ethnic conflicts, and roadblocks caused by landslides and the washout of roads used for transporting equipment. Thus the efficiency of the project was fair. With regards to the operation and maintenance of facilities, 66% of the constructed facilities by the project are now functioning while the staffing, maintenance skills and financial capacity of Woreda Water Desks, which play central roles in maintenance, have room for improvement. Thus the sustainability of the project effect was judged to be fair.

In light of the above, this project is evaluated to be partially satisfactory.

[1] Woreda is the third-level administrative divisions of Ethiopia and is positioned as district.
[2] At the time of ex-post evaluation, target woredas increased to 25 along with the jurisdiction change.

1. Project Description



Project location

A water facility provided by the project

1.1 Background

Ethiopia is located at the center of the Horn of Africa and is the second largest country in terms of population (approx. 85 million) in Sub-Saharan Africa. The country covers 1,104,000 square kilometers of land and is a landlocked state sharing borders with Eritrea, Djibouti, Somalia, Kenya and Sudan. The seasons are divided into a light rainy season (February to May), a heavy rainy season (June to September) and a dry season (October to January). The source of the Nile lies in the northern half of the national soil and thus makes Ethiopia an important country in considering the water resource management of the Northeastern African continent. However, water shortages due to the massive drought that hit the country recently left serious damage in its society and economy. Moreover, due to delays in water facilities construction, the water supply coverage was 23%, which was quite lower than the 54% of the Sub-Saharan average. Such situation made local residents unavoidable to use rivers and spring water as their primary water sources. As a result, there were frequent outbreaks of water-related diseases.

In response to this situation, the government of Ethiopia developed the Second Five-Year National Development Plan (2000-2005) in 2000 and the Sustainable Development Poverty Reduction Program (SDPRP hereafter) in 2002 in which they identified the water sector to be one of their priorities. The Water Sector Development Program (WSDP hereafter) (2002-2016) developed in 2002 also prioritized water resource development in order to achieve poverty reduction and sustainable development. It suggested that beneficiaries should have a responsibility for sustainable operation and maintenance of water facilities as well as water supply development. Further, the Water Supply and Sanitation Development Program (WSSDP hereafter) in the WSDP prescribed that village water supply coverage is to increase from 23.1% in 2001 to 70.9% in 2015 at the national level. The National Water Supply and Sanitation Master Plan that was developed in January 2003 suggested the necessity of securing financial resources, woreda and region personnel at implementing agencies and their capacity building in

order to achieve the WSSDP goals.

Given this background, the government of Ethiopia requested grant aid from Japan for the SNNPRS where existing water facilities showed low functioning rates in order to tackle the shortage of water facilities in rural villages as Japan has long been contributing to groundwater development projects in Ethiopia including the Groundwater Development and Water Supply Training Project, which was a technical assistance project implemented from 1998 to 2005.

1.2 Project Outline

The objective of this project is to increase served population with safe and stable drinking water supply in 106 villages in 25 woredas in 10 zones of the SNNPRS by procuring drilling machines, constructing water facilities, and establishing user organizations to continuously operate and maintain the facilities.

Grant Limit/Actual Grant Amount	1,061million yen / 810 million yen
Exchange of Notes Date	Term 1/2: June 20, 2005 Term 2/2: June 23, 2006
Implementing Agency	SNNPRS Water Resource Development Bureau
Project Completion Date	Term 1/2: March 13, 2007 Term 2/2: July 17, 2008
Main Contractors	Term 1/2: Toa-Tone Boring Co., Ltd. Term 2/2: Marubeni and Urban Tone Consortium
Main Consultant	Term 1/2, Term 2/2: Nippon Koei Co., Ltd.
Basic Design	October 6, 2004 - March 18, 2005
Detailed Design	N/A
Related Projects	Technical Assistance: “Groundwater Development and Water Supply Training Project”, (JICA, 1998-2005) “The Water Sector Capacity Development Project in SNNPRs” , (JICA, 2007-2011) Projects by other agencies: “Master Plan of Operation, Water and Environmental Sanitation” (UNICEF, 2002-2006) “Water Supply and Sanitation project” (World Bank, 2004-2009)

2. Outline of the Evaluation Study

2.1 External Evaluator

Yumiko Nakamura, Binko International Ltd.

2.2 Duration of Evaluation Study

The ex-post evaluation was done in the following durations.

Duration of the Study: October, 2012 – August, 2013

Duration of the Field Study: February 2 – 22, 2013 and June 9 – 16, 2013

2.3 Constraints during the Evaluation Study

229 water facilities were constructed in 10 zones of SNNPRS in this project. However, the ex-post evaluation could not check the operation and maintenance situation of all water facilities that were expected to be covered in the evaluation due to the constraints on field study period and budget. The study could not survey all 25 Woreda Water Desks, either.

3. Results of the Evaluation (Overall Rating: C[3])

3.1 Relevance (Rating: ③[4])

3.1.1 Relevance with the Development Plan of Ethiopia

The Poverty Reduction Strategy Paper (PRSP) at the time of the Basic Design Study (BD Study hereafter) was the SDPRP (March 2002 to May 2004) developed in 2002. It set the strategy by identifying water resources, village agricultural development and food security as core sectors for attaining poverty reduction. The SDPRP prescribed the target value of the water supply coverage at the village level of 31.4% be achieved by 2005. WSDP (2002-2016) in 2002 also put emphasis on the importance of water resource development for poverty reduction and sustainable development, and suggested imposing an appropriate level of contribution on beneficiaries to actualize sustainable water supply development and maintenance. Further, WSSDP in the WSDP set the target value of village water supply coverage in SNNPRS at 68% being achieved by 2016.

Even at the time of ex-post evaluation, importance of water resource development for the purpose of achieving MDGs and poverty reduction was identified in Ethiopia's national development plan (PASDEP[5] hereafter) (2005-2010) and "strengthening the infrastructure backbone" was highlighted as one of the eight priorities. In strengthening basic infrastructure, the PASDEP targeted increasing water supply coverage in both urban and rural areas and reducing nonfunctioning water facilities in rural areas from 30% (2005) to 10% (2010). In

---

[3] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

[4] ③: High, ②: Fair, ①:Low

[5] PRSP: Plan for Accelerated and Sustained Development to End Poverty

addition, the Growth and Transformation Plan (GTP) (2010-2015), which was a new five-year development plan created in 2010, set out seven strategies. Among them, a safe drinking water supply was considered to be essential for improving socioeconomic development, standards of living and poverty reduction, and was positioned as one of the priorities in strengthening infrastructure development. Further, the revised Universal Access Plan (UAP) (2011), which is the country's five-year water sector development plan, set forth human resource development and capacity building at a woreda level as well as introducing water facilities that allow low-cost operation as a critical strategy.

Thus, the project which consists of construction of water facilities and a soft component program that was implemented for the purpose of developing and strengthening human resources in the water sector has contributed to increase in access to safe drinking water. Thus, both ex-ante and ex-post evaluations found that the project has been highly relevant to the development policies of Ethiopia.

3.1.2 Relevance with the Development Needs of Ethiopia

At the time of the BD Study, the country's water supply coverage was 24% on average, which was quite lower than the Sub-Saharan average of 54%. Water supply coverage in SNNPRS during the same period was as low as the national average at 24%, and therefore development of water facilities was urgently required. More than 80% of the SNNPRS residents used rivers and spring water as their primary domestic water source and as a result, outbreaks of water related disease became frequent including diarrhea, dysentery, typhoid and cholera. Furthermore, annual drought caused water shortages and left a serious impact on the society and economy of Ethiopia. This situation made the improvement of the living environment through developing and promoting sanitary water facilities an urgent issue.

The rural water supply coverage in SNNPRS was 58.7% in 2010 when the ex-post evaluation was conducted. This was lower than the average national water supply coverage in rural areas of 65.8%[6]. Among 25 woredas in the project sites, 11 woredas that were examined in this study showed 38.3% water supply coverage on average, which was 20% lower than the regional average. Further, the 2001 Demographic Health Survey showed 16.4% diarrhea prevalence among children (under five years old), which remained to be higher than the national average of 13.4%. Thus, the development needs for improving water access in SNNPRS that was targeted by the project were high.

3.1.3 Relevance with Japan's ODA Policy

Japan's ODA policy to Ethiopia (2005) took priorities for a poverty reduction strategy into consideration and identified food security and agricultural development, water resource

[6] Source: UAP (2001)

development and management, education and capacity building, health and HIV/AIDS and economic infrastructure as aid priorities. The draft of work plan that was published in the process of County Assistance Planning in 2005 also emphasizes that water resource development was closely connected to poverty reduction and food security in Ethiopia and its surrounding countries along with human resource development, health improvement, and transportation and communication infrastructure development.

In addition, this project was implemented based on the Japanese Prime Minister's announcement of "doubling aid to Africa in three years" made at the International Conference on African Development in April 2005. Thus it was coherent with Japan's ODA policy at the time of planning.

Based on the above, this project has been highly relevant with the country's development plan, development needs, as well as Japan's ODA policy, and therefore its relevance is high.

3.2 Effectiveness[7] (Rating: ②)

3.2.1 Quantitative Effects (Operation and Effect Indicators)

The actual number of people who were newly served with water through this project was 54,038 in 2013. The achievement rate is 61%. The number of project beneficiaries that was intended as the 2013 target at the time of BD Study was 90,389 and the number of people who were served with water at four sites where the functionality of facilities was not confirmed in this study was 1,400. The balance, 88,989, equals 61% of the originally intended target of 90,389 (Table 1)[8].

The actual number being lower than the target was caused by the following reasons: nine hand pump shallow wells and two spring water facilities were not constructed, one hand pump facility in Dalocha Woreda was destroyed due to trouble with a neighboring village, and nonfunctioning water facilities reduced the number of people with access to water[9]. Major causes of breakdown included broken hand pump chains and deterioration of PVC pipes.

[7] Sub-rating for Effectiveness is to be put with consideration of Impact.

[8] Calculation is done by deducting the intended number of people who are newly served with water in four sites (1,400) from the target number as data on functionality was not available from the four sites at the time of ex-post evaluation. Based on the actual number of constructed facilities, the actual number of people with access to water in 2013 is 63% of the intended value.

[9] The rate is calculated based on the number of functioning facilities at the time of the ex-post evaluation. The facilities are judged to be "functioning" when water was successfully pumped up when our surveyor visited the water facility that was provided by the project. It must be noted that the functionality here is defined differently from the UAP definition that nonfunctioning facilities are the ones that do not function for at least two to three weeks a year.

Table 1: The number of constructed facilities, their functioning rate and the population newly served with water as a result of this project (2013)

	Target value		Actual value (2008)		Actual value (2013)	
Type of water facility	Number of facilities	Intended population served with water[10]	Number of facilities	Population newly served with water	Number of Functioning (Functioning rate)	Population newly served with water
Hand pumped shallow well	214	74,900	205	71,750	134/201 (67%)	46,900
Spring water facility	26	15,489	24	13,404	15/24 (63%)	7,138
Total	240	90,389	229	85,154	149/225 (66%)	54,038

Source: Target value: BD Study Report (2005), Actual value (2008): Documents provided by JICA, Actual value (2013): Results of the ex-post evaluation study (2013)

Well drilling at the project sites was done by two drilling machines that were procured by this project in addition to other preexisting drilling machines and that left a positive impact on achieving the project goal.

Field studies found that the machines were still in regular use even after the project had finished. However, the average number of drilled wells was 14 for the past six years, which was significantly lower than the 60 wells per year on average that was originally targeted. Interviews with Southern Water Works Construction Enterprise (SWWCE hereafter) during the ex-post evaluation study found that one of the reasons for not meeting the target was that a machine was overturned and its engine destroyed. Other possible reasons would be that well drilling done by SWWCE between 2007 and 2008 was only eight cases. Based on these reasons, while machine procurement showed some contribution to the project target, its role in achieving the region-wide water supply coverage target was extremely limited.

One of the targets in this project was for WASHCOs to start collecting a tariff in all villages. This was implemented as originally planned.

3.2.2 Qualitative Effects

(1) Safe water supply

The primary water sources that residents used before the construction of water facilities in this project were creeks and rivers. According to the results of BD study, more than half of the residents using those sources answered that the water quality was not good[11]. The survey conducted among 99 beneficiary households during the study also found that the major water sources were “creeks and rivers” and “spring water” before water facilities were constructed. Although some households were still using these sources at the time of ex-post evaluation, users

[10] The 2013 target was re-calculated based on population baseline data and the population growth rate of each village because the BD Study Report (2005) showed the 2014 target.

[11] Source: BD Study Report (2005)

of borehole facilities developed by this project were the overwhelming majority[12].

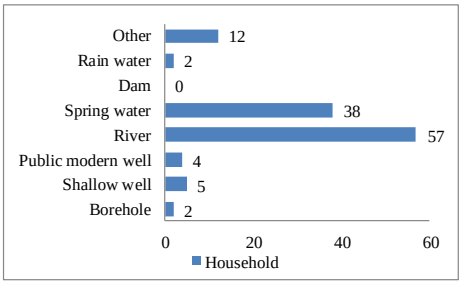


Figure 1: Former water source
(n=99 households)
Source: The beneficiary survey results

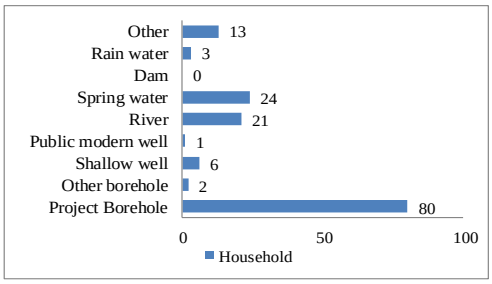


Figure 2: Present water source
(n=99 households)

Among the 80 households that used the water facilities provided by this project, 85% (68/80 households) were satisfied with the smell of the water, 96% (77/80) with the color and 86% (69/80) with the taste (Figure 3). The facility survey performed during the study found that 10 out of 30 facilities (33%) were nonfunctioning and over 15 facilities out of 20 facilities (75%) showed no problems about smell, color and taste in their water (Figure 4).

Based on the facts above, the effectiveness of this project was maintained at the time of ex-post evaluation.

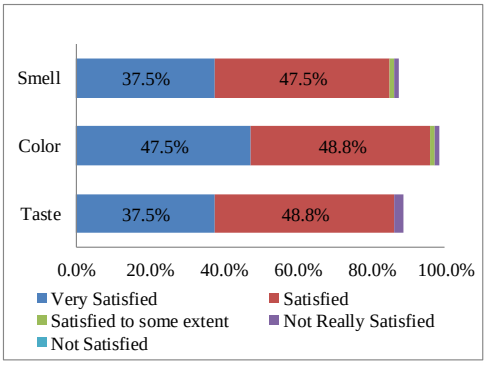


Figure 3: Residents' feedback on water quality
(n=89 households)
Source: The beneficiary survey results

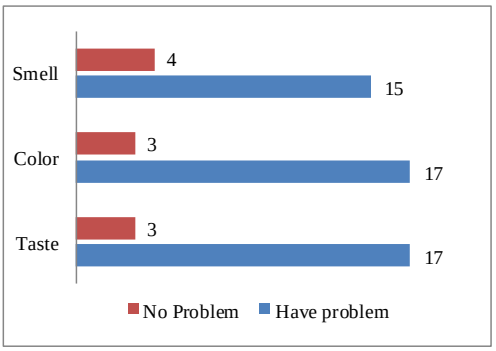


Figure 4: Results of facility survey
(n=20 facilities excluding 10 nonfunctioning ones)

(2) Community-based facility maintenance system

Along with the facility construction, the project implemented a soft component program with an aim to organize community-based water users associations and to establish and continue facility maintenance systems. Awareness raising activities for residents and training on

[12] The beneficiary survey targeted 107 households in 21 villages in 12 woredas in 9 zones that are extracted from 106 villages in 25 woredas in 10 zones considering their access condition and survey schedule. However, the local Woreda Water Desk told after the study that eight households in different districts were included in this group. So, these households were excluded from the sample and finalized the number as 99 households.

monitoring capacity building for staff members of Woreda Water Desks were also given as part of this soft component program.

The study found that 14 out of the 21 targeted WASHCOs were managing functioning facilities and that 11 WASHCOs (about 80%) were engaged in daily facility inspection and continuously held meetings with residents to discuss their emergency responses and facility maintenance[13]. WASHCOs also collect water tariff from user households adopting either fixed-rate (13/14 WASHCOs) or a metered rate (1/14) systems (see 3.5.3 "Financial Aspects of Operation and Maintenance" for financial situations of WASHCOs). In addition, most of the households (76/80) that used the water facilities provided by the project responded, "water facilities are owned by communities". Such a strong sense of ownership among residents had positive impact on routine maintenance. The result of beneficiary survey showed that 61 out of 80 households (76%) responded that they were engaged in activities to "keep cattle away from facilities," 59 households (74%) were engaged in "mowing" and 54 households (68%) were engaged in "cleaning facilities". For example, in Angacha, one of the studied areas, a local WASHCO and residents are farming together to use the revenue from farming to pay for the maintenance of water facilities. Hence, participatory facility maintenance becomes more common at a community level.

On the other hand, among 18 WASHCOs that answered a question on a six month monitoring visit by the local government, 10 WASHCOs (56%) answered "being monitored", and the other eight WASHCOs (44%) did not show any record of Woreda Water Desks monitoring[14]. A questionnaire survey among Woreda Water Desks presented similar results. Among 12 Woreda Water Desks that responded to the survey, eight Desks (67%) "monitored WASHCO's activity in the past six months" and four Desks (33%) had "never performed monitoring"[15]. The reasons for not being able to perform regular monitoring were staff shortages, a lack of modes of transportation and activity budget, and problems with site locations[16].

Although ensuring the regular monitoring of Woreda Water Desks was expected as a result of implementation of the soft component program, it has only partially been established as only eight out of 12 Desks showed that monitoring was actually done.

[13] WASHCO is a community organization responsible for water supply. 6 out of 14 WASHCOs (43%) are holding regular meetings while the rest (8/14 WASHCOs, 57%) hold meetings when necessary (based on the beneficiary survey results).

[14] Among them, five WASHCOs (28%) are regularly monitored and the rest five WASHCOs (28%) are irregularly monitored, according to their answers (Source: The beneficiary survey results).

[15] These eight woredas include five woredas that were targeted under the technical assistance project, the "Water Sector Capacity Development Project in Southern Nations, Nationalities and People's Region (WAS-CAP)" that was conducted along with this project in 2007. Of the eight Woreda Water Desks that answered that they are monitoring, seven Desks answered , "regularly" and one Desk answered, "irregularly." (Source: The beneficiary survey results).

[16] Source: Interviews with Woreda Water Desks

3.3 Impact

3.3.1 Intended Impacts

(1) Reducing water-related diseases[17]

The results of the beneficiary survey conducted at the time of ex-post evaluation showed that most of the project facility users among 80 households responded, "patients with water-related diseases have decreased" and about half said, "infant mortality and mortality of children under five years old have decreased." The beneficiary survey conducted among 21 villages in 11 woredas during the ex-post evaluation found that diarrhea actually represented only 3% of the total population (Table 2) even though its rate was the highest in the previous two weeks compared with that of other water-related diseases.

Table 2: Water-related disease rates in the previous two weeks in 21 target villages (2003)

	Disease	Children (person)	Adults (person)	Total number of people infected (person)	Percentage in total (577)
1	Diarrhea	8	10	18	3%
2	Malaria	7	7	14	2%
3	Eye disease	3	0	3	1%

Source: The beneficiary survey results

The background for this decrease in water-related diseases in the target villages includes water quality improvement and awareness raising among people on a causal relationship between water and disease. First of all, residents used to use "creeks /rivers" or "spring water" as their primary water sources before the project while they used water facilities as their primary water sources after the construction. Therefore, improving access to safe drinking water led to a decrease in water-related diseases in the project area. Secondly, most of the 75 households (72/75, 96%) that responded to a question on people's awareness of the causal relationship between water and disease understood the relationship. This is a significant improvement compared with 47.5% at the time of BD Study.

Based on the facts above, this project not only increased the number of people with access to safe water, but also raised awareness among resident on diseases, which eventually reduced overall water-related diseases. This is one of the outcomes of the activities by the soft component program implemented as part of this project.

(2) Increased opportunities to effectively utilize time for daily activities by reducing water-fetching workload

[17] The BD Study Report does not mention the pre-project data on water-related disease rates in the project area and thus comparisons with the data obtained from the ex-post evaluation study are impossible. A questionnaire among the agencies involved in facility maintenance (Water Resource Development Bureau, SWWCE, Woreda Water Desks, and WASHCO) and a beneficiary survey with villagers were conducted as part of the ex-post evaluation study.

The BD Study expected to create opportunities for women and girls to advance in their society and work, and for children to have more time for study as a result of reduction of their workload by the construction of water facilities[18]. The study found that fetching water was predominantly a woman's job in 59 out of 80 households (74%) that used the water facilities provided by this project. Figure 5 shows that the frequency and amount of fetching water increased after the construction in most of the households. On the other hand, the time required for one fetching trip (both ways) was reduced from 93 minutes to 55 minutes on average after the construction.

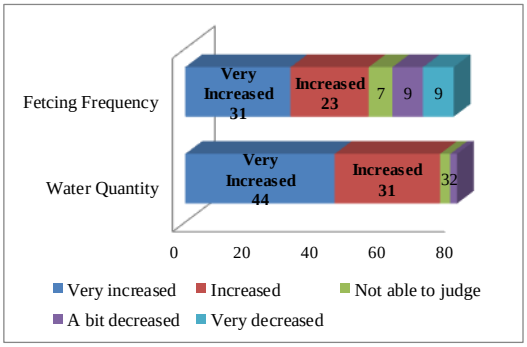


Figure 5: Change in frequency and amount of fetching water (n=80)

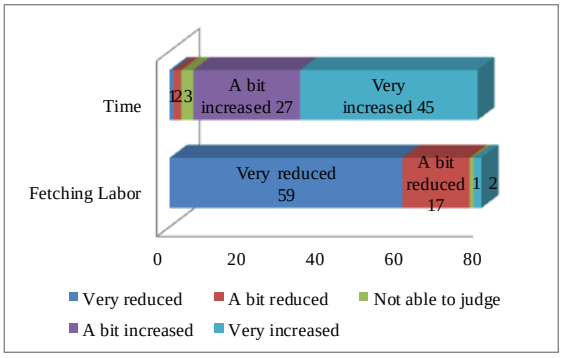


Figure 6: Change in time for daily activities and burden of fetching water (n=80)

Source: The beneficiary survey results

While the increases in water usage and frequency of fetching water could have led to an increase in fetching time per day, most of the 80 households that used the facilities provided by this project said, "fetching labor was reduced" and by which "time for housework has increased." Residents thought their water-fetching workload was reduced because the burden of fetching water at the water sources as well as the distance and time required for fetching water were reduced. Interviews with residents found that they had to travel several kilometers to a water source before the project, and the fetching water at the water sources also took even more time[19]. Constructing foot-pump water facilities relatively close to their residence not only shortened distance and time required for carrying water, but also made water-fetching workload at the water sources easier. These two reasons explain why the residents felt their water-fetching workload was reduced.

The beneficiary survey results showed that 61 out of 80 households (76%) were engaged in income generating activities such as farming and handicrafts by using their free time. They also spent more time on childcare, cooking, laundry and study, and half of the target households (42/61 households, 69%) said, their "income increased after the construction of the water

[18] Source: BD Study Report (2005)
[19] Source: Results of interviews with residents during the beneficiary survey

facilities."

Therefore, the project contributed to increased opportunities for facility users to effectively utilize time for daily activities[20].

3.3.2 Other Impacts

(1) Impacts on the natural environment

The survey results showed that most of the WASHCOs (20/21 WASHCOs) said, "there was no soil erosion, land degradation, or water deterioration by the project even after construction of water facilities were completed"[21]. Field studies found no serious environmental impact, either.

(2) Land Acquisition and Resettlement

There was neither land acquisition nor resettlement involved in this project. The land used for the construction of water facilities was donated by the local community. Therefore, no positive or negative impact was observed in terms of land acquisition or resettlement.

(3) Unintended Positive/Negative Impact

No other positive or negative indirect effects were observed.

This project has somewhat achieved its objectives, therefore its effectiveness is fair.

3.4 Efficiency (Rating: ②)

3.4.1 Project Outputs

(1) Machine and equipment procurement

Machines were procured as intended (Table 3).

[20] Women were responsible for fetching water in 59 out of 80 households that used the water facilities provided by the project. Most of them (57/59 households, 96%) were aware that labor involved in fetching water was reduced after the project and about 80% (46/59) were engaged in income generation activities. However, the impact of this project on women's social advancement cannot be determined due to the lack of baseline data during BD Study.

[21] The other WASHCO in Derashe said, "soil erosion was observed." This means a landslide occurred during the construction process which was not directly caused by it (Source: Interviews with WASHCO).

Table 3: Machines and equipment procured by this project

Machines and equipment	Intended number	Actual (Term 1)	Actual (Term 2)	Actual (Total)
Truck mounted top drive rotary drilling rigs	2units	1unit	1unit	2units
Truck mounted high pressure air compressors	2units	1unit	1unit	2units
Cargo trucks	2units	1unit	1unit	2units
Cargo trucks with cranes	2units	1unit	1unit	2unit
Dump trucks	2units	1unit	1unit	2unit
Equipment for well drilling (Accessories and tools)[22]	2[23]sets	1set	1set	2sets
Electric logging equipment	1unit	1unit	0unit	1unit
Handy incubators	2units	2units	0unit	2unit
Microbiological testing kits	1set	1set	0	1set

Source: Documents provided by JICA

(2) Construction of water facilities

The project provided 205 hand pump shallow wells and 24 spring water facilities in 106 target villages in 25 woredas in 10 zones (Table 4). The numbers were lower than those in the BD Study by nine for hand pump shallow wells and two for spring water facilities.

Table 4: The number of facilities constructed in the project

(comparison between planned and actual) (Unit: site)

FY	2005	2007/2008
Type of water facility	Construction plan	Actual number constructed
Hand pump shallow wells	214	205
Spring water facilities	26	24
Total	240	229
Difference	－	-11

Source: BD Study Report (2005),

The actual number of constructed hand pump shallow wells in this project decreased because the project cost went up between the time of E/N and the Detailed Design Study due to exchange rate fluctuation. On the other hand, spring water facilities decreased because construction was terminated at two villages as well as at their alternative sites in Derashe Special Woreda where an ethnic conflict occurred in the Term 2/2 period[24]. Hence, the actual number of constructed spring water facilities decreased due to an unpredictable conflict between ethnic groups, and the decrease was unavoidable.

[22] "Accessories" are accessories for drilling rigs and "tools" include casing tools and fishing tools (Source: Documents provided by JICA).

[23] It was planned to purchase spare parts required for two years for the purpose of smooth operation of purchased machines (Source: BD Study Report (2005)).

[24] At the two target villages in Derashe Special Woreda, construction sites were changed due to an ethnic conflict during the construction process. Construction was also terminated at the alternative sites that were set up afterward because it was difficult to establish resident-oriented maintenance systems (Source: Documents provided by JICA).

(3) Soft Component Program

Awareness-raising activities among residents and training for Woreda Water Desks and WASHCO staff were provided based on the plan of the soft component program in this project. However, the goal was not set out in planning and it was impossible to judge the outcomes of these activities or the efficiency in implementing the project, other than the establishment of WASHCOs in all of the 106 villages.

3.4.2 Project Inputs

3.4.2.1 Project Cost

With regard to the cost incurred to Japan with this project, the E/N grant limit was 1,061 million yen (517 million yen for Term 1/2 and 544 million yen for Term 2/2), yet the actual grant amount was 811 million yen (399 million yen for Term 1/2 and 412 million yen for Term 2/2) which was lower than planned (76% of the planned amount). The reduction is explained by the decreased output and the large balance left over (245 million yen) after bidding. Other than the balance, the actual output was reduced because the construction of nine hand pump facilities (11 million yen) was cancelled in order to offset the overspending in the project cost caused by an exchange rate fluctuation during Term 1. It was also because the construction of two spring water facilities (4 million yen) was terminated due to the armed fight in the project sites in Term 2. The reduction was 15 million yen in total[25].

Taking this reduced output into consideration, the project cost was lower than planned. Therefore, the efficiency of the project was high.

As for the cost incurred on the Ethiopian side, it was planned to be 193,000 Birr (2.5 million yen) to cover construction management, training expenses for Woreda and citizen trainees, establishment and operation of water users associations, instruction on maintenance, and securing personnel[26]. Yet, the actual cost was higher than planned, and was 287,000 Birr (3.4 million yen).

3.4.2.2 Project Period

The project was planned to be 30 months long. It actually took 37 months (123% of the planned duration) and was slightly longer than planned. Two major factors caused to the prolonged project period. First, flash flooding in June 2007, which was six months before the project completion, washed out roads and caused landslides in Loma Woreda, Dawero Zone

[25] 11 million yen consists of: the drilling of nine wells (8,517,000 yen) + hand pump installation (1,959,999 yen) + transportation packaging (177,000 yen) + general management (876,000 yen). Construction cost (4 million yen) after the termination of two spring water facilities was calculated based on direct construction cost (3,189,000 yen) + shared temporary building and site management (608,000 yen) + general management (220,000 yen) (Source: Documents provided by JICA).

[26] Participation costs required for trainings and workshops of the soft component program held in the capital city of SNNPRS, Awasa included transportation, per diem allowance and accommodation (Source: Documents provided by JICA).

where the project was scheduled. This blocked machine transportation and traffic. Although roads were repaired in the Woreda after the rainy season, drilling had to be postponed until the road repair was completed and as a result, the construction was not completed until June 2008.

Secondly, an ethnic conflict occurred in November 2007 near the site where drilling was planned in Derashe Special Woreda. This conflict resulted in prohibition of entry into the site for three months until the end of February 2008, which also contributed to the prolongation. Even after the conflict calmed down, it was not completely finished and alternative sites were chosen. However, surrounding villages did not agree to the facility construction at the alternative sites and the plan was finally terminated in April 2008, and it took another three months to complete the official procedure to terminate[27].

Although the project cost was lower than planned, the project period was slightly longer than planned; therefore efficiency of the project is fair.

3.5 Sustainability (Rating: ②)

3.5.1 Institutional Aspects of Operation and Maintenance

(1) Roles of involved agencies

Stakeholders in the maintenance of the water facilities provided by the project are the Water Resource Development Bureau, Zone Water Desks, Woreda Water Desks, WASHCOs and SWWCE. Their roles are listed in Table 5.

Table 5: Roles of stakeholders and their major responsibilities in facility maintenance (2013)

Agencies (role)	Major responsibilities
Water Resource Development Bureau (Superintendent of water facility maintenance in the region)	Coordinating zones and woredas, repairing on a mass scale[28]
Zone Water Desk (Superintendent of water facility maintenance in their jurisdictional zone)	Requesting regions to take care of repairs that cannot be done by zones, supporting woredas to supply spare parts, providing consultation services for repairs or new projects by woredas, applying for budget.
Woreda Water Desk (Superintendent of water facility maintenance in their jurisdictional woreda)	Repairing facilities, water quality testing, monitoring WASHCO activities, providing training and technical advice.
WASHCO (Practitioner of water facility maintenance)	Monitoring residents' activities, providing training for residents, collecting water tariff, basic repairing and maintenance of facilities, procuring parts.
SWWCE (Practitioner of drilling machine maintenance)	Maintenance of drilling machines (inspection, repair, and maintenance)

(This table was created by the evaluator based on the beneficiary survey.)

[27] Source: Documents provided by JICA

[28] Roles other than maintenance include water quality testing at the time of construction, contracting large scale facility construction (planning, preparing for bidding) and urban water supply projects.

(2) Roles of each stakeholder and staff allocation

1) Water Resource Development Bureau

The plan specified their major roles to be supplying staff to Woreda Water Desks, purchasing spare parts for hand pumps and helping transportation to zone/woreda. However, in recent years, a parts procurement network has been developed and the task to purchase spare parts that was originally the region's responsibility shifted to WASHCOs. This consolidated the current roles of the Bureau to ① coordination at the zone and woreda levels and ② large-scale repair of water facilities (Table 5)[29]. On the other hand, staff allocation within the Bureau recently went through reorganization as a result of merger of the Ministry of Water and the Ministry of Mines and Energy, and the number increased from the intended 64 to an actual 76. Interviews with the Bureau did not find any staff shortage and thus a sufficient level of staffing to pursue their roles was attained in the Bureau.

2) Zone Water Desk

The roles of Zone Water Desks included coordinating regions and woredas, obtaining spare parts from regions upon woredas' requests and helping transport the parts to woredas. Their authority was meant to be gradually downsized during the BD Study conducted in 2005. While there was no change in the coordination between regions and woredas at the time of this study, new responsibilities were added including facility repair, consultation work on new facility constructions and budget requests[30].

3) Woreda Water Desk

The plan specified their major roles to be patrolling villages to provide instruction on WASHCO operations, raising awareness on hygiene and other issues, repairing and inspecting hand pumps and spring water facilities, testing water quality, requesting spare parts replacement (region/zone) and storing and supplying spare parts. The only change since the original plan was that WASHCO was responsible for spare parts procurement at the time of this study.

When the staff allocation at six interviewed Woreda Water Desks was compared to the data from the BD Study, it showed that staff increased in three Desks out of six Desks. However, the actual allocation remained at a low level as the Table 6 shows that there was only four to nine

[29] During the BD Study (2005), spare parts that would be required for a certain period (for about three years) were provided to zones at the same time facilities were handed over. Then zones would transport the parts to woredas upon their request. However, parts were actually delivered to woredas through zones in Term 1 and provided directly to woredas in Term 2 so that parts were available at a woreda level whenever necessary (Source: Documents provided by JICA). The ex-post evaluation found that seven spare parts shops were opened as part of the previously mentioned technical assistance project, WAS-CAP. Types of shops were diverse including privately-run and publicly-run by zones and woredas (Source: Results of the second field study).

[30] Woreda Water Desks were supposed to support WASHCOs in organizing the operation and maintenance of facilities in this project. Thus, the ex-post evaluation did not cover Zone Water Desks and does not provide organizational information on them.

staff allocated(4.5 on average, 49% fill-rate), which did not meet the quota (9-11 people). Many of the project sites in Ethiopia were remotely located and scattered over a wide range. Some woredas involved in the project had to monitor 146 facilities (Angacha) and 272 facilities (Boloso Sore) within their jurisdictional woreda with just two or three water sector staff. Having considered this situation, the allocation of four to five at each woreda on average is hardly sufficient for Woreda Water Desk to monitor several hundred water facilities in their jurisdiction.

Table 6: Change in staff allocation at Woreda Water Desks

(comparison with the original plan) (Unit: person)

Zone, Woreda	BD	Quota (water sector)	Actual (water sector)	Comparison with BD (change)	Notes
	2005	2012	2012		
Gedeo, Yerega Chaffe	N.A.	—	—	Non-comparable	
Hadiya, Lemo	N.A.	9	9	Non-comparable	
Hadiya, An Lemo	N.A.	9	3	Non-comparable	New woreda
Wolaita, Boloso Sore	2	—	—	Non-comparable	
Derashe, Derashe	3	9	5	Increased	
Sidama, Hula	4	—	—	Non-comparable	
South Omo, Debub Ari	N.A.	—	—	Non-comparable	
K Tembara, Angacha	5	—	—	Non-comparable	
K Tembara, Doyogen	N.A.	—	—	Non-comparable	New woreda
Dawero, Loma	2	9	4	Increased	
Silti, Dalocha	2	9	2	No change	
Silti, Siliti	2	11	4	Increased	

Source: BD Study Report (2005), Results of questionnaire survey of Woreda Water Desks.

4) WASHCO

The plan specified the roles of WASHCOs to be performing maintenance and repairing on facilities, collecting and managing the water tariff, storing and managing spare parts and tools and locking fences. The ex-post evaluation found that procuring parts was added to these roles. Staff allocation that was required for facility maintenance in the planning period involved five staff members playing the roles of chair and vice-chair of an association, secretary, accountant, water tariff collector, article manager and auditor. 52% of the 21 target WASHCOs were found

to have maintained this five-staff member structure in the study[31]. The staff allocation required for facility maintenance had been maintained at the time of the ex-post evaluation as well.

5) SWWCE

SWWCE is a public corporation established at a regional level and responsible for the maintenance of drilling machines and equipment. SWWCE has 200 staff members in their machine maintenance department including mechanics, electricians, welders and drivers and the number has quadrupled compared to the 47 at the time of planning (2005). This is explained by the increase in drivers who transport equipment and machines to the site; the staff required for machine maintenance has not increased. On the other hand, the number of machines owned by SWWCE increased by one since the BD Study and they are operating well except for one drilling machine that broke down recently. Judging from these facts, SWWCE has a sufficient staffing level to pursue their machine maintenance work.

3.5.2 Technical Aspects of Operation and Maintenance

(1) Water Resource Development Bureau

In pursuing maintenance of the facilities provided by the project, the Water Resource Development Bureau was expected to have the capacity to coordinate with lower administrative organizations as a superintendent of facility management as well as the capacity to respond to problems including large-scale defects. Among these, this study could not find any actual responses to large-scale defects. However, the Bureau continues to monitor the activities of lower administrative organizations and to support parts replacement once every three months after the project's conclusion[32]. Judging from these survey results, technical aspects of water facility maintenance by the Bureau are largely being maintained.

(2) Woreda Water Desk

Woreda Water Desks were expected to have the capacity to patrol villages to monitor and provide training to villages as well as the capacity for maintenance and repair techniques. Among the 12 target Woreda Water Desks in the study, eight Desks (67%) said they monitored the activities of WASHCO in the past six months and the other four Desks (33%) did not have any record of monitoring[33]. While these four Desks did not patrol to monitor, they not only

[31] An association with less than five members also fills these five roles by assigning more than one role to each officer (Source: The beneficiary survey results).

[32] By principle, WASHCOs were responsible for obtaining parts at the time of the ex-post evaluation. However, many areas did not have parts retailers. Increasing parts shops is imperative in order to pursue sustainable maintenance and the Bureau is now coordinating to establish more shops. The Bureau also obtained parts that were not available at a woreda level on their behalf (Source: Results of interviews with Water Resource Development Bureau).

[33] WASHCO's response on woreda patrolling visits showed similar results to the previous "3.2 Effectiveness and 3.2.2 Qualitative Effects." Among the 18 WASHCOs that responded to the survey, ten WASHCOs (56%) said they

visited the sites to provide technical instruction upon request, but also repaired machines as necessary. Among the eight Desks that performed monitoring in the past six months, five of them were also targets of the technical assistance project, the Water Sector Capacity Development Project (WAS-CAP hereafter) that was implemented along with this project.

Table 7: Machine defects in each village and repairer

Zone	Woreda	Village	Number of defects	Pump	Repaired by
Hadiya	Lemo	Dulacha Belela	1	India Mark II[34]	Woreda Water Desk
Kambata Tembero	Doyogena	Dinika	1	India Mark II	Other
Segen Area	Derashe	Bursa	1	Other	Woreda Water Desk
Sidama	Hula	Gase	1	Afridev	Woreda Water Desk
Silte	Dalocha	Nadhuyiagam	2	Afridev	Woreda Water Desk
Walayita	Boloso Sore	warmuma	1	Afridev	Woreda Water Desk

Source: The beneficiary survey results

With regard to the repairs done by Woreda Water Desks, six out of the 21 target WASHCOs had defects in the past six months as seen in Table 6, most of which were repaired by Woreda Water Desks[35].

Other than this, Woreda Water Desks were expected to conduct water quality testing including sterilization of facilities and to provide various training for WASHCOs. However, they did not implement these activities as per the expectation due to the lack of budget and human resources[36]. In addition, training for WASHCOs has not been given technical support because of a lack of budget and personnel.

Based on these facts, while Woreda Water Desks were involved in facility maintenance, their capacity to implement training for WASHCOs including repair techniques, monitoring and

---

were visited in the past six months while eight WASHCOs (44%) said they were not visited at all (Source: The beneficiary survey results).

[34] India Mark II is an Indian-made hand pump for boreholes jointly designed by the government of India, WHO and UNICEF in the 1970s. (Source: Related websites). India Mark II had been used in Ethiopia in the past and was introduced based on recommendations from local industry to replace Afrideep (for wells requiring a 60m maximum operating depth) that was to be introduced but was not in stock (Source: Documents provided by JICA, results of interviews with project contractors and implementing agencies).

[35] India Mark II often requires the support of Woreda Water Desks' for maintenance for technical reasons. In new woredas, Zone Water Desks or private businesses do repairing as it is hard for new woredas to provide assistance in a timely manner due to a lack of mechanics and repairing skills (Source: Results of WASHCO questionnaire survey and interviews) .

[36] In the questionnaire survey, responses were collected from two Woreda Desks in charge of the spring water facilities provided by the project and nine Desks in charge of shallow wells. The former conducted no water quality testing or sterilization and for the latter, three Desks conducted the testing and sterilization. The three did sterilization with chlorine and the other Desks showed no record of testing (Source: The beneficiary survey results).

awareness-raising activities has room for further reinforcement and improvement.

(3) WASHCO

WASHCOs were expected to have basic technical and organizational management skills in order to run water facilities. Actually, most of the 14 responding WASHCOs (with valid response) that covered the functioning facilities were engaged in routine facility checkups, replacement of chains for hand pump facilities and pipes and valves for spring water facilities as necessary, and keeping operational records after the checkup (see Table 8). Most of these WASHCOs developed action plans and implemented activities based on them (Table 8). Judging from these facts, they have basic organizational management skills.

Table 8: WASHCOs' activities

WASHCO activities	Responded WASHCO	%
Developing WASHCO action plan	12	86%
Implementing WASHCO action plan	11	79%
Using monitoring check list	7	50%
Keeping operational record	11	79%
Facility inspection	11	79%
Using financial manual	6	43%
Using field manual	5	36%

Source: The beneficiary survey results

(4) SWWCE

SWWCE was expected to be capable of maintenance including equipment and machine inspection and repair. Machines and equipment that were procured by the project and were in use are summarized in Table 9. They were all in use and functioning well except for the ones beyond SWWCE's responsibility due to lack of technical skills necessary to operate them[37]. One cargo truck is being used by the Water Resource Development Bureau.

Based on these survey results, SWWCE meets the necessary technical standards to perform machine inspection, maintenance and repair.

[37] The equipment that was outside SWWCE responsibility includes those items such as electric logging equipment and microbiological testing kits. (Source: Results of interviews with Water Resource Development Bureau and SWWCE). Procured machines and equipment were planned to be handed over to SWWCE via the Bureau in the BD Study and they were actually handed over to SWWCE after they started using them. The machines and equipment that were not in use in the Table are the ones that the Bureau meant to use initially but were handed over to SWWCE with other machines instead.

Table 9: Number of machines and equipment procured by the project and current status

Machines and equipment	Number procured	Number in use
Truck mounted top drive rotary drilling rigs	2	2
Truck mounted high pressure air compressors	2	2
Cargo trucks	2	1
Cargo trucks with cranes	2	2
Dump trucks	2	2
Equipment for well drilling (Accessories and tools)	2	2
Electric logging equipment	1	Not in use yet
Handy incubators	2	Not in use yet
Microbiological testing kits	1	Not in use yet

Source: Results of interview surveys to SWWCES

3.5.3 Financial Aspects of Operation and Maintenance

(1) Water Resource Development Bureau

Their annual budget was 615 million Birr (116 million yen) in fiscal year (FY hereafter) 2011/2012 and their investment expenses were 522 million Birr during the same period (98 million yen)[38]. There is no information on budget composition after 2009 as the Maintenance Department was broken up and reorganized into the Department of Drinking Water Supply Scheme and Maintenance after organizational restructuring. Thus, it is not able to determine if financial resources required for facility maintenance were actually available.

(2) Woreda Water Desk

Concrete annual budgets were not identified at six target Woreda Water Desks. Yet, it was found that annual budgets for concerned Desks as a whole including Energy Department and Industrial Department were increasing every year.[39] Breakdown of expenses includes personnel costs, onsite allowances, office expenses, maintenance costs (for vehicles and machines), raw material costs and labor costs. Expenses related to Woreda Water Desk operation including WASHCO training, technical advice and monitoring are included in the onsite allowance and maintenance costs mentioned above[40]. Personnel expenses represented over 80% of the budget at four Woreda Water Desks where breakdown of expenses in FY 2011/2012 was identified; the budget for facility maintenance and monitoring was only 7% of the total. Therefore, it was not a sufficient budget to pursue responsibilities as an administrative agency that supports communities in operating and maintaining their facilities.

(3) WASHCO

All the 14 WASHCOs that have functioning facilities introduced either fixed-rate or

[38] Calculated based on the exchange rate (1Birr=5.29 yen) at the time of the ex-post evaluation (July 2013).
[39] Source: The beneficiary survey results
[40] Source: Results of interviews with Woreda Water Desk at the time of the ex-post evaluation

metered systems to collect a water tariff regularly from residents[41]. As for the rate, 11 WASHCOs (85%) attained the 1-3 Birr/month level that was established by the BD Study and this included metered amounts as well[42]. To the question on water tariff collection rate, eight out of 14 WASHCOs excluding one that did not respond (62%) answered "the collection rate was over 80%" and this showed that the water tariff was continuously collected. Money collected from residents was then pooled as a reserve that is to be used to cover labor costs, spare parts and transportation required for repairing. While the cost of repairing itself was supposed to be covered by the reserve in principle, money is additionally collected from residents when the reserve is not enough. Interviews with WASHCOs found that additional collections took more time at the time of repairing.

Regarding the water tariff, over 80% of the facility using households (67/80) answered that it was "a reasonable price" or "cheap." This shows that the level is appropriate for the living standard of the residents. Additionally, most of the households (72/80) were affirmative in paying extra for necessary improvement of facility functions. 80% of 14 WASHCOs that were managing functioning facilities provided their financial reports to Woreda Water Desk and residents, while only five out of 14 WASHCOs (36%) kept books and only half of the WASHCOs were saving money in their WASHCO bank accounts[43].

Judging from these facts, while some of the WASHCOs that manage functioning facilities have problems in financial management, they have the financial capability to perform basic facility maintenance.

(4) SWWCE

Just as planned, SWWCE recorded profit and its management is in surplus (Table 10). The profit covers all the costs for operation and maintenance of machines and equipment, staff salaries and purchasing of spare parts. Therefore, they had sufficient financial resources and no problem was identified in operating and maintaining machines and equipment. The major increase in balance and profit between FY 2009/2010 and FY 2010/2011 is explained by the fact that the number of constructed wells largely increased between FY 2007/2008 and FY 2008/2009 (Table 11).

Table 10: Balance and profit of SWWCE

Item/year	FY 2008/2009	FY 2009/2010
Balance	37 million Birr	165 million Birr
Profit	0.1 million Birr	1.5 million Birr

Source: Documents provided by the SWWCE

[41] Breakdown includes seven out of 14 WASHCOs required water facility users for money contribution as a water tariff and 7/14 WASHCOs as management costs (Source: The beneficiary survey results).
[42] Excluding one WASHCO that did not respond.
[43] About half of them (6/14 WASHCOs) kept their savings in their accountants' residence (Source: The beneficiary survey results).

Table 11: Number of SNNPRS owned drilling machines and constructed wells

Item/year	FY 2006/07	FY 2007/08	FY 2008/09	FY 2009/10	FY 2010/11	FY 2011/12
Number of functioning drilling machines (No. of machine)	6	3	7	7	6	6
Total number of constructed wells (No. of sites)	71	8	60	56	21	34
Number of constructed wells per machine	11.8	2.67	8.57	8	3.5	5.67

Source: Source: Documents provided by the SWWCE , Result of interviews survey with SWWCE

3.5.4 Current Status of Operation and Maintenance

(1) Current status of water facility operation and maintenance

The nonfunctioning rate of water facilities provided by the project was 34% (76/225), which was about the same level as the national average at 35% (2010). This rate is higher than the 25% average of SNNPRS[44]. At the 25 hand pump shallow wells that were inspected onsite during this study, a nonfunctioning rate of facilities that used Afridev hand pumps was 25% (4/16) and 56% (5/9) for India Mark II[45]. Major repairs included replacement of pipe, pipe assembly parts, PVC water pipe, chains, and seals. The high nonfunctioning rate is explained by the following reasons.

- Administrative jurisdictions have been changed and new woredas were established as a result. However, they are not able to repair water facilities in their jurisdictional areas due to lack of staff, reparing tools and technical skills;
- India Mark II requires special tools for repairing including chain blocks and thus woredas have to be involved in repairing. However, some of the new woredas do not have such tools and could not repair them. Woredas without repairing skills have to request repairing assistance from zones and regions, which in turn required longer time for repairing[46];
- As a result of a technical assistance project, WAS-CAP, seven spare parts shops opened in SNNPRS and made spare parts procurement easier at woreda and zone levels. However, these shops did not carry enough parts for India Mark II compared to those for Afridev and Afrideep, and delivery usually took longer. There is not a sufficient selection of parts at new shops either;
- Among the 21 Woreda Water Desks that were interviewed, only half of them were monitoring facilities due to a lack of monitoring staff, lack of modes of transportation and

[44] Sources of nonfunctioning rates for Ethiopia and SNNPRS are Universal Access Plan 2011 Revised Edition. (Ministry of Water and Energy). Nonfunctioning numbers of facilities by their type are 67/201 for hand pumped shallow wells and 9/24 for spring water facilities (Source: The beneficiary survey results).

[45] Hand pump for shallow wells made in India (maximum operating depth: 40m). This pump has been introduced not only in Ethiopia but also in its surrounding African countries (Source: BD Study Report (2005)).

[46] Afridev hand pumps are repairable at a community level (Source: Documents provided by JICA).

activity budget, and problems with site locations. This situation makes it harder to identify defects at an early stage; and

- Collecting a repair fee at a community level takes a long time.

Five of the 18 target woredas were also included in the target woredas of WAS-CAP, the technical assistance project, that was implemented in SNNPRS for four years from 2007 to 2011. The nonfunctioning rate was 28% in five woredas, which was 6% lower than the 34% nonfunctioning rate of 225 facilities in total. Developing a parts procurement network and technical training for WASHCOs by technical assistance project implemented during this grant aid project reinforced the system for facility maintenance and contributed to the stable high functioning rate.

(2) Current status of machines and equipment operation and maintenance

The machines and equipment provided by the project were first delivered to Water Resource Development Bureau and then managed by SWWCE. However, electric logging equipment, testing kits and handy incubators had not been used at the time of the ex-post evaluation. Interviews with involved agencies found that they were not used due to a lack of experts who could properly handle them as well as the fact that procured equipment was not stored at the Water Resource Development Bureau that was responsible for developing water facilities implementation plans and selecting sites, but instead, stored at SWWCE that manage drilling machines[47].

Other machines and equipment have been in regular use after procurement and maintenance and inspection have been properly done.

In summary, some problems have been observed in terms of staff allocation, technical and financial levels at Woreda Water Desks, and the financial situation of WASHCO, therefore sustainability of the project effect is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project aims to provide the residents of 106 villages in 14 woredas of 10 zones in SNNPRS with access to safe drinking water. The project constructed water facilities and set up WASHCOs in order to continuously run and maintain those water facilities[48]. The objective of this project is highly relevant to the country's development policy, development needs, as well

[47] Prior to constructions of water facilities, the Water Quality Testing Team of the Water Resource Development Bureau performs the testing using the Microbiological testing kit and handy incubators (Source: Results of interviews with SWWCE).

[48] At the time of ex-post evaluation, target woredas increased to 25 along with the jurisdiction change.

as the ODA policy that Japan upholds. The percentage of people provided with water access by the project remains at 61% of the target value because the functioning rate of water facilities was 66%. However, the intended effects in the project are observed such as that water facility users noted that water related diseases had decreased and opportunities to effectively utilize time for daily activities had increased by reduced water-fetching workload. Thus the effectiveness and impact of the project are fair. The project cost was lower than planned; yet the project period exceeded the plan due to ethnic conflicts, and roadblocks caused by landslides and the washout of roads used for transporting equipment. Thus the efficiency of the project was fair. With regards to the operation and maintenance of facilities, 66% of the constructed facilities by the project are now functioning while the staffing, maintenance skills and financial capacity of Woreda Water Desks, which play central roles in maintenance, have room for improvement. Thus the sustainability of the project effect was judged to be fair.

In light of the above, this project is evaluated to be partially satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Implementing Agency

(1) Improving facility functioning rates

Among the water facilities developed in this project, Afridev pumps are easily repairable and WASHCOs can handle them while India Mark II requires a chain block and other special tools for repairing. As a result, Woreda Water Desks without proper tools often cannot perform repairs. Some of the newly born woredas do not have sufficient technical skills and systems to pursue a maintenance operation and do not perform repairs due to lack of techniques and resources. In addition, while spare parts shops are opening in local woredas and neighboring zones, spare parts for India Mark II pumps are rarely in stock compared to others, and recently-opened shops have a limited selection of parts. Such inventory shortages are one of the factors that prolong downtime.

With the above in mind, the following measures should be taken for enhancing the functioning rate of water facilities in the future. Water Resource Development Bureau and other agencies are recommended to ① ensure that Woreda Water Desks are equipped with necessary tools for repairing India Mark II, ② provide training on repair techniques for Woreda Water Desks that are in charge of repair and maintenance of facilities, and ③ further promote for developing a network for parts arrangement to allow regular and systematic parts procurement, in order to encourage more prompt and appropriate repairs.

(2) Reinforcing organizational strength at Woreda Water Desk

In addition to the repairing techniques mentioned above, Woreda Water Desks are expected to perform various activities as one of the major actors for water facility maintenance including

monitoring by patrolling villages to spot problems early on and prevent defects in advance, continuous hygiene education and facility sterilization. However, only a few woredas are actually engaged in these activities. Interviews conducted during the study identified a lack of human resources, modes of transportation, and program funding as the factors that prevent Woreda Water Desks from active involvement. Reinforcing organizational strength of Woreda Water Desks is essential to enhance the functionality of facilities and maintain the population with water access that was intended in this project. With the above in mind, concrete measures for the future will be ① recruiting staff, ② making roles of Woreda Water Desks widely known and ③ reinforcing budgetary measures. Above all, securing budgets for repair and maintenance of facilities should be noted in the future as the current focus is mainly on constructing new facilities.

(3) Reinforcing the financial capability of WASHCO

Among the interviewed WASHCOs, a water tariff was collected from residents in all villages regardless of the functionality of facilities and if their saving could not cover repair costs, they collected supplementary fees from residents. However, interviews found that collecting a supplementary fee from residents after they made regular payments based on a fixed-rate or metered system was difficult and time consuming. Most of the WASHCOs have cashers but bookkeeping was hardly done after collecting the water tariff. Usage and balance of their reserve are not clearly known.

Thus, in order to respond to facility defects immediately and reduce downtime, WASHCOs' financial capability needs to be reinforced so that they can strictly manage the money after routine collection from residents and retain the necessary level of savings for future facility repair and maintenance. If the current rate of the water tariff is not enough to cover repairs, a reorganization of the rate structure should also be considered.

4.2.2 Recommendations to JICA

No recommendation.

4.3 Lessons Learned

(1) Ensuring availability of required tools and spare parts

The project originally planned to distribute basic tools and spare parts required for facility maintenance from a construction company to Woreda Water Desks via Zone Water Desks in Term 1. However, this was not ensured as some woredas did not receive tools even a year after the facility handover and thus their facility maintenance was negatively affected. To address this problem, some measures were taken in Term 2 including distributing tools to Woreda Water Desks directly.

Tools and spare parts are essential to perform routine maintenance of facilities. Thus, if the procurement and distribution of such tools and basic spare parts are required for any similar future projects, immediate procurement and distribution need to be ensured so that the repairing agency[49] have them ready for facility maintenance.

(2) Effective use of procured machines and equipment

The study found that most of the drilling machines provided by the project have been used and properly maintained by SWWCE, which was the intended user of those machines in the original plan. However, among the machines and equipment provided by the project, electric logging equipment and microbiological testing kits were supposed to be stored at the receiver and yet they were given to SWWCE with other drilling machines after the second inspection for defects. They were after all left unused due to a lack of experts in SWWCE and a disparity in their responsibilities.

Therefore, it is necessary to ensure proper storage and maintenance of those machines and equipment at the agencies that are intended or expected to use them in order to effectively utilize procured machines and equipment.

[49] In this project, Woreda Water Desks are the repairing agency.

Tanzania

Ex-Post Evaluation of Grant Aid Project

"The Project for Water Supply Development around the Metropolitan Area"

External Evaluator: Yumiko Nakamura, Binko International Ltd.

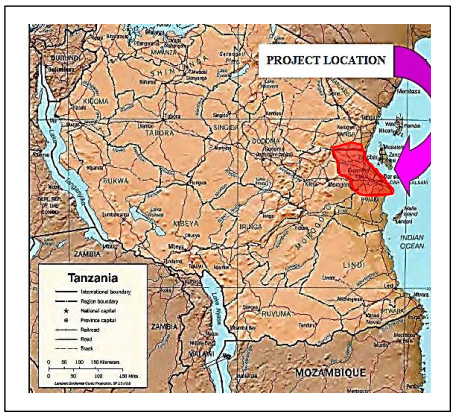
0. Summary

This Project aimed to increase water supply coverage in the Coast Region and Dar es Salaam Peri-Urban. It developed water facilities at the designated sites and formed Water User Associations (WUAs[1] hereafter) to secure sustainable maintenance and operation of water facilities. The objective of the project is highly consistent with Tanzania's national development policy, development needs, as well as the ODA policy that Japan upholds. The population with access to a water supply has only increased to 74% of the target value due to changes in construction plans during the project period and a high non-functioning rate of the hand pump water facilities (Level 1 facilities hereafter). However, the intended effects of this project have been observed as follows: some WUAs in the project locations replaced hand pumps with electric pumps at their own initiative; reduced water-fetching workloads resulting in a revitalization of the local economy in some of the project locations. The efficiency of the project is judged to be fair based on the fact that the project cost was higher than planned considering the decrease of the output, while the project was executed within the planned period. With regard to the operation and maintenance of water facilities, the functioning rate of the Level 1 facilities is 45%, which is lower than the national average of 66%. Also, there is a need for reinforcement and improvement of technical and financial skills of WUAs that play central roles in facility operation and maintenance and support systems by the local governments. However, the functioning rate of the piped water supply facilities (Level 2 facilities hereafter) constructed by the project was 100% at the time of the Ex-post Evaluation Study, and that exceeds the average functioning rate in all of the project targeted areas. Therefore, sustainability of the project effect is judged to be fair.

In light of the above, this project is evaluated to be partially satisfactory.

[1] WUA stands for "Water Users Association". In this project, WUAs for the Level 1 facilities were formed at the village level, while WUA for the Level 2 facilities were established at each facility. WUAs for Level 1 facilities in this project were established at the village level because when a WUA is established at each facility, its management tends to be inefficient due to the lack of coherence and coordination among WUAs in the same village (Source: The Basic Design Study Report (2007)).

1. Project Description



Project Location

A piped water facility provided by the project

1.1 Background

The United Republic of Tanzania is located on the east side of Central Africa, bordering Kenya, Uganda, Rwanda, Burundi, Zambia, and Mozambique. Its population is approximately 43 million (in 2009), and the country covers 94,700 square kilometers of land. Most of the land enjoys a savanna climate and rainy seasons are generally observed twice a year from March to May and from November to December. Annual precipitation reaches approximately 1,000 mm.

The Tanzanian government has been engaged in an undertaking to improve the water supply environment in collaboration with international organizations and donor agencies since early 1970s. The National Water Policy developed in 1991 declared universal access to safe and clean water within 400m by 2002. However, the objective was not achieved because intended interventions had not proceeded as planned.

To improve this situation, the government of Tanzania developed "Vision 2025" in 1999 as well as the "National Strategy for Growth and Poverty Reduction" (NSGRP hereafter) in 2000 by which water resource development was positioned as one of seven policy priorities. Further, the "National Water Sector Development Strategy" (NWSDS hereafter) was established in 2002 and set the goals for capacity development of local governments and communities along with universal access to safe and hygienic water within 400m by 2025.

Despites these policy initiatives, the water supply environment had not been improved and thus the population with access to safe water in rural areas was as low as 45% in 2002 as shown in the 2002 National Population Census[2]. The Basic Design Study (BD Study hereafter) indicated the followings reasons for the delayed improvement of water supply coverage: construction of new water facilities did not make progress as planned due to the lack of a development budget; existing water facilities were left abandoned after failure occurred due to

[2] Source: BD Study Report (2007)

their fragile operation and maintenance systems and thus were not functioning; or existing facilities were not able to meet the demand of the water supply from the rapidly increasing population after the expansion of residential areas[3].

Given this background, the government of Tanzania requested grant aid from Japan for the implementation of a development survey, the development of a water supply plan, and the implementation of a feasibility study for priority projects in order to make up for the delay in the construction of water supply facilities in the Coast region and the Dar es Salaam Region. Upon this request, a master plan on the water supply was developed for 278 villages based on the results of the development survey and among which 22 sites of Level 2 facilities were selected as priority projects. Based on the master plan, the government of Tanzania requested additional grant aid from the Japanese government for the construction of Level 2 facilities and the implementation of the Soft Component program to strengthen the capacity of facility operations and maintenance in the two regions.

1.2 Project Outline

The objective of this project is to increase the population that is supplied with water and water supply coverage by construction of water facilities and by developing operation and maintenance mechanisms with public participation in the Coast Region and the Dar es Salaam Region.

E/N Grant Limit/Actual Grant Amount	1,705 million yen/ 1,424 million yen
Exchange of Notes Date	Term 1/2:July 03, 2007 Term 2/2:June 27, 2008
Implementing Agency	Ministry of Water, Community Water Supply Division[4]
Project Completion Date	Term 1/2:March 04, 2009 Term 2/2:Februrary 26, 2010
Main Contractor	Konoike Construction Co., Ltd.
Main Contractor	Earth System Science Co., Ltd.
Basic Design	May, 2006 – September, 2007
Detailed Design	Term 1/2: July, 2007 – December, 2007 Term 2/2: August, 2008 – December, 2008
Related Projects	Technical Assistance by Japan International Cooperation Agency (JICA): -Rural Water Supply and Sanitation Capacity Development Project, Phase I (2007-2010), Phase II (2011-2014) Japan International Cooperation Agency (JICA) -National Rural Water Supply and Sanitation Program, World Bank (2006-2025)

[3] Source: BD Study Report (2007)
[4] Ministry of Water and Irrigation was renamed to Ministry of Water in 2011.

2. Outline of the Evaluation Study

2.1 External Evaluator

Yumiko Nakamura, Binko International Ltd.

2.2 Duration of Evaluation Study

The Ex-Post Evaluation Study was conducted in the following durations:

Duration of the Study: October, 2012-August, 2013

Duration of the Field Study: January 20-Februrary 2, 2013 and June 16-June 22, 2013

2.3 Constraints during the Evaluation Study

35 water facilities were constructed in three districts and four municipalities of Coast and Dar es Salaam Regions. However, due to the time and financial constraints of the field survey, the Ex-Post Evaluation Study was not able to examine the operation and maintenance situation of all water facilities in the project locations.

3. Results of the Evaluation (Overall Rating: C[5])

3.1 Relevance (Rating: ③[6])

3.1.1 Relevance with the Development Plan of Tanzania

The "Poverty Reduction Strategy Paper" (2000) at the time of the BD Study highlighted water resource development as one of the seven priorities for poverty reduction. In addition, the "National Water Policy" in 2002 emphasized the importance of User-Pay-Principle for the operation and maintenance of water facilities in rural areas. Further, NWSDS (2006-2015), which serves as a long term plan for the water supply sector stipulated strategies, including an increase in the quantity of water intake to 25L/capita/day as well as the construction of water facilities within approximately 400m to realize the minimum of 250 people using the facility. Based on the recommendation of the development of a Community-Owned Water Supply Organization (COWSO hereafter) in the NWSDS, community-led activities for operation and maintenance of water facilities have been promoted by the government[7].

The Ex-Post Evaluation Study also found that the second "National Strategy for Growth and Poverty Reduction (MKUKUTA II)" developed in 2010 highlighted an improvement of living-standard as well as social welfare as contributing factors for growth and poverty reduction. Aiming at the improvement of access to safe and clean water, the MKUKUTA II set the target value of the water supply coverage in rural areas from 58.7% (2009) to 65% (2015) so that the water supplied population would increase to 2.2 million. The "Water Sector

[5] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

[6] ③: High, ②: Fair, ①: Low

[7] Dissemination of COWSOs advocated in NWSDS (2005-2015) has been delayed due to revision of law on water supply and hygiene (Source: Results of the Ex-Post Evaluation Study) .

Development Program" (WSDP hereafter) launched in 2007 continuously emphasized water resource development as a critical issue and set the targets of construction of new water facilities to increase the number of beneficiaries. Although disseminating the idea of COWSOs that was advocated by the NWSDS (2005-2015) had been delayed due to the 2009 modification of the law on water supply and sanitation, the development of water supply facilities has been placed at a high priority as a national project.

Thus, the project that was implemented for the purpose of increasing the population with access to safe drinking water through the development of water supply facilities has been highly relevant to the development policies of Tanzania before and after the project.

3.1.2 Relevance with the Development Needs of Tanzania

At the time of the BD Study, the water supply coverage in the project target areas was 23% and it was lower than the national average of 42%. These two regions had received a number of people who flow into metropolitan areas. Rapid growth of the population in these regions had brought about inappropriate operation and maintenance of water facilities and increased demand for water supply. In such circumstances, serious shortages of water supply or water pollution by household wastewater had become a matter of concern.

The average water supply coverage of the Dar es Salaam and the Coast regions in 2011 was 66.2% and 64.6% respectively. This showed significant improvement compared with the 23% at the time of the BD Study; however, the gap when compared with the water supply coverage of 86% in urban areas is not yet dissolved[8]. Moreover, water supply to the increased population in the Dal es Salaam and the Coast regions where the population growth rate is 4.3% and 2.4%[9] remains one of the pressing issues.

Thus, the development needs for improving the water supply situations in the project targeted pre-urban areas were high.

3.1.3 Relevance with Japan's ODA Policy

Development needs for basic infrastructure have increased in Tanzania as a result of the high population growth in urban areas. Specifically in the capital city of Dal es Salaam, infrastructure required for proper metropolitan function was not fully developed and therefore basic infrastructure development became an urgent issue. Given this state of affairs, the Japanese government focused on an improvement of living standards by means of infrastructure development in urban areas as one of the five assistance priorities in the "Country Assistance policies to Tanzania (2002)". Based on the policy, Japan has provided support preferentially

[8] Average water supply coverage in rural areas in general as of 2011 was 56.6% (Source: Water Sector Report, Ministry of Water, 2012).

[9] Source: Water Sector Report, Ministry of water, 2012

toward Basic Human Needs including basic infrastructure development that directly benefits socially vulnerable groups such as local farmers. Further, based on the result of the World Summit on Sustainable Development held in September 2002 and the World Water Forum in March 2003, the water sector was made one of the priority areas in the Third Tokyo International Conference on African Development (TICAD III) held in September 2003.

Thus, this project that aimed to improve the water supply situation in the peri-urban areas is consistent with Japan's ODA Policy.

This Project has been highly relevant with the country's development plan, development needs, as well as Japan's ODA policy; therefore its relevance is high.

3.2 Effectiveness[10] (Rating: ②)

3.2.1 Quantitative Effects (Operation and Effect Indicators)

(1) Increase of water supply coverage in the project target villages

In order to validate the effectiveness of the project, the target year of 2015 was changed to 2013 and a new target value of water supplied population (55,637) for 2013 was set at the time of the Ex-Post Evaluation Study[11]. The actual number of people supplied with water in 2013 was then calculated based on the facility functioning status identified during the field survey and was confirmed to be 33,955.

Table1 The number of constructed facilities, their functioning rate and the population newly served with water as a result of this project (2013)

	Planned Value (2005)		Actual Value (2009-2010)		Actual Value (2013)	
Type of water facility	Number of facilities	Intended population with water (2013)	Number of facilities	Population newly served with water	Functioning facilities/ Constructed facilities	Population newly served with water
Level 1	14	3,500	22	5,500	10/22 (45%)	2,500
Level 2	18	52,137	13	31,455	13/13 (100%)	31,455
Total	32	55,637	35	36,955	23/35 (66%)	33,955

Source: Planned Value: BD Study Report (2007), Actual Value (2009-2010): Japan International Cooperation Agency (JICA) provided materials, Actual Value (2013): Results of the Ex-Post Evaluation Study (2013)

The following two factors can be explained as reasons for the decrease in water supplied population. Firstly, the actual number of people with access to a water supply had decreased by 3,000 due to a high non-functioning rate of Level 1 facilities identified during the Ex-Post Evaluation Study (Table 2). Secondly, modification of the construction plans made during the

[10] Sub-rating for Effectiveness is to be put with consideration of Impact.

[11] In establishing the new target value for 2013, planned population, which is the total population in the target villages, was first calculated based on the population data and population growth data at the time of BD Study and then population with access to water was calculated based on the planned population in 2013.

project period became a cause of reduction of water supplied population. According to documents provided by Japan International Cooperation Agency (JICA hereafter), a construction plan was modified right after the commencement of the project because one of the project sites in Kitunda village of Ilala municipality overlapped with a project location of Dar Es Salaam Water Supply And Sewerage Authority (DAWASA). Other than this, water shortages, undesirable water quality, and financial inability to operate and maintain water facilities in other project locations led to the additional revisions in the construction plans, including changes in the number of wells drilled, the type of water facilities, and a reduction of target villages. The reduction in population caused by these changes reached 16,784 as a result (Table2)[12].

Table 2 Increases and Decreases by changes of plan during the project period

Target Area District/ Municipality Village	Planned Facility type (No. of facility)	Facility type after changes (No. of facility)	Reasons	Actual reduction of water supplied population
Kisarawe, Chore	Level 2 (1)	Cancelled	Shortage of water	2,665
Bagamoyo, Kwanduma	Level 1 (4)	Level 1 (1)	Water quality problem	750
Ilala Kitunda	Level 2 (3)	Level 2 (1) Level 1 (6)	Duplication of the project site, Reduction of 1 drilling well	9,461
Ilala, Pugu	Level 2 (1)	Level 1 (3)	Shortage of water	1,912
Kidondoni, Matosa	Level 2 (1)	Level 1 (2)	Shortage of water	1,997
Total				16,785

Source: Results of the Ex-Post Evaluation Study

Of these reductions, 9,461 people in Kitunda village of Ilala municipality had already received water supply service by the DAWASA project. Therefore, the concerned population can be taken out of the project target value and the target value in 2013 can be revised to 46,176 people. As mentioned the above, the actual number of people supplied with water in 2013 was 33,955; thereby, the achievement rate was recalculated as 74%.

(2) Improvement of water quality

According to the social survey conducted during the BD Study, most frequently-used water sources among the people in the project locations were “unprotected shallow wells”, “protected shallow wells”, and “rivers and streams”. 60% of the surveyed 550 households answered that

[12] The number of project target villages had decreased to 21 villages from 22 villages at the time of the BD Study due to the cancelation of a facility construction at Chore village in Kisarawe District (Source: Documents provided by JICA).

they were “not satisfied” or “not satisfied at all” in terms of the water quality of those water sources. Therefore, securing safe water supply was considered as one of the issues in improving the living environment and health in the said areas.

Given this state of affairs, the project aimed at improving access to safe and stable water among the residents in the project locations by means of construction of water facilities, and set up improvements of water quality as one of the indicators to measure the project outcomes.

According to the results of the water quality analysis carried out after test drillings in the BD Study, every water source met the WHO standard except for one site with a high salt level: Minazi Mikinda (1/2). Results of the questionnaire survey conducted at six Municipality /District Water Engineer Offices and eight WUAs showed that none of them had ever conducted water quality tests based either on the WHO guideline or Tanzania’s national drinking water standard after the facilities were constructed. Thus, it is impossible to determine whether those water sources constructed by the project still meet the required water standards.

On the other hand, 94 of 95 facility-using households answered in the beneficiary survey that they were satisfied with the taste and the smell of the water, and more than 80% of them showed their satisfaction toward the color of the water[13]. The level of satisfaction by facility type is shown in figures 1 and 2. Moreover, no problem with the smell, the color, or the taste of the water was identified in the facility condition survey conducted during this study.

Thus, it is impossible to determine whether the water quality at the project locations still met the WHO or the national standards. However, taking into account of the fact that the level of satisfaction with water among the residents after facility construction has increased in comparison with that of the BD Study, water quality at the project locations can be judged as being improved.

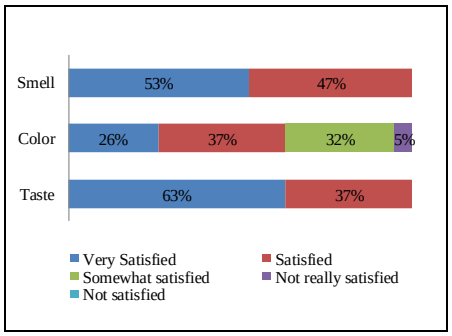


Figure 1 Evaluation by the residents on the smell, the color, and the taste of the water (Level 1)

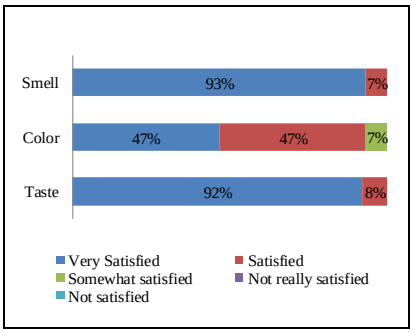


Figure 2 Evaluation by the residents on the smell, the color, and the taste of the water（Level 2）

Source: The beneficiary survey results

[13] The beneficiary survey targeted 108 households in 16 villages in three districts and three municipalities among 20 project targeted villages of four districts and three municipalities in two regions considering their access condition and survey schedule.

(3) Increase in the units of water demand

Units of water demand per person per day were expected to be increased from 20L/capita/day to 25L/capita/day after the construction of water facilities. The beneficiary survey found that of the surveyed 108 households, 94 households including 19 Level 1 facility-using households and 75 Level 2 facility-using households used the water facilities constructed by the project. Units of water in demand from these 19 Level 1 facility-using households increased to 40L/capita/day, while that of the 75 Level 2 facility-using households increased to 33L/capita/day. It is therefore confirmed that the target value of 25L/capita/day set in the BD Study was achieved by the project implementation.

(4) Reduction of the distance to water sources

According to the data obtained during the BD Study (2007), the time required for fetching water to and from the water sources was 30 minutes on average in cases of short distance, while it took more than 2 hours in cases of long distance. Given the fact that people are able to walk 50m per minute, it is calculated that the distance to and from water sources was approximately 1,500m to 6,000m[14]. In order to reduce the water-fetching workload, the project set the construction target as follows: Level 1 facilities were to be constructed "within 400m from residential area as much as possible", and Level 2 facilities were to be installed "approximately within 400m".

The beneficiary survey found that the time required for fetching water among the 94 facility-using households before the construction of the water facility was: 5 to 120 minutes round trip, 55 minutes on average, in the prospective project locations for Level 1 facilities; and 5 to 90 minutes, 37 minutes on average, for Level 2 facilities. When converted to distance, it was 1,375m and 925m on average, respectively. In contrast, the time required for fetching water after the facilities were constructed became 5 to 45 minutes, 29 minutes on average, in the villages with Level 1 facilities, and 5 to 40 minutes, 27 minutes on average, in the villages equipped with Level 2 facilities. It shows that time required for fetching water has decreased approximately by half or by 1/4. The distance to the facility from the residential area was therefore calculated as 725m for Level 1 facilities and 675m for Level 2 facilities, which exceeded the target distance of 400m by 70% to 80%.

Thus, the distance to the water sources has been reduced by the construction of the water facilities; however, the target of constructing facilities "approximately within 400m"or "within 400m from residential area as much as possible" was achieved partially in the project locations.

[14] Source: BD Study Report (2007)

3.2.2 Qualitative Effects

The project implemented the Soft Component program along with facility construction to pursue the establishment of an operation and maintenance system with participation of the local people, and thereby to develop ownership among the residents in the project locations.

The Ex-Post Evaluation Study found that while the financial management capacity has room for improvement, a water tariff was collected by the surveyed 8 WUAs, most of them held meetings with residents, and 90% of the residents cleaned the facilities voluntarily. Further, at the Level 1 facility sites such as Pugu Station and Kitunda Muzinga, hand pumps were replaced with a pump powered by a solar system or by an electric system at their own expense. Thus, the development of ownership among the residents was observed in some of the WUAs.

3.3 Impact

3.3.1 Intended Impacts

(1) Increased opportunities for women's social advancement and the creation of new jobs as well as increased time spent in study

More than 90% of the surveyed 108 households answered women over 20 years old were responsible for fetching water. This indicates that the situation remained the same as before; fetching water was still a woman's job at the time of Ex-Post Evaluation Study (Table 3).

Table 3 Person in charge of water-fetching
(Comparison between 2005 and 2013)

Gender/Age	2005		2013	
	Household	%	Household	%
Women (Over age-20)	96	89%	92	85%
Men (Over-20)	12	11%	18	17%
Girls (Under age-19)	7	6%	12	11%
Boys (Under age-19)	10	9%	12	11%
Others	4	4%	4	4%

Source: The beneficiary survey results

As already mentioned in the "3.2 Effectiveness (4) Reduction of distance to water sources", the Study confirmed that the time required for fetching water had been reduced by more than 10 minutes on average among the 94 facility-using households. Moreover, most of them; 93 households, answered that "water-fetching workloads had been reduced after the construction of the water facility" and that "the time for housekeeping work as well as the time with kids had increased" (Figure 3).

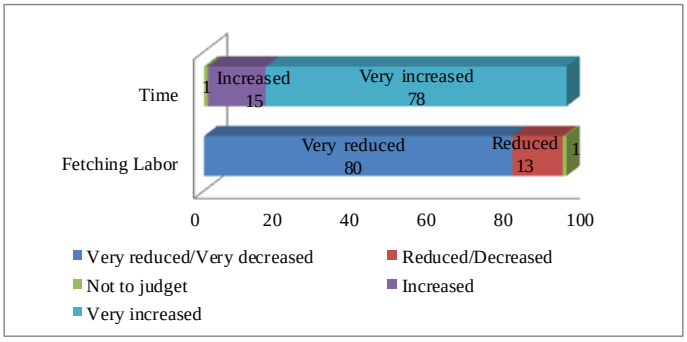


Figure 3 Additional time and Water-fetching Workload (n=94)

Source: The beneficiary survey results

93 households showed recognition of increased opportunities to effectively utilize time for additional activities and among which only 12 households (13%) answered that surplus time was used for income generating activities and farming. However, 11 households out of these 12 answered that "household income had increased through participation in income generating activities" and therefore it can be judged that the project brought about an economical effect in the said households. Further, according to the information acquired from the surveyed 8 WUAs, economic activities such as farming, production and sale of bricks, and livestock breeding became active after the construction of the water facilities.

Thus, the construction of the water facilities contributed to the activation of the local economy in some of the project locations, yet women's social advancement and the creation of new jobs expected by the implementation of the project were not fully recognized.

With regard to "increased time spent in study among children", another indicator of the project impact, most of the surveyed households (91 households) responded that the school attendance rate had increased. However, the school attendance rate in the project target areas was 61%, which was not so high, and no baseline data for the project locations at the time of planning was available. Thus, it is impossible to determine whether the project contributed to increased time in study among children.

(2) Reducing the cost of water tariffs

The beneficiary survey found that the water tariff per 20L was: between 50 Tsh and 100 Tsh for the Level 1 facilities, and between 30 Tsh to 100 Tsh for the Level 2 facilities. It shows that there was no WUA that achieved the target value for 2015 of reducing the water tariff to 20Tsh-24Tsh. On the other hand, given the average inflation rate of 7.7%[15] in Tanzania since 1999, it is unlikely that the water tariff will decline from the current rate. Therefore, it can be

[15] Source: National Bureau of Statistics

judged that achievement of a desired value is difficult.

(3) Decline of infant mortality rate and reduction of medical expenses from water-related diseases

While the national average of the infant mortality rate was 68 / 1,000 in 2004, the rate in the Coast region was 105/ 1,000 and in the Dal es Salaam region it was 102 / 1,000, which was eighth and tenth highest among the 21 regions in the mainland[16]. According to data from the Demographic Health Survey in 2010, the national average of the infant mortality rate declined to 51/1,000; however, an improvement after the project implementation could not be identified as baseline data at the time of the BD Study was not available both on the infant mortality rate and on the water-related disease infection rate in the project locations[17].

With regard to a reduction of medical expenses, more than 80% of the respondents were not aware of its reduction and only nine households out of the 93 households answered that medical expenses had been reduced after the construction of water facilities. Thus, it can be judged that the intended effect of the project to reduce medical expenses spent on water-related diseases was limited.

3.3.2 Other Impacts

(1) Impacts on the natural environment

As a result of questionnaire survey at the community water supply department at the Ministry of Water as well as at the District / Municipality Water Engineer Offices, neither positive nor negative impacts on the natural environment were observed.

(2) Land Acquisition and Resettlement

There was neither land acquisition nor resettlement involved in this project.

(3) Unintended Positive/Negative Impacts

No other positive or negative indirect effects were observed.

This project has somewhat achieved its objectives, therefore its effectiveness is fair.

[16] Source: BD Study Report (2007)

[17] In the beneficiary survey, only seven households out of 94 facility-using households responded that infant mortality rate had declined.

3.4 Efficiency (Rating:②)

3.4.1 Project Outputs

(1) Construction of water facilities

The project provided 22 Level 1 facilities and 13 Level 2 facilities in the 22 target villages.

Table 4: The number of facilities constructed in the project
(Comparison between planned and actual numbers)

(Unit: location)

FY	2005	2009/ 2010	Difference	Changes
Type of water facility	Planned	Actual	Difference in the number	
Level 1 facility	14	22	+8	• Terminated (-3 facilities) • Changed from level 2 (+11)
Level 2 facility	18	13	-5	• Terminated (-5)
Total	32	35	+3	

Source: Planned Value: The BD Study Report (2007), Actual Value: Documents provided by JICA

A comparison between the actual and planned numbers of facilities constructed in the project shows that the Level 1 facilities increased by eight and the Level 2 facilities decreased by five. The main reasons for the changes in the numbers and termination of constructions include undesirable water quality, water shortages, and the preexistence of water facilities at the prospective construction sites (see 3.2 Effectiveness and 3.2.1 Quantitative Effects). The preexistence of water facilities was investigated through prior communication and coordination with the DAWASAs so that there were no overlaps in facility construction. However, the changes that were made based on the undesirable water quality and volume were unavoidable as it was hard to identify them in the electrical sounding survey before drilling.

(1) Soft Component Program

The project introduced the Soft Component Program in addition to constructing water facilities, and as a result, WUAs were established in all of the 20 target villages. With regard to registering WUAs, local governments had been given authority to handle registration and administration since 2009 when the act on water supply and sanitation was amended. However, the study found that the corporate registration of WUAs had been delayed nationally as local governments had not fully developed the systems. According to the interviews with District/Municipality Water Engineer Offices, corporate registration of all 20 WUAs in the target areas will not be completed until 2015[18].

[18] Water Engineer Offices in Kibaha and Kisarawe Districts and Temeke Municipality are currently screening the

On the other hand, the District Water and Sanitation Teams (DWST hereafter) (the current Council Water and Sanitation Team: CWST), which were considered to be essential for improving community support systems by local governments, were created in all the seven Districts/Municipalities through the Soft Component Programprogram as per the original plan[19].

3.4.2 Project Inputs

3.4.2.1 Project Cost

With regard to the cost incurred to Japan with this project, the EN grant limit was 1,705 million yen (3.4 million yen for Level 1 facilities and 65 million yen for Level 2 facilities), yet the actual grant amount was 1,424 million yen (593 million yen for Term 1/2 and 831 million yen for Term 2/2), which was lower than initially planned (83% of the planned amount).

However, when the changes in the number of constructed facilities were calculated in terms of changes in costs based on the estimated unit price for one facility (3.1 million yen for Level 1 facilities and 65 million yen for Level 2 facilities), the cost required to construct eight Level 1 facilities was 24 million yen and the cost avoided by reducing Level 2 facilities was 325 million yen. Therefore, the project cost was reduced by 301 million yen as a result of the changes in the number of constructed facilities[20]. This amount is 7% higher than the difference between the E/N grant limit and the actual grant amount of 281 million yen. Thus, although the project cost was lower than initially planned, it did not correspond to the outputs as they were reduced as a result of switching from Level 2 to Level 1 after drilling due to water quality and volume problems[21].

Tanzania planned to spend 4.89 million yen on developing village access roads as part of the cost of the "Rural Water and Sanitation Project" in the budget of the Community Water Supply Division[22]. However, interviews with the Water Ministry, District/Municipality Water Engineer Offices and local residents showed that there was no record of spending that amount (on developing village access roads) in the "Rural Water and Sanitation Project" budget. There was no record of residents actually developing roads during facility construction, either.

3.4.2.2 Project Period

The project was planned to be 32.5 months long. It actually took 31 months (95% of the

documents submitted by WUAs. The registration is expected to be completed between February and March 2013 (Source: Field survey results).

[19] DWST was recently renamed to be CWST (Source: Involved agency in Japan).

[20] It was calculated based on the costs of Term 1 and 2 combined that were estimated at the DD. The cost included 77,264,000 yen for Level 1 facility construction and 853,473,000 yen for Level 2 facility construction. The former was divided by 25 prospective sites and the latter was divided by 13 prospective sites to yield the unit price.

[21] Exchange gains were not validated due to lack of relevant information.

[22] Source: The BD Study Report (2007)

planned duration) and was shorter than the original plan.

Although the project period was within the plan, the project cost was exceeded; therefore efficiency of the project is fair.

3.5 Sustainability (Rating: ②)

3.5.1 Institutional Aspects of Operation and Maintenance

The water facilities provided by the project are maintained by WUAs based on the User-Pay-Principle. Agencies involved in supporting those community organizations are the (1) Community Water Supply Division (former Rural Water Supply Division) of the Ministry of Water, (2) Regional Water and Sanitation Team (hereafter RWST), and (3) CWST and Water Engineer Office including the District/Municipality Water Engineer (hereafter DWE) (Figure 4). There is no major organizational change in the framework for maintenance as shown in Figure 4. The Rural Water Supply Bureau of the Ministry of Water was actually renamed as the Community Water Supply Division and the regional water engineer that used to be a regional agency of the Ministry of Water is now a part of the regional government, following the decentralization trend. In addition, DWSTs that were formed under local governments (District/Municipality) were recently renamed as CWST. The team has not been active so far as described in the following sections. Administrative support is being provided to communities by District/Municipality Water Engineer Offices to complement the CWST activities[23].

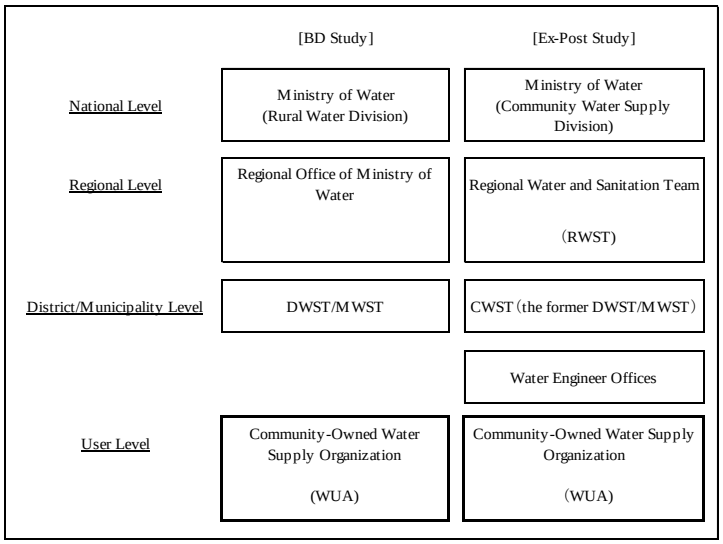


Figure 4: Systems for Water Facility Maintenance (comparison between the BD Study and the Ex-Post Evaluation Study)
(The figure was created by the evaluator).

(1) Community Water Supply Division of the Ministry of Water

The Community Water Supply Division is responsible for the rural water supply in the Ministry of Water. The Division is expected to plan and implement projects for water facility development, as well as to provide technical assistance and monitoring of the activities

[23] With regard to the administrative services by local municipalities, the systems based on the conventional District/Municipality Water Supply Engineer Office framework are now shifting to the monitoring systems governed by CWST, therefore concrete information was not available on personnel and financial conditions.

performed by municipalities. Their roles were largely unchanged even after the implementation of the project.

The Division had 91 engineers and 352 technicians under a director at the time of the BD Study. However, in 2009 there were only one director, three deputy directors, 28 engineers, one architect, and ten technicians[24]. Although 45 staff members were allocated in 2013, the number had decreased to a total of 16 including a director, two deputy directors, eight engineers and five technicians at the time of this study. The reasons for the decrease include retirement, severance and temporary leave to obtain an academic degree[25].

The number of staff decreased to half of what it had been at the beginning of the year due to severance and other reasons although no problems were identified in either the Ministry of Water's *Water Sector Status Report* (2012) or this study. Thus, the staff allocation is hardly at a sufficient level to carry out necessary responsibilities.

(2) RWST

The roles of RWSTs were not changed before or after the project. Their roles remained to be providing local governments with instructions and support for water facility maintenance. However, it was hard to determine the relevance of the staffing level required for water facility maintenance because detailed information on current staffing and the activities of RWSTs were unavailable.

(3) Local government

1) CWST

CWSTs were founded within local governments in an attempt to reinforce the administrative services that had traditionally been provided by District/Municipality Water Engineer Offices and to practice a comprehensive approach in developing the rural water supply and sanitation subsector. The team consists of DWEs, a planning officer of local government, a health officer, and a community development officer. The team was originally expected to play a central role in supporting communities by performing regular monitoring and follow-ups on operation and maintenance by local communities and facilitating communication and partnership among stakeholders[26].

CWSTs continue to play a central role in maintenance at the time of this study. The questionnaire survey conducted in six districts and municipalities identified the existence of CWSTs with an allocation of six staff members on average. However, CWSTs are composed of

[24] Source: Interviews with directors of the Community Water Supply Divisions.

[25] The reduction includes 6 retirements, 14 severances and transfers, 5 deaths and a temporary leave to obtain an academic degree (Source: Interviews with deputy directors of Community Water Supply Division).

[26] Source: The BD Study Report (2007), Documents provided by JICA, and the Ex-Ante Evaluation Study Report for the Rural Water Supply and Sanitation Capacity Development Project in Tanzania (2007)

members who are senior officials with multiple responsibilities and officials from different divisions. Therefore some CWSTs cannot spare time for the intended activities in the plan and their activities are limited to quarterly meetings while others are effectively inactive. Thus, the field study concluded that CWSTs did not satisfy their expected functions and roles. The questionnaire survey conducted among Water Engineer Offices found that there was room for reinforcement and improvement of CWSTs' activities as some offices were concerned that CWSTs were losing their substance[27].

2) Water Supply Engineer Office[28]

Before CWSTs were established, DWEs and technicians were directly responsible for water supply projects and services. CWSTs were expected to change their roles to be more planning, supervising and monitoring oriented[29]. However, as previously mentioned, CWSTs are composed of members who are leading other organizations and are not fully functioning as working teams that are actually able to visit communities regularly and perform monitoring. On the other hand, DWEs and technicians at the Water Supply Engineer Office were taking initiative in community-based monitoring of facility maintenance at the time of the Ex-Post Evaluation Study.

District/Municipality Water Supply Engineer Offices allocate a few technicians and administrative staff under DWEs. The study found that the six target offices allocated one or two engineers and one to nine technicians. The staffing level varies at each District/Municipality while two out of the six target offices had fewer staff members than the number found at the beginning of the project. High turnover seems to contribute to this chronic staff shortage in rural areas as it is pointed out in the Ministry of Water's *Water Sector Status Report* (2012).

[27] The Ministry of Water's Water Sector Status Report (2012) also identifies staff shortages in local government as one of the problems in implementing WSDPs.

[28] The Water Supply Engineer Office is founded within local governments. CWST, on the other hand, is a council with DWE as the chair (Source: The BD Study Report (2007) and the Ex-Ante Evaluation Study Report for the Rural Water Supply and Sanitation Capacity Development Project in Tanzania (2007)).

[29] Source: The Ex-Ante Evaluation Study Report for the Rural Water Supply and Sanitation Capacity Development Project in Tanzania (2007)

Table 5: Technical staff allocation (Comparison with the BD Study) (Unit: person)

	2007			2013			Change
District/Municipality	Engineer	Technician	Total	Engineer	Technician	Total	
Kidondoni Municipality	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Illala Municipality	1	13	14	N.A.	N.A.	N.A.	N.A.
Temeke Municipality	2	11	13	14		14	＋
Kiwarawe District	2	14	16	1	9	10	－
Kibaha District	N.A.	N.A.	N.A.	2	1	3	N.A.
Bagamoyo District	1	8	9	2	3	5	－

Source: The Ex-Ante Evaluation Study Report for the Rural Water Supply and Sanitation Capacity Development Project in Tanzania (2007), the results of the questionnaire survey at the time of the Ex-Post Evaluation Study

(2) WUA

The plan specified the major roles of WUAs to be performing operation, maintenance and repairs on facilities as well as setting and collecting the water tariff. The Ex-Post evaluation Study found that WUAs continued to play the same roles. At the time of this study, 16 out of 20 WUAs (80%) were actively engaged in the activities including four of the seven WUAs (57%) in charge of Level 1 facilities and 12 of the 13 WUAs (92%) in charge of Level 2 facilities[30]. In those active WUAs, all of the facility-using households are WUA members as originally planned. The eight WUAs that responded to the questionnaire survey elected officials by accepting candidates (4WUAs, 50%) or by voting (3WUAs, 38%) and allocated eight officials on average at the time of the Ex-Post Evaluation Study[31].

Therefore, among the active WUAs, the staff allocation is at a sufficient level to maintain water facilities as intended in the plan.

3.5.2 Technical Aspects of Operation and Maintenance

(1) Community Water Supply Division of the Ministry of Water and RWST

In pursuing maintenance of the facilities provided by the project, the Community Water Supply Division of the Ministry of Water and RWSTs are expected to have the capacity to provide Districts and Municipalities with monitoring training as well as actually monitor their activities at the time of the Ex-Post Evaluation Study. According to the results of the interviews with the Ministry, training was given to Districts and Municipalities for a few days when implementing the WSDP. The Ex-Post Evaluation Study also found that such training was continuously, though not regularly, given to Districts and Municipalities. In the training sessions, trainees learn how to utilize the maintenance manuals and are encouraged to perform monitoring so that they can identify problems at an early stage. On the other hand, the Division

[30] Source: Results of field studies and telephone interviews conducted during the Ex-Post Evaluation Study

[31] Officials are appointed by a village chief in the other WUA (Source: Results of the questionnaire survey of WUAs).

ensures the progress of the project by contacting DWEs by phone or email, and organizing an annual meeting to provide opportunities for involved agencies to discuss issues on water facility operation and maintenance[32].

Thus, the Community Water Supply Division largely retains the capacity required for facility maintenance.

(2) Local government

1) CWST

CWSTs were expected to plan, supervise, and coordinate the facility operation and maintenance activities led by communities in cooperation with DWEs. CWSTs are composed of staff members with interdisciplinary backgrounds who are often at the top of different sectors and thus considered to have extensive knowledge and experience in various fields. Some of the Districts/Municipalities that were interviewed in this study organized Minor CWSTs[33] under CWST with ten technical workers to supervise community-led activities on behalf of CWSTs. However, as described above (see "3.5.1 Institutional Aspects of Operation and Maintenance" of "Sustainability"), there are increasing concerns among Water Supply Engineer Offices that CWSTs were not functioning and losing their substance as organizations, and hence individual knowledge and expertise are not fully incorporated in the actual implementation, operation and maintenance of water facilities.

Building capacity to implement and operate rural water supply projects has been one of the priorities of development programs in Tanzania. In support of the country's development efforts, the Japan International Cooperation Agency (JICA) implemented the Rural Water Supply and Sanitation Capacity Development Project (RUWASA-CAD, Phase 1), which is a technical assistance project for public agencies governing rural water supply projects including CWSTs, from 2007 to 2010 along with this project. Phase 1 was a three-year project for municipal employees from the Ministry of Water, DWSTs and Basin Water Offices and aimed to enhance their capacity to implement water supply projects and maintain water facilities. Phase 2 was launched in 2011 to improve and spread the training package developed during Phase 1 throughout the country with a view to further reinforce and improve CWSTs' functions.

2) Water Supply Engineer Office

Most of the six target District/Municipality Water Supply Engineer Offices monitor WUAs'

[32] The vice minister of the Minister of State and related officials of the Ministry of Water at Regions, Districts, Municipalities are involved in the annual meeting (Source: The results of the interview with the Community Water Supply Division of the Ministry of Water).

[33] Bagamoyo District organizes the Minor CWST. This Minor CWST takes initiative in performing monthly checkups in the District (Source: The results of the interview with concerned Divisions).

activities on a regular or an irregular basis (Table 6)[34]. They normally respond to WUAs' requests for support within a few days to three weeks though there is some variation among the Water Supply Engineer Offices. The interviews with them showed that they understood the importance of regular monitoring of communities and providing technical assistance. However, many of them provide support irregularly or only upon request due to their financial condition, availability of transportation, and the number of water facilities in their jurisdiction. Thus, the study revealed that reinforcing administrative support remained a priority[35].

In the questionnaire surveys conducted among the six District/Municipality Water Supply Offices, five of them reported they changed parts or repaired facilities for WUAs on a regularly or irregular basis as described in Table 6. The surveys of WUAs also confirmed that technical assistance was provided to communities as two of the three sites that had defects in the past six months (all in Illala District) were repaired by their respective Water Supply Engineer Offices.

Table 6: Current status of activities at District/Municipality Water Supply Engineer Offices

	Training for WUA		Monitoring of WUA activities*a		Technical assistance	
	Regular	Irregular	Regular	Irregular	Regular	Irregular
Kibaha District	-	●	-	●	-	●
Kidondoni District	-	-	-	●	-	-
Illala Municipality	●	-	-	●	●	-
Kisarawe District	-	-	●	-	●	-
Temeke Municipality	-	-	●	-	-	●
Bagamoyo District	-	-	-	-	●	-

(Note) *a: based on the actual monitoring record

Source: The beneficiary survey results

(3) WUA

WUAs were required to have maintenance and repairing skills to operate and maintain water facilities, financial skills, and leadership and communication skills to put together residents' opinions when this project was originally planned. Among the eight WUAs where the survey was conducted, three WUAs in Pugu Station, Kitunda-Kivule, and Msongora villages experienced a breakdown of their water facilities (broken chains) in the past six months[36]. One case in Pugu Station required actual repair and the local Water Supply Engineer Office performed repairs on behalf of the local communities that could not handle the situation by

[34] Although no monitoring was conducted at WUAs, Bagamoyo District, one of the targets in this study invited village chiefs once every three months to hold a Standing Committee in the District and discussed problems with facility functionality and maintenance (Source: Results of the interviews with DWEs).

[35] Source: The results of the interviews with District/Municipality Water Supply Engineer Offices

[36] The survey targeted eight WUAs including three that managed Level 1 facilities and five that managed Level 2 facilities. The WUA in Pugu Station manages Level 1 facilities. The WUAs in Kitunda-Kivule and Msongora manage Level 2 facilities.

themselves due to lack of technical skills[37]. In addition, among the seven WUAs that were functioning at the time of the Ex-Post Evaluation Study, only 50% of the Level 1 facilities (6/12) managed by the three WUAs were functioning[38]. This also leads to the observation that the technical capacity of the WUA-led facility maintenance systems is not sufficient yet and therefore requires further reinforcement and improvement in the future.

With regard to facility maintenance and inspection, the questionnaire survey conducted among WUAs and local residents found that seven out of the eight target WUAs performed regular facility inspections[39], and organized maintenance activities with residents' participation including cleaning and mowing around the facilities (Table 7). Furthermore, seven WUAs said they developed their association's regulations during or after the project, and most of the eight WUAs held regular conferences. Seven of them (88%) actually hold regular meetings with local residents as well[40].

Table 7: Participatory maintenance activities (n=94)

	The number of response			The percentage of response		
	Total	Level 1	Level 2	Total	Level 1	Level 2
Cleaning	86	16	70	91%	84%	93%
Mowing	86	16	70	91%	84%	93%
Keeping cattle away	46	13	33	49%	68%	44%
Other	5	1	4	5%	5%	5%

Source: Results of the questionnaire survey conducted among WUAs

On the other hand, judging from the fact that all the targeted WUAs introduced either metered or fixed-rate collection systems, systems for collecting a water tariff from residents have been established in the project locations[41]. However only one WUA reported that the collection rate was high, three WUAs answered that the rate was 50 to 80%, and the other three said that the rate was low. Thus, the financial capacity is not at a sufficient level. While four WUAs of the eight target WUAs provide financial reports to residents, none of the WUAs had any financial records including cashbooks and their financial management was not transparent. In an interview, a WUA that managed Level 1 facilities said that hand pumps frequently broke down and their reserve was not enough to cover the cost of repairs. In that case, they had to

[37] Other problems included troubles related to fuel shortages and did not require repairing.

[38] The number of functioning facilities are as follows: 3/6 in Msimbu village in Kiwarawe District, 1/3 in Kitunda Mzinga village in Illala Municipality, and 2/3 in Pugu Station in Illala Municipality (Source: The results of the interviews with WUAs and DWEs).

[39] Frequency of the inspection varies: daily at two WUAs (25%), once a week at four WUAs (50%), and once a months at a WUA (13%) (Source: The results of the questionnaire survey of WUAs).

[40] Frequency of the regular conference varies: monthly (1), every two months (1), every three months (1), every six months (1) and every year (1). Meetings with residents are held: every month (2), every three months (3), twice a year (1) and once a year (1).

[41] All WUAs set it at 50Tsh/20L regardless of pump types. Four out of the six WUAs managing Level 2 facilities also set a separate range at 1,500-2,500Tsh/1,000L.

collect additional fees from each household but it was difficult and time-consuming.

Based on the above, WUAs need to reinforce and improve their repairing skills for Level 1 facilities as well as financial capacity including collecting the water tariff and managing and utilizing their reserve although they have leadership and communication skills to put together residents' opinions.

3.5.3 Financial Aspects of Operation and Maintenance

(1) Community Water Supply Division of the Ministry of Water

The Community Water Supply Division of the Ministry of Water budgeted 34,508 million Tsh (2006/2007) annually for this project at the time of planning. They spent 8,925.5 million Tsh (26%) on expanding and repairing existing facilities. The budget was reduced once in fiscal 2010 but increased again in 2011 to an amount larger than the 2009 budget (see Table 8). Budget lines for maintaining existing facilities are "expansion and repair of rural water supply facilities" and "support for local government," and the former represents about 20% of the total budget every year and the latter represents about 10% of the total budget every year though it is on the increase. Thus, the budget for maintaining existing facilities has been stable since 2008. However, concrete information was not available during the Ex-Post Evaluation Study to clarify the number and types of the facilities that were expanded or repaired and thus detailed maintenance activities remained to be largely unknown. Therefore, it is impossible to determine whether the budget allocated to the Ministry of Water was enough to maintain existing water facilities.

Table 8: Annual budget of the Community Water Supply Division of the Ministry of Water

(unit: million Tsh)

Item	06/07	07/08	08/09	09/10	10/11	11/12
Total budget (A)	34,506	66,239	86,752	120,073	105,202	137,521
Budget for facility maintenance						
Expansion and repairing of rural water supply facilities	8,925	26,904	7,926	36,325	18,560	21,175
Support for local government	795	15,044	3,399	14,044	14,452	20,585
Subtotal (B)	9,720	41,948	11,325	50,369	33,012	41,760
Ratio of the maintenance cost in the total budget (%) (B/A)	28%	63%	13%	42%	31%	30%

Source: Results of the questionnaire survey of the Community Water Supply Division of the Ministry of Water

(2) Local government

1) CWST

The Ex-Post Evaluation Study conducted questionnaire survey of the Community Water Supply Division of the Ministry of Water and six District/Municipality Water Supply Engineer Offices. However, the survey did not provide sufficient information on CWSTs' financial

conditions and other related matters. Therefore, it is impossible to determine whether their budget was enough to implement the activities assigned to them.

2) Water Supply Engineer Office

The budgets of the three Districts and one Municipality Water Supply Engineer Offices that responded to the questionnaire survey had been fluctuating for the last several years. The budget amounts vary significantly depending on the District/Municipality as seen the fact that Bagamoyo District has the largest budget of 762 million Tsh for 2011/2012 while Kisarawe District has 319 million Tsh (Table 9). Some of the six target offices secure their budget for repairing existing facilities though the overall ratio of the budget for maintenance is as low as 1% with the exception of Kidondoni Municipality. This situation indicates that development and activities are largely underfunded.

On the other hand, budget execution by the Water Supply Engineer Offices has not been desirable and the year 2011/2012 generated a 200 to 500 million Tsh balance. Such a large balance is presumably caused by underdevelopment of budget related information management systems and a lack of ability to plan, manage, and execute the budget.

Table 9: Annual budget and income/expenditure at District/Municipality Water Supply Engineer Offices

(Unit: million Tsh)

District/Municipality	Item	2009/2010	2010/2011	2011/2012
Kibaha District	Income	532	606	559
	Rural Water Supply and Sanitation Project	459	482	341
	Repairing existing facilities	3	5	5
	Expenditure	395	393	102
	Balance	137	213	457
Kisarawe District	Income	397	428	319
	Rural Water Supply and Sanitation Project	NA	NA	NA
	Repairing existing facilities	NA	NA	NA
	Expenditure	103	113	126
	Balance	294	315	193
Bagamoyo District	Income	485	195	752
	Rural Water Supply and Sanitation Project	NA	NA	NA
	Repairing existing facilities	1	N/A	N/A
	Expenditure	297	122	245
	Balance	188	73	507
Kidondoni Municipality	Income	540	478	624
	Rural Water Supply and Sanitation Project	70	80	91
	Repairing existing facilities	301	119	NA
	Expenditure	358	451	425
	Balance	182	27	199

Source: Results of the questionnaire survey of the District/Municipality Water Supply Engineer Offices

(3) WUA

The interviews with WUAs found that the eight WUAs managing functioning facilities introduced either metered or fixed-rate system to collect a water tariff from facility-using

households[42]. The collected money is saved in WUA bank accounts (4/8 WUAs, 50%), in accountants' residence (3/8 WUAs, 38%), and other (1/8 WUA, 13%). The amount of the reserve varied at the time of the Ex-Post Evaluation Study: three WUAs had 20,000 to 30,000 Tsh (about 10,000 to 15,000 yen) and two WUAs had over 50,000 Tsh (about 25,000 yen)[43] (Table 10). The BD Study estimated the annual cost of maintaining facilities and concluded about 50 USD/month was required to maintain a Level 1 facility, and 1,700 USD to 3,000 USD/month to maintain a Level 2 facility[44]. On the other hand, only one WUA that manages the Level 1 facilities had the minimum necessary amount of saving required for maintenance[45].

Thus, most of the eight surveyed WUAs do not have the financial capacity to pursue maintenance work.

Table 10: Amount of reserve (by facility type)

Saving	Level 1	Ratio	Level 2	Ratio
Under 50,000 Tsh (about 2,500 yen)	1	33%	-	-
50,000- 99,999 Tash (about 2,500- 5,000 yen)	-	-	-	-
100,000-19,999 Tsh (about 5,000-10,000 yen)	-	-	-	-
200,000-299,999 Tsh (about 10,000-15,000 yen)	-	-	3	67%
300,000-399,999 Tsh (about 15,000-50,000 yen)	-	-	-	-
400,000-499,999 Tsh (about 20,000-25,000 yen)	-	-	-	-
Over 500,000 Tsh (about 25,000 yen)	1	33%	1	17%
Unknown	1	33%	1	17%
Total	3		5	

Source: Results of the questionnaire survey of WUAs

3.5.4 Current Status of Operation and Maintenance

The nonfunctioning rate of the level 1 facilities constructed in this project was 55% (12/22 facilities), which was higher than the 33.9% of the national average of Tanzania[46] as well as the 36% of the Sub-Saharan average[47]. The high nonfunctioning rate of the Level 1 facilities is explained by the following reasons.

[42] According to the results of the beneficiary survey, four WUAs collect the water tariff every month. Two WUAs collect the tariff every time users take the water. Two WUAs do not set a certain day but collect the tariff randomly.

[43] Based on the exchange rate as of July 2013 at 1 yen = 0.05 Tsh. 90% of the 94/100 facility-using households pay for the water and most of them (83/85) feel the current rate is "reasonable" (Source: The beneficiary survey results). Among the WUAs that manage Level 1 facilities, the WUA in Kitunda Mzinga, Illala Municipality had less than 50,000 Tsh in their saving had two major defects in the past. Their savings might have decreased partially because they had to spend a significant portion on repairs.

[44] The BD Study estimated the costs of maintaining facilities including wages for superintendents and commissions for accountants. The cost was USD 566.6 (595,000 Tsh/year) for a Level 1 facility and USD 20,000-40,000/year for a Level 2 facility. The maintenance costs of Level 2 facilities vary depending on the facility (Source: The BD Study Report, 2007).

[45] Concrete analysis of WUAs' financial capacity requires not only the amount of reserve but also the payment situation of wages and fees in the past (flow). However as previously described, all of the target WUAs had no financial record including cash book and evaluation based on the past financial records was impossible.

[46] Source: Water Sector Status Report (2012, Ministry of Water)

[47] Source: Rural Water Supply Network

(1) Dysfunctional WUA and lack of organizing capacity

In this project, 22 Level 1 facilities were constructed in seven villages and a total of seven WUAs were created to manage them. Among them, four villages did not have WUA and six of the ten facilities in the villages were not functioning[48]. On the other hand, half of the 12 facilities are not functioning in the other three villages with active WUAs. Thus, the high nonfunctioning rate of the Level 1 facilities provided by this project can be attributed not only to the absence of WUAs but also to the lack of organizing capacity at the existing WUAs.

(2) Lack of financial capacity of WUA

While WUAs collect a water tariff from residents, many sites do not achieve high collection rates. The money is saved in WUA accounts or accountants' residence after collecting, but they do not make financial statements. Thus the usage and balance of the collected money are not managed adequately. The study found that Level 1 facilities were likely to have more defects including broken chains because residents use them frequently. If WUA cannot afford the repair cost with their reserve, they have to collect money every time the facility breaks down so that they can pay for repairs. However, lack of understanding among residents about the importance of maintenance prevents prompt collection and results in the delay of the overall repairing process. It is quite possible that WUAs' financial problems affected their responses to defects.

(3) Lack of partnership between WUA and local government

Five of the eight surveyed WUAs (63 %) report problems to District/Municipalities. However, only one of the three WUAs that manage Level 1 facilities reports to local governments. It indicates that notification, reporting and consultation are not fully exercised. Likewise, local governments were not completely engaged in monitoring facility sites through patrolling and providing technical assistance because CWSTs were not functioning and losing their substance, and Water Supply Engineer Offices were not ready to respond. Thus, the lack of partnership between WUAs and local governments could have delayed the identification of problems and caused delayed reaction with proper solutions to defects.

On a related note, pump accessories were broken but left unrepaired for a long time in some of the nonfunctioning facilities in a target village because there were a few other water facilities provided by other donors in the neighborhood[49]. This problem was identified in only one of the seven villages where Level 1 facilities were constructed and it is hardly considered a factor to

[48] An elementary school was operating and maintaining facilities on behalf of a WUA at one of the four functioning sites (Source: The results of the on-site survey).

[49] It is Minazimikinda village (1/2) in Kibaha District (Source: The results of the interview with DWEs).

affect the maintenance of Level 1 facilities while the existence of alternative water sources could be one of the causes of prolonged downtime of facilities.

On the other hand, all of the Level 2 facilities were functioning (100% functioning rate), substantially exceeding the past functioning rates in the two target Regions (Coast Region: 35%, Dar Es Salaam Region: 77%). Such high functioning rate can be explained by the following reasons.

(1) Durability of the facility

The facilities are only five years old; therefore defects are unlikely to appear.

(2) Familiarizing facility maintenance and inspection

Contractors gave instructions on using generators and pump control boxes and consultants gave instructions on the maintenance of piping in the control house, distribution tanks, duct lines and flow meters when they completed and delivered Level 2 facilities. The Ex-Post Evaluation Study found that four of the five WUAs (80%) that were interviewed continued to use the instruction manuals given with the facility delivery. At two of the eleven Level 2 facilities where the facility condition survey was conducted pumps were locked and fences were built around the sites. Such proper maintenance and inspection practices based on instruction manuals contributed to preventing troubles and allowed desirable operational conditions[50].

In summary, although problems were identified in local governments' support systems, the financial conditions of the Community Water Supply Division of the Ministry of Water, local governments and WUAs, and maintenance conditions of Level 1 facilities, active involvement of residents in their maintenance activities was observed at some sites as seen in the example of replacing hand pumps with electric pumps at the expense of residents[51] in addition to the fact that Level 2 facilities are functioning well. Judging from this, sustainability of the effect manifested in the project is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This Project aimed to increase water supply coverage in the Coast Region and Dar es Salaam Peri-Urban. It developed water facilities at the designated sites and formed WUAs to secure sustainable maintenance and operation of water facilities. The objective of the project is highly consistent with Tanzania's national development policy, development needs, as well as

[50] The rate of utilizing instruction manuals among the WUAs managing level 1 facilities is 33% (1/3 WUAs).

[51] Kitunda-Kivule village and Pugu Station No.1 village in Illala Municipality switched from hand pumps to electric pumps (Source: The results of the interviews with WUAs and DWEs).

the ODA policy that Japan upholds. The population with access to a water supply has only increased to 74% of the target value due to changes in construction plans during the project period and a high non-functioning rate of the Level 1 facilities. However, the intended effects of this project have been observed as follows: some WUAs in the project locations replaced hand pumps with electric pumps at their own initiative; reduced water-fetching workloads resulting in a revitalization of the local economy in some of the project locations. The efficiency of the project is judged to be fair based on the fact that the project cost was higher than planned considering the decrease of the output while the project was executed within the planned period. With regard to the operation and maintenance of water facilities, the functioning rate of the Level 1 facilities is 45%, which is lower than the national average of 66%. Also, there is a need for reinforcement and improvement of technical and financial skills of WUAs that play central roles in facility operation and maintenance and support systems by the local governments. However, the functioning rate of the Level 2 facilities constructed by the project was 100% at the time of the Ex-post Evaluation Study, and that exceeds the average functioning rate in all of the project targeted areas. Therefore, sustainability of the project effect is judged to be fair.

In light of the above, this project is evaluated to be partially satisfactory.

4.2. Recommendations

4.2.1 Recommendations to the Implementing Agency

(1) Reinforcing organizing capacity at WUAs

The functioning rate of Level 2 facilities was 100%, which is higher than the 35% of the Coast Region and the 77% of the Dar Es Salaam Region. On the other hand, the functioning rate of Level 1 facilities was 45%, which is much lower than the national average of 66%. Based on the User-Pay-Principle under the policy of the Tanzanian government, the facilities developed in this project were expected to be operated and maintained by local residents in the project locations where the facilities were constructed. However, in reality some facilities were not functioning because they were not maintained properly due to a lack of repairing and mending skills and the financial capacity of the WUAs. Reinforcing the organizing capacity of the WUAs that maintain multiple facilities in each village is thus essential to pursue repairing duties on nonfunctioning facilities and to keep up the operation of functioning facilities. Actual solutions to this are: to ① encourage allocation of technical staff at WUAs, ② provide technical training to them, ③ instruct executives and accountants of WUAs on financial management methods, and ④ organize awareness-raising activities for communities on the issues such as water and health and sanitation and health.

(2) Reinforcing organizing capacity at local governments

WUAs are responsible for reporting regularly on their facilities operation to local

governments in addition to performing routine operation and maintenance of the facilities. On the other hand, CWSTs and local governments were expected to check on the operational status of water facilities in their jurisdictional Districts and Municipalities based on the reports of the local communities, to provide assistance to communities when they cannot handle repairing by themselves, and to monitor WUAs activities. However, officials in CWSTs usually have multiple responsibilities in different departments while supervising monitoring of rural water supply facilities in local governments. As a result, many of them cannot spare enough time for the monitoring activities. District/Municipality Water Supply Engineer Offices are, on the other hand, providing technical training and operational instructions by visiting local communities under such conditions. However, their activities are greatly affected by the staffing levels, the financial situation of the offices, the availability of transportation, and the number of jurisdictional areas and water facilities; therefore regular monitoring is not necessarily ensured.

Thus, revitalizing CWSTs is essential for improving the operation of the water facilities provided by the project and for maintaining and increasing the water supplied population as intended in the project. In order to do so, it is necessary to: ① clarify the roles and positions of CWSTs and Water Supply Engineer Offices, and ② reinforce and improve their capacity for implementing activities based on their responsibilities.

4.2.2 Recommendations to JICA

No recommendations.

4.3 Lessons Learned

(1) Ensuring coordination of projects among implementing agencies

The BD Study examined if other organizations were planning to start aid programs in the project target areas and ensured in advance that there were no existing projects in the prospective sites. However, it turned out that there were projects sponsored by other agencies after this water supply project was launched. As a result, construction plans had to be changed and the intended water supply coverage was reduced. Also, some water facilities provided by the project were broken and left unrepaired at the sites where there were alternative water sources. The availability of alternative water sources could thus prolong downtime. Therefore, it is necessary to request implementing agencies to research preexistence of water facilities and other organizations' construction plans in the project target area as well as to ensure thorough coordination with other projects.

Republic of Guinea

Ex-Post Evaluation of Grant Aid Project

"The Project of Water Supply in Rural Areas of Middle Guinea"

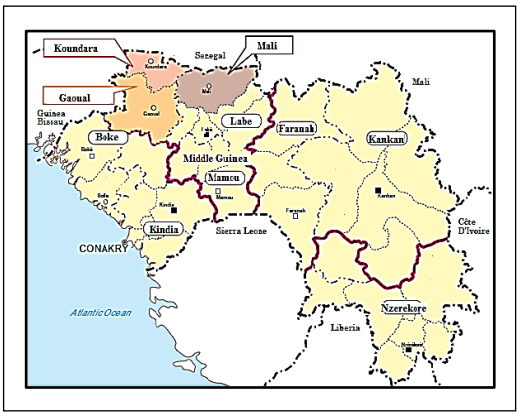
External evaluator: Yumiko Nakamura, Binko International Ltd.

0. Summary

This project developed water facilities and operation and maintenance system by community participation for the purpose of increasing the population with access to safe and stable supply of drinking water in three prefectures in middle Guinea, namely Gaoual, Koundara, and Mali. The objective of the project is highly relevant to the country's development policy, development needs, as well as the aid policy that Japan upholds. In addition, the actual number of population who were provided with water as well as constructed water facilities by implementation of the project reached more than 90% of the target value. As a result, expected positive effects of this project were observed during the Ex-Post Evaluation Study such as the followings: water related disease rates in the project target areas has decreased; and opportunities to effectively utilize time for daily activities by reduced water-fetching workload has increased. On the other hand, although the project cost was executed within the plan, it was slightly higher than planned considering the actual outputs generated by the project. Thus, the efficiency of the project is fair. While the maintenance of the facilities leaves room for improvement in terms of personnel deployment, the operation and maintenance skills, and financial capacity, the sustainability of the project effect is fair based on the fact that the functioning rate of water facilities constructed by the project was at 95% as of this Study, which is higher than the 84% of the national average.

In light of the above, this project is evaluated to be satisfactory.

1. Project Description



Project location

Foot-pump water facility with iron remover provided by the project

1.1 Background

The Republic of Guinea is located on the southwestern edge of West Africa, bordering Senegal, Equatorial Guinea, Mali, Sierra Leone, and Liberia. Its population is 10.2 million (in 2011) and the country covers 245,000 square kilometers of land. While the country is blessed with rainfall as it is widely known as the "Water Bottle of West Africa", infrastructure development to ensure a safe supply of drinking water is significantly delayed. As a result, unhygienic surface water including rainwater, manually-dug shallow wells, and rivers became the primary water sources for local residents. Residents also have had to suffer from water shortages when these water sources dry up in the dry season (December to April). This environment led to delays in the promotion of latrines in rural areas and the lack of sanitation awareness among residents as well, which caused the further spread of water-related diseases including diarrhea, cholera, and parasitic diseases as well as a high infant mortality rate.

To improve such situation, the government of Guinea identified the development of rural water facilities as a key to socio-economic development and revitalization of rural communities, and adopted the "Long-term Plan for Rural Water Access" in 1995 in which they proposed a target of building water facilities in 15,000 locations across the country by 2005. In addition, the "Guinea Poverty Reduction Strategy" adopted in 2002 provided new targets against 2010 of improving the rural water access rate to 90%. In order to achieve these target values, the government pledged to develop 20,000 water facilities nationwide by 2010.

Given this state of affairs, the government of Guinea that placed high value on the contribution of the "Projet d'approvisionnement rural en eau potable de la Guinee Maritime" (Rural Drinking Water Supply Project in Coastal Guinea), a three-year grant aid project commenced in 2000, requested grant aid for the three prefectures in middle Guinea that had fewer boreholes and limited access to safe drinking water with a view to actualize the country's water supply plan.

1.2 Project Outline

The objective of this project is to increase the population with access to safe and stable drinking water by developing water supply facilities and operation and maintenance system with residents' participation in three prefectures in middle Guinea, namely prefecture of Gaoual, Koundara, and Mali.

E/N Grant Limit / Actual Grant Amount	1.073 billion yen / 1.069 billion yen
Exchange of Notes Date	Term 1/2: June 28, 2004 Term 2/2: June 8, 2005
Implementing Agency	National Water Authority of Guinea (Service National d'Aménagement des Points d'Eau*: SNAPE)*
Project Completion Date	Term 1/2: March 6, 2006

	Term 2/2: June 28, 2007
Main Contractor	Term 1/2: Drico, Ltd. Term 2/2: Urban Tone Corporation
Main Contractor	Term 1/2, 2/2: Japan Techno Co. Ltd.
Basic Design	February, 2003 - April, 2003
Detailed Design	Term 1/1: N/A Term2/2: Jun-October, 2005
Related Projects[1]	Japanese Grant Aid (1) Projet d'approvisionnement rural en eau potable de la Guinee Maritime (2000-2003) (2) Projet d'alimentation en eau potable de la partie est de la ville de Conakry（1990-1993） (3) Projet d'alimentation en eau potable de la partie est de la ville de Conakry (1994-1995); Other international institutions and aid agencies <u>Gaoual and Koundara</u> • Follow-up activities for continued maintenance, lifestyle improvement (UNICEF, 1996-2006) • Construction of 36 boreholes (OMVG, 2008-2009) • Construction of 20 boreholes (CICR, 2010-2011) <u>Mali Province</u> • Construction of 15 boreholes and 14 shallow wells (FIDA, 2007-2008) • Construction of 5 boreholes and 9 shallow wells (BAD, 2008-2010) • Construction of 57 boreholes (KfW, 2011-2012)

2. Outline of the Evaluation Study

2.1 External Evaluator

Yumiko Nakamura, Binko International Ltd.

2.2 Duration of Evaluation Study

The Ex-Post Evaluation Study was done in the following durations.

Duration of the Study: October 2012 – August 2013

Duration of the Field Study: February 5 – March 1, 2013; June 1– 9, 2013

2.3 Constraints during the Evaluation Study

The country was undergoing social unrest due to demonstrations and general strikes organized frequently throughout the country in the face of a parliamentary election and subsequent martial law. A demonstration was staged during the first field study of this project and this instability continued throughout the second study. Interview survey held in the capital city of Conakry with concerned parties were thus limited to time and places that allowed

[1] OMVG : Organisation pour la Mise en Valeur du Fleuve Gambie (Gambia River Basin Development Organization)
CICR : Comite Intenrational de la Croix-Rouge (International Committee of the Red Cross)
FIDA : Fonds international pour le développement agricole (International Fund for Agricultural Development)
BAD : Banque africaine de développement (African Development Bank)
KfW : Kreditanstalt Für Wiederaufbau (German Credit Institution for Reconstruction)

mobility.

3. Results of the Evaluation (Overall Rating: B[2])

3.1 Relevance (Rating: ③[3])

3.1.1 Relevance with the Development Plan of Guinea

A policy for the rural water sector at the time of the Basic Design Study (BD Study hereafter) was the "Long-Term National Rural Water Supply Program" (1995) which specified a target of constructing 15,000 boreholes nationwide by 2005. Water resources development was emphasized as the foundation for socio-economic development of the country and the revitalization of rural communities. The "National Socio-Economic Development Program" established in 1996 declared its short-term goal of constructing 12,200 water facilities by 2000 and of realizing improvement in unit water demand in a village with over 100 residents to 10 L/capita/day. The "Poverty Reduction Strategy Paper" (PRSP hereafter) in 2002 further stated that supplying of safe drinking water is essential to improve rural living environments, and set out new targets for improvement of rural water access rate from 63% in 1996 to 90% in 2010 and unit water demand in villages to 20 L/capita/day by 2020.

The improvement of the water access rate in rural areas remained a top priority at the time of Ex-Post Evaluation Study. The PRSP (2007-2010) (2007) highlighted the improvement of rural water access rate as an essential measure for "the improved access to quality social services," which is one of three pillars in the policy, and set the specific target for improvement of rural water access rate from 52.8% (2002) to 77.9% (2015). The "Programme National d'Alimmentation en Eau Potable et Assainssement" (PNAEPA, or National Program for Rural Water Supply and Sanitation) in 2007 also made it imperative to increase the water access rate in rural areas and declared that 13,221 new water facilities be constructed by 2015. The "Five-Year Plan for National and Social Development (2011-2015)" in 2011, which is a higher national policy, also identified water source development as an activity that contributes to "fight against poverty, achievement of the MDGs, and human resource development".

This project contributes to increased access to safe and stable drinking water in the three prefectures in middle Guinea by construction of water facilities; therefore, both ex-ante and ex-post evaluations found that the project has been highly relevant with the development plan and policies that the Guinean government pursues.

3.1.2 Relevance with the Development Needs of Guinea

In Guinea, infrastructure development including water facilities construction to ensure the supply of safe drinking water had been delayed. As a result, in rural regions especially, lack of

[2] A: Highly satisfactory, B: satisfactory, C: Partially satisfactory, D : Unsatisfactory

[3] ③: High, ②: Fair, ①: Low

access to safe drinking water was remarkable. Due to this situation, many of the local residents had to tolerate severe living conditions where they need to live on water with the high possibility of contamination including rainwater, manually dug shallow well, river, and pools of water. Such unhygienic living environment caused the spread of water-related diseases including diarrhea, cholera and parasitic diseases. Hence, improvement of living environments of local residents through developing and promoting hygienic water facilities in rural area needed to be addressed immediately.

At the time of Ex-Post Evaluation Study, over 80% of poverty was concentrated in rural areas. The poverty level of the Labe Region where one of the target areas of the project, Mali Prefecture, is located, is especially high (61.1-66.3% as of 2005) and improvement of their living standard was imperative[4]. The average rate of water access as a country reached 73.8% in 2007 and showed improvement compared with the 62.3% observed at the ex-ante evaluation[5]. However, while 91.2% of the population in cities receives water supply, only 67.1% of the rural population receives water supply and this shows that the need for water resource development continues to be high in rural areas. In particular, the water access rate in Labe Region of middle Guinea, where three project targeted prefectures are included, was 66.2 %, which is lower than the national average rate, and makes water supply improvement urgent[6]. In addition, demand for water facilities among local residents is quite high as seen in the results of the Rural Village Survey conducted by the World Bank in 2011 that listed "drinking water supply" as the top priority for the community development of rural areas. In light of the above, the improvement of the water supply situation in rural villages, especially in middle Guinea, is a pressing need and also development needs are high.

3.1.3 Relevance with Japan's ODA Policy

Guinea remains one of the poorest countries in the world due to the influence of the long socialist control and problems with governance as well as riots in neighboring countries. Japan has been supporting Guinea's efforts to grow out of poverty by improving basic human needs and developing basic socio-economic infrastructure in terms of "poverty reduction" and "sustainable development" is one of the priority issues of the Japan's ODA Charter. Support to ensure safe drinking water was positioned as one of the priority sectors in the country's basic ODA policy along with education, fishery and agriculture[7]. In addition, this project was

[4] Guinea's national average of the poverty rate was 53.6% as of 2005 (Source: Republic of Guinea, Ministry of the Economy, Finances and Planning, 2007).

[5] Source: Poverty Reduction Strategy Paper Progress Report (2011-2012) (2011)

[6] Guinea is divided into eight regions. Water access rates in each region are as follows (in the order from the most to least): Conakry (97.9%), Kankan (87.9%), Faranah (83.1%), Nzerekore (76.1%), Boke (71.3%), Labe (66.2%), Kindia (55.7%) and Mamou (45.4%). Labe was the sixth among the eight regions (Source: Poverty Reduction Strategy Paper Progress Report (2011-2012) (2011)).

[7] Source: ODA Data Book 2003, Ministry of Foreign Affairs

implemented based on the Japanese Prime Minister's announcement made at the Tokyo International Conference on African Development (TICAD) III held in Tokyo in September 2003 and is coherent with "human-centered development" which was one of the three pillars of African Development: namely 1) human-centered development aid; 2) poverty reduction through economic growth; and 3) consolidation of peace[8].

This project has been highly relevant to the country's development plan, development needs, as well as Japan's ODA policy; therefore its relevance is high.

3.2Effectiveess[9] (Rating: ③)

3.2.1 Quantitative Effects (Operation and Effect Indicators)

(1) Increase of water supplied population as a result of this project[10]

The actual number of people who were newly served with water through this project was 53,900 in 2007 in all of the three prefectures. It is slightly less than the original target value of 57,200 for 2007 and 2008 as set out in the BD Study, yet reached 94% of the planned level[11]. Therefore, the intended target value of this project was largely achieved (Table 1). The actual number being slightly lower than the target was because boreholes constructions were reduced by eleven in Mali Prefecture.

[8] At the conference, former Prime Minister Junichiro Koizumi pledged grant aid of one billion dollars for the following five years in the fields of healthcare including HIV/AIDS, education, water and food supply.

[9] Sub-rating for Effectiveness is to be put with consideration of Impact.

[10] The Ex-Post Evaluation of this project involved two different studies: an Ex-Post Evaluation Study; and a study for detailed analysis. The Ex-Post Evaluation Study includes a questionnaire survey for the party concerned for facility maintenance: SNAPE headquarters, two SNAPE branches, 14 Rural Development Committees (CRDs), and 20 Water Committees (CPEs)), as well as a beneficiary survey for villagers at the project sites. 20 villages were surveyed among the 173 villages in the beneficiary survey which includes 13 sites equipped with iron remover that were excluded from the survey for detailed analysis and seven sites of foot pump water facility. In selecting seven sites of boreholes, the number of targeted CRDs for the survey was carefully distributed among the three prefectures. The makeup of a total of 20 targeted survey sites is 9 villages in Gaoual, 6 villages in Koundara, and 5 villages in Mali. Among them, a total of 100 households including 40 in Gaoual, 30 in Koundara, and 20 in Mali were randomly sampled.

On the other hand in the study for detailed analysis, the questionnaire survey was conducted with CPE and villagers in 150 villages except three villages which were conducted the sampling survey among 153 villages. Among the 150 surveyed, two villages were not investigated as one village had disappeared and one site was not found during the survey. Therefore, the percentage of actual site coverage was 99% (171 out of 173), the makeup of which is: 57 out of 58 sites in Gaoual, 54 out of 55 sites in Koundara and all 60 sites in Mali. All sites that were studied in this evaluation were given facility surveys to check the functionalities of facilities.

[11] The population served with water (target value and actual value) is calculated based on the SNAPE - standard of 300 people per facility (2007).

Table 1: The population newly served with water by this project and facility functioning rate[12]

	Target		Actual		Inspection Survey		Ex-Post Evaluation Study		
	(1: 2007, 2: 2008)		(1: 2006, 2: 2008)		(2007, 2009)		(2013)		
	No. of facility	Pop. served with water	No. of facilities	Pop. served with water	No. of functioning facility	Functioning rate	No. of functioning facility/ No. of surveyed-facility	Functioning rate	Pop. served with water
Level 1	Foot pump water facility								
Koundara	55	16,500	55	16,500	55	100%	53/54	98%	15,900
Gaoual	58	17,400	58	17,400	58	100%	53/57	93%	15,900
Mali	71	21,300	60	18,000	60	100%	57/60	95%	17,100
Level 1 Total	184	55,200	173	51,900	173	100%	163/171	95%	48,900
Level 2	Piped water system								
Mali	1	2,000	1	2,000	1	100%	1/1	100%	3,856
Total	-	57,200	-	53,900	-	-	-		52,756

Source: Target: BD Study Report, Actual and Inspection survey: Documents provided by Japan International Cooperation Agency (JICA), Ex-Post Evaluation: Results of the Ex-Post Evaluation Study

Facility functioning rates at the time of Ex-Post Evaluation Study was 98% (53 out of 54 facilities) in Koundara, 95% (53 out of 57 facilities) in Gaoual, and 95% (57 out of 60 facilities) in Mali and surpassed the national average of 84%. As indicated in the above, the effect of the project continued to be observed through the time of Ex-Post Evaluation Study. There are eight nonfunctional facilities among the surveyed 171 and the major causes of their failure were broken pedals and lowering water levels.

3.2.2 Qualitative Effects

(1) Water use and supply

According to responses from a total of 1,098 households in 168 villages with regard to the use of their daily water sources before and after the construction of water facilities, their primary water sources before the project launched were “creek/river”, “deep water facilities”, “spring water”, and “public shallow well” (Figure 1). In contrast, over 90% of the total respondents use the water facilities made available by this project as their primary water source at the time of Ex-Post Evaluation Study (Figure 2). The number of households using those water sources that were previously utilized by many of the respondents has decreased. As Figures below indicate, the daily water sources for those residents in the project locations are shifting from less safe to highly safe sources after the introduction of water facilities by this project.

[12] The rate is calculated based on the number of functioning facilities at the time of the Ex-Post Evaluation Study. The facilities are judged to be “functioning” when water was successfully pumped up when surveyors visited the sites.

According to the result of the beneficiary survey, the reasons for using the project water facilities were: cleanliness (93/100 households), taste (23/100), proximity (22/100), and safety (18/100). Further, the Study also found that almost all facility-using households use the water from the facility for drinking and cooking purposes.

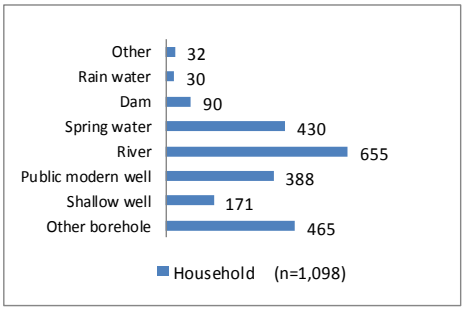


Figure 1: Major water source before the project

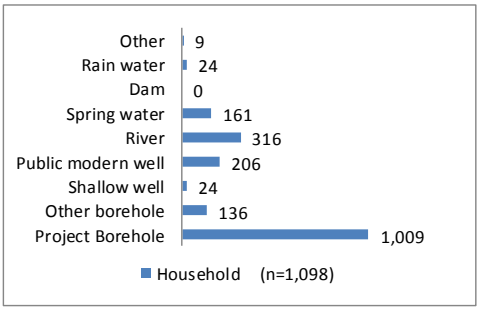


Figure 2: Major water source after the project

Source: Results of the Ex-Post Evaluation Study

(2) Routine maintenance

Reinforcing community based maintenance systems including the routine maintenance of facilities and responses to facility failure directly affect safe and stable drinking water supply. Thus, as part of the animation and sensitization activities of the project (the Soft Component hereafter), skill trainings were given to a technician of the Water Committees (CPEs hereafter) and patrolling repairmen (ARs hereafter) to enhance their basic maintenance and repairing skills.

The evaluation study verified retention rate of those trainees on site and found that almost half (48%), or 74 out of 153 CPEs that responded to the questionnaire survey, have continued to allocate such ex-trainees to be responsible for repairs. The rest of the villages either allocated those who did not receive the training (66 of 153 CPEs) or never allocated technical staff (13 of 153 CPEs) (Figure 3). These 79 villages are not equipped with basic skills to ensure routine maintenance and repairs, and thus a sustainable supply of safe drinking water is questionable.

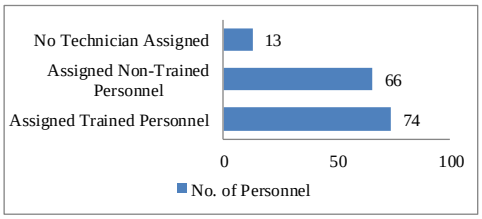


Figure 3: Allocation of technicians by CPE

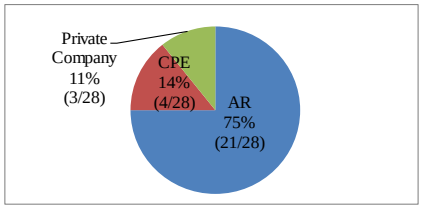


Figure 4: Actual repairers in the past 6 months

Source: Results of the Ex-Post Evaluation Study

On the other hand, the results of the Ex-Post Evaluation Study for 20 CPEs found that all CPEs were aware that each sub-prefecture has allocated two ARs and that at least one contact name is kept on record in the case of emergency. According to the failure records over the past six months at the 171 sites, a total of 37 failures (17 serious and 20 minor failures) were observed. Among them, 28 were repaired, of which more than 70% was taken care of by ARs (Figure 4).

Thus, while some concerns remain regarding the continued effects of technical assistance in allocating technical staff, it can be concluded that routine maintenance and management systems are in place in the community in order to provide safe and stable drinking water.

(3) Monitoring

In addition to reinforcing the maintenance systems at the community level, trainings aimed at strengthening monitoring capacity of the Rural Development Committee (CRD hereafter) at Sub-prefectures were also given during the Soft Component period in order to supply safe and stable drinking water. However, results of the Ex-Post Evaluation Study showed that 70% of CPEs (116 of 169) responded that they were "never visited by CRD" and only 12% (21 of 169) responded that they were "visited every three months by CRDs," as per the instructions during the Soft Component activities[13]. Therefore, CRD was less involved in the facility maintenance even at the time of Ex-Post Evaluation Study and effects that were expected from the Soft Component were only partially actualized.

3.3 Impact

3.3.1 Intended Impacts

(1) Reducing water-related diseases[14]

At the time of the BD Study, interview surveys were conducted with 360 households in the three prefectures on disease prevalence being recognized by residents. The results showed that almost half of them indicated high rates of disease prevalence on water-related diseases including diarrhea, dysentery and infection[15].

In contrast, the results of the questionnaire survey conducted in the three prefectures showed lesser prevalence though it was not enough to eliminate water-related diseases completely. Among 8,108 people of 1,042 households in 160 villages using the water facilities provided by the project, only 2-7% of people, children and adults combined, had been affected by

[13] The survey of 14 CRDs found that regular patrols by CRD were difficult to pursue due to lack of transportation and fuel expenses, and members engaging in different tasks at once.

[14] Data were collected during the dry season both in the BD Study and in the Ex-Post Evaluation Study.

[15] Having compiled responses in which locals answered "most of them are affected" and "many are affected" among the social survey data provided by the BD Study, water-related diseases were found most in the form of diarrhea (193 of 360 households) followed by infection (187/360) and dysentery (177/360) for children. For adults, it was in the order of dysentery (183/ 360), diarrhea (177/360) and infection (159/360).

water-related diseases in the past two weeks. This is a significant reduction compared with the previous situation where "more than half showed high rates of disease prevalence" according to the respondents for BD Study.

Table 2: Disease prevalence in 171 villages in three prefectures (2013)

	Children		Adults		Prevalence (%)
Order	Disease	Number of those affected (A)	Disease	Number of those affected (B)	(A+B) / Total population, 8,108
1	Malaria	331	Malaria	222	7%
2	Diarrhea	298	Diarrhea	103	5%
3	Dysentery	79	Dysentery	66	2%

Source: Results of the Ex-Post Evaluation Study

In the Ex-Post Evaluation Study among 100 households, 95% answered that water-related diseases have been greatly reduced after water facilities were constructed. To a question regarding the socio-economic impact of the facility construction, health improvement attracted most responses, representing70% of the respondent (75 of 100 households).

Thus, the implementation of the project contributed to the reduction of water-related diseases and health improvements for people in the project locations.

(2) Increased opportunities to effectively utilize time for daily activities by reducing water-fetching workload in the targeted areas

1) Water use

With regard to utilization of foot pump water facilities (level 1 facility hereafter), frequency of water-fetching during the dry season has stayed the same as the planning period (Table 3). However, the volume of water usage by the residents increased and the time required to fetch water was reduced to a third of what it took previously. Thus, the conditions around water use are clearly improving. Besides the increased use of domestic water, some other factors including an increase in the amount of water used for the livestock, for vegetables and fruits, and for house construction and maintenance contribute to the increased use of the water after facility construction[16].

The results of the study could give the impression that water-fetching workload have increased with the increasing volume of water, yet there was positive feedback on the site at the time of Ex-Post Evaluation Study stating that water facilities made collecting water at the water source easier and shortened the distance water has to be carried. Therefore, overall workload required to fetch water has been reduced as a result.

On the other hand, piped water facility (Level 2 facility hereafter) doubled the amount of water use compared with the BD Study, decreased the frequency of water-fetching by 70%, and

[16] Source: Results of the questionnaire survey

reduced the time required to fetch water to 1/4 compared with that of the BD Study. Considering the fact that residents used to fetch water at the boreholes placed along the creek as well as spring water several kilometers away before the installation of the water system by this project, the water facility significantly improved the water use in village centers.

Table 3: Water use

	Level 1 Facilities			Level 2 Facilities	
	2003	2013		2003	2013
	BD Study	Ex-Post Evaluation Study	Detailed Analysis	BD Study	Ex-post Evaluation Study
Water use (liter/person/day)	9.7	Dry season: 23.9 Wet season: 12.4	-	13.4	25
Frequency of fetching(time/day)	3.6	Dry season: 4.1 Wet season: 2.0	3.5	3.2	1
Time required for fetching (min/way)	22.3	7.6	6.7	13.2	3

Source: Results of the Ex-Post Evaluation Study

In the beneficiary survey, 80% of the respondent households (78 out of 97) answered that the water facilities greatly increased the opportunity for them to effectively utilize their time for daily activities. Judging from the fact that much of the time previously required for fetching water is used for agricultural works (58 of 96 households), for refining palm oil, and for house construction and maintenance, intended positive impacts of the project were generated as a result of the reduced time for water-fetching.

2) Improvement in school enrollment

The school enrollment rate in the 42 villages in 11 sub-prefectures at the time of Ex-Post Evaluation Study was 57.6% (2013) and has increased by 20% compared with 34.7% at the time of the BD Study. However, while it is possible that school enrollment improved due to the fact that the water facilities improved water accessibility by shortening the distance from water sources and reduced the labor required in fetching water, only one out of 100 households (1%) and 29 out of 163 CPEs that have functioning facilities answered that the facility contributed to improve school enrollment. Based on the result, no strong correlation was found between increased time for daily activities by reducing water-fetching workload and the improvement in school enrollment.

3.3.2 Other Impacts: Positive and Negative Impact

(1) Impacts on the natural environment

Hearings and questionnaire surveys with the National Water Authority of Guinea (Service National d'Aménagement des Points d'Eau: SNAPE headquarters hereafter) found no particular impact on the natural environment.

(2) Land acquisition and resettlement

There is no resettlement required during the project period. The land used for facility construction was donated by the local community; therefore, no problems were found in the process of acquiring the land.

(3) Other indirect effects

The construction of water facilities and improvement in safe and stable water access in the project locations left positive impacts including improved sanitation, improved livestock health, increased vegetables and fruit harvests, and increased number of house construction as a result of improved efficiency in building and painting houses. Some also answered that the maintenance system by the CPE strengthened the bonds in the villages. There were no negative impacts found.

This project has largely achieved its objectives; therefore its effectiveness is high.

3.4 Efficiency (Rating: ②)

3.4.1 Project Outputs

This project constructed a total of 173 Level 1 facilities in the three prefectures. It was actually 6% less than the originally planned 184 facilities (Table 4). The actual number of constructed water facilities was reduced by eleven in the second term due to a loss in the exchange rate that was ongoing from before the project launched, and the steep increase in the price of locally procured materials after the oil price surge as well as the depreciation of the local currency in Guinea. On the other hand, one piped water system was constructed in Mali as originally planned. 13 iron removers, out of the maximum 14 that were supposed to be installed, were built in Gaoual, Koundara and Mali Prefectures as per the original plan.

Table 4: Project outputs (comparison between planned and actual values)

Type of facility	BD Study (Planned Value)		Actual Value	Achievement
(1) Level 1 Facilities	Gaoual	58	58	100%
	Koundara	55	55	100%
	Mali	71	60	85%
	Total	184	173	94%
(2) Level 2 Facility	Mali	1	1	100%
(3) Iron remover	3 prefectures	14	13	93%

Source: Documents provided by JICA

In addition to construction of water facilities, this project planned to introduce the Soft Component. Based on this plan, awareness raising activities for residents, training and

monitoring activities for CRDs, ARs, and CPEs were implemented in an attempt to build community based maintenance and management system after installing water facilities.

3.4.2 Project Input

3.4.2.1 Project Cost

With regard to the cost incurred to Japan with this project, the E/N grant limit was 1,073 million yen (546 million yen for Term 1/2 and 527 million yen for Term 2/2), yet the actual grant amount was 1,069 million yen (544 million yen for Term 1/2 and 525 million yen for Term 2/2) which was lower than initially planned. However, when the project cost required for the decreased number of facilities is calculated based on unit cost for installing one borehole (approx. 4 million yen[17]), it becomes about 44 million yen which is significantly more than the decrease in actual project cost (4 million yen). Although the project cost was within planned, it was slightly higher than planned considering the decrease of the output.

As for the cost incurred to the Guinean government, it was planned to be 237.3 million FGN (3.3 million yen), yet the actual cost was reduced by half and was 108.2 million FGN (1.5 million yen)[18]. This is because the planned cost of acquiring land for the facilities was avoided as the land was donated by local communities and the expenses of hiring a construction manager and a technical assistance manager that were supposed to be budgeted under personnel costs on the Guinea side were paid for out of the project expenses.

3.4.2.2 Project Period

The project was planned to be 36 month long. It was actually 36 months from June 2004 to June 2007 (100%) as planned.

In summary, although the project period was within the plan, the project cost was exceeded, therefore, efficiency of the project is fair.

3.5 Sustainability (Rating: ②)

3.5.1 Institutional Aspects of Operation and Maintenance

(1) Framework and the role of maintenance

As a result of this study, the Construction Service Division was merged with other divisions by the reorganization of the SNAPE headquarters in 2010, by which facility construction was commissioned to a private entity[19]. Other than that, the framework of maintenance did not

---

[17] Unit price for constructing a foot-operated borehole (4 million yen) consists of: about 100,000 yen for additional facilities for a foot-operated borehole, about 300,000 yen for foot-operated pumps, and about 3.6 million yen for borehole excavating work (Source: Documents provided by JICA).

[18] Applied exchange rate between Guinean Franc and Japanese yen is 100 yen = 7,170 FGN as of June 2013.

[19] The abolishment of the Construction Service Division was officially declared by Decree in 2010 (Decree No.

change and a multi-layered structure has been maintained at the time of the Ex-Post Evaluation Study. The CRD was responsible for supervising the facility operation and maintenance under the technical instruction of the SNAPE headquarters and SNAPE local branches[20]. The operation and maintenance systems of the Level 2 facility constructed by the project have not deviated from the plan. The roles of the stakeholders are summarized in Table 5.

Table 5: Roles of the stakeholders and their major responsibilities in facility maintenance

Stakeholders (role)	Major responsibilities
SNAPE head office (Superintendent of regional water facility maintenance)	Developing annual reports based on reports from branches; collecting, managing data on operational status of regional water facilities throughout the country; developing and promoting implementation of plans to develop new water facilities and conduct repairs; and providing follow-up on the issues that branches are not able to handle.
SNAPE branches (Superintendent of water facility maintenance in their jurisdictional prefecture)	Consolidating CRD's reports (including data) on facility maintenance obtained and reporting back to the headquarters; conducting follow-up activities on water facility maintenance (including field surveys at sites with problems, addressing failures that ARs are not able to handle, and raising awareness among residents).
CRD (Superintendent of water facility maintenance in their jurisdictional sub-prefecture)	Patrolling facilities every quarter; and submitting monitoring results to SNAPE branches.
AR (Service performer of water facility maintenance in sub-prefectures)	Patrolling and inspecting facilities every quarter, checking operationality, instructing on CPE management, responding to failures, and instructing on parts procurement (purchasing parts with advance payment).
CPE (Service performer of water facility maintenance)	Routine facility inspections, repairing and mending.

Source: BD Study Report (2003), Results of the Ex-Post Evaluation Study

(2) Staff Allocation

1) SNAPE headquarters: At the time of this study, 123 staff members (78 permanent and 45 contracted employees) were assigned at the SNAPE headquarters. This is an increase of 30 people compared with 90 people (30 permanent and 60 contracted employees) at the time of the BD Study, and shows that there are enough personnel to promote follow up activities and to implement operation and maintenance of the water facilities in the country.

121/PRG/CNDD/SGPRG/2010). In the same year, a new strategy called "public service of water" (Service Public de l'Eau) was provided. However, it is not disseminated enough and the former style facility maintenance continued to be applied in the targeted areas of this project at the time of Ex-Post Evaluation Study. According to the SNAPE headquarters' officer, the new strategy is being introduced and popularized in the Forested Guinea region that tends to attract a number of new projects.

[20] The number of CRDs in the three prefectures are; seven in Gaoual, eight in Koundara and 13 in Mali.

2) SNAPE branches[21]: There are two branches in charge of the project target areas: Boke and Labe branch. The number of staff has doubled compared with the five at the BD Study; 14 (including 9 permanent employees) at the Boke branch and 18 (including 10 permanent employees) at the Labe branch at the time of Ex-Post Evaluation Study. The staff shortage issue that was raised at the time of BD Study is being resolved. However, at both branches there are only two maintenance staff and two follow-up staff assigned. The staff allocation is nowhere near enough for a branch that supervises about 2,000 water facilities established in their region including the ones provided by this project[22].

3) CRD: There are seven staff members on average are currently allocated though only three or four staff members were assigned at the time of the BD Study. CRD is responsible for managing and supervising 32 development projects in their jurisdiction in addition to water facility maintenance work. However, support for maintenance and supervision of water facilities were not provided sufficiently as many CRD members have main job such as shop owners and teachers and CRDs do not have sufficient fuel budget and modes of transportation.

4) AR: ARs have been strictly kept on a two person per sub-prefecture basis, just as planned. ARs mainly work as blacksmiths, bicycle shop owners, motorbike repairmen, and electricians and patrolling is normally their second job. In some sub-prefectures, allocation of responsible facilities is more than 50 facilities per AR. On top of that, roads to the villages are in a poor condition, sites are broadly scattered, and transportation method for ARs is normally a motorbike. Thus, the number of villages that ARs can visit in a day is limited. Considering all these conditions, allocation of two ARs per sub-prefecture is not sufficient to cover all water facilities in their responsible area.

5) CPE: Staff allocation is as planned in the BD Study at the Level 1 facilities; a chairperson and five to seven committee members are assigned at 165 CPEs out of 171CPEs. This makes it sufficient for the minimum personnel required for facility maintenance. The operational rate of CPEs[23] is quite high as seen by the 98% in Gaoual, 94% in Koundara, and 100% in Mali; the intended level of facility maintenance systems in the plan is largely sustained.

[21] Among the three prefectures targeted in the project, Gaoual and Koundara Prefectures belong to the SNAPE Boke branch and Mali Prefecture belongs to the Labe branch. The SNAPE Boke branch covers Boffa, Fria, and Boke Prefectures in addition to the two mentioned above and the SNAPE Labe branch covers Koubia, Labe, Lelouma, and Tougue Prefectures other than Mali Prefecture.

[22] According to the information from the SNAPE database (PROGRES) dated December 31, 2012, there are 1,677 water facilities in the Boke branch jurisdiction and 2,464 facilities in the Labe branch (Source: Data from SNAPE PROGRES (2012)).

[23] Failures occurred at eight CPEs despite their adequate staffing. There are, on the other hand, some sites where continuous operation was observed with the maintenance efforts led by military officers and village elders in spite of under-staffing. Levels of operations and staff allocation of CPEs do not necessarily reflect the maintenance condition of facilities.

On the other hand, the CPE of the Level 2 facility has not changed from the BD Study with seven people including chairperson, vice chairperson, secretary, accountant, sanitation officer and two technicians. Therefore, the personnel required for facility maintenance are currently sufficient.

3.5.2 Technical Aspects of Operation and Maintenance

1) SNAPE headquarters: The original plan for this project called for water facility management capacity of SNAPE headquarters including problem solving and addressing challenges entailed in water facility maintenance throughout the country as well as data consolidation. At the time of Ex-Post Evaluation Study, the SNAPE headquarters had applied for budget funding for the facility repairs that branches could not correspond, and had carried out large scale rehabilitation in regions[24]. Hence, the problem solving capacity required to the headquarters is deemed adequate. However, a discrepancy was observed in the data in the SNAPE headquarters documents on the construction and operation of rural water facilities, which leaves room for improvement in data collection, management, and operation.

2) SNAPE branch: As supervisors responsible for maintenance, the SNAPE branches are expected to have the public administration capacity to support CRD's monitoring activities and have the technical skills for facility maintenance. According to questionnaire survey results, the Boke and Labe branches taking care of the project locations continue to provide technical advice and instructions for the problems that ARs found difficult to handle including broken parts identification and parts arrangement between parts distributors. Thus, the technical skill and expertise involved in facility maintenance are being sustained. On the other hand, sending and collecting monitoring sheets to and from the CRDs, collecting facility condition data, and reporting back to the SNAPE headquarters were not practiced on a regular basis. This makes their public administrative capacity required for facility maintenance less than sufficient.

3) CRD: CRDs are responsible for water facility maintenance in respective sub-prefectures and thus are required to have the planning capacity for facility monitoring as well as monitoring skills. In reality, lacking such knowledge on facility monitoring among many of the members, regular monitoring was hardly done[25]. Therefore, the CRD does not have enough technical capacity required for water facility maintenance.

[24] The SNAPE headquarters received funding for "facility maintenance and repair" from the government in 2012 and implemented a series of repairs and rehabilitations at broken sites throughout the country (Source: Results of hearing with the financial division of the SNAPE head office during the Ex-Post Evaluation Study).

[25] As mentioned in the previous sections: "(2) Staff allocation, 3-5-1 Operation and maintenance under 3. Sustainability," implementation of monitoring by CRDs is affected by lack of transportation methods and budget for fuel.

4) AR: ARs play important roles in water facility maintenance. They are required to have the inspection skills for functionality of the water facilities, the skills for checking pumps and entire facilities, and the skills to make repairs in the case of a failure. The ARs who are currently assigned at the sub-prefectures were appointed by CRDs from among citizens with mechanical knowledge and received maintenance training that were jointly organized by donors and pump manufacturers. As a result of questionnaire surveys done for 14 CRDs, 26 ARs are allocated in 14 sub-prefectures and 90% of them (24 ARs) turned out to own "Certificates of Training Completion" issued by the Vergnet. Thus, ARs have basic technical skills required for water facility maintenance.

5) CPE: CPEs that manage Level 1 facilities are required to have the capability to pursue necessary arrangement for basic maintenance and repair work as well as the maintenance around the facility. As previously mentioned, nearly half of the CPEs, or 74 CPEs (48%) that responded to the survey continue to allocate technicians who have completed trainings. Nevertheless, 66 out of 153 CPEs (43%) allocate technicians who have not received training and 13 out of 153 CPEs (8%) did not even allocate technicians. Facility conditions are excellent on the sites managed by the CPEs that allocate trained technicians, with the exception of one site. Thus, the CPEs responsible for these functioning sites maintain a sufficient technical level for routine maintenance, inspection, and repair. On the contrary, a lack of technical skills could have affected the functionality of facilities since 60% of the nonfunctioning sites are included in the said 79 CPEs with no trained technician[26].

Two maintenance staffs who received skill training by the Soft Component are allocated to the water committee for Level 2 facility to handle minor defects. There have been no serious problems since the facility was handed over, which shows that the two have basic technical skills that are required for the maintenance of the facility[27].

3.5.3 Financial Aspects of Operation and Maintenance

1) SNAPE headquarters: The Construction Service Division was abolished when the SNAPE was restructured in 2010. At the time of the Ex-Post Evaluation Study, there was no project income by implementing excavation subcontract work as intended in the original plan, making government subsidy and contract fund from international agencies the main source of income. In fact, the personnel cost for regular employees, which makes up 50-80% of the total budget, is funded by government subsidy. Expenses incurred for facility maintenance and monitoring are

[26] Five CPEs among the eight CPEs managing non-functioning facilities answered that they have allocate technical staff without training experience. Other 2 CPEs answered that they are not aware of training experience of those assigned personnel.

[27] As mentioned above, there have been no serious problems so far. CPEs that manage Level 2 facility maintain a good relationship with maintenance staff at Labe branch and have contact and notification systems in place for emergencies.

covered by the fund from international agencies (Table 6). Therefore, the SNAPE is in a dire financial situation, and operation and maintenance of regional water facilities is still greatly affected by the donor country's trends and Guinea's national budget.

Table 6: Changes in the SNAPE head office budget (2009-2012) (Unit: FGN)

	2009/2010	2010/2011	2011/2012
Income			
Government subsidy	1,562,421,120	1,624,480,000	2,067,582,720
Fund from international agencies	804,534,826	628,797,688	2,509,705,433
Total income	2,366,955,946	2,253,277,688	4,577,288,153
(increase)		-5%	103%
Expenditure			
Miscellaneous	428,634,704	31,975,069	1,814,022,611
Personnel cost	1,766,181,120	1,822,360,000	2,384,142,720
- Permanent	1,562,421,120	1,624,480,000	2,067,582,720
- Contracted	203,760,000	197,880,000	316,560,000
Total expenditure	2,194,815,824	1,854,335,069	4,198,165,331
Balance	172,140,122	398,942,619	379,122,822

Source: Results of the Ex-Post Evaluation Study

2) SNAPE branch: Total budget of the SNAPE branches for the past three years has increased yearly, yet balance has been zero and no amount is transferred to the following year. It is because the budget for activities at branches comes from the headquarters upon each request instead of one-time transfer in the beginning of the fiscal year. Most of the expenditure is in the form of miscellaneous including labor cost, power generator, fuels; activity budget for sensitization of the local residents does not actually represent much of the total expenditure. Although the branches have experienced chronic shortage of lines of communication and means of transportation, there is almost no budget secured for procurement of equipment at the branches, which has prevented implementation of regular follow-up activities including field inspection to a problem site, problem solving, and repairing the breakdowns that ARs could not handle.

Therefore, the budget is not sufficient to pursue responsibilities as maintenance supervisor for water facilities in multiple prefectures.

3) CRD: There is budget gap between sub-prefectures though tax revenue and non-tax revenue are the major source of income for CRDs. Most of the CRD budget is used for staff salary, per diem, CRD's daily operation and regular meetings with village representatives. Not only the budget for monitoring required for operation and maintenance of water facilities but also the budget for managing and operating development projects is hardly secured in the surveyed

sub-prefectures[28]. Therefore, CRD does not have sufficient financial capacity that is required to maintain water facilities.

4) CPE: 117 out of 163 villages (72%) introduce fixed rate or metered system. Average collection rate in each prefecture is quite high; 87% in Gaoual, 75% in Koundara and 84% in Mali[29]. While water tariff ranges from 1,000FGN to 5,000FGN depending on villages, the provided water tariff reflects the residents' standard of living as 93% of households (93 out of 100) answered the price was "reasonable"[30]. Also, 97% (97 out of 100 households) were willing to pay for future improvement of the facility according to the survey result. Thus, sustainable collection of water tariff is highly possible in the future.

However, only 5% of the CPEs (9 out of 163) was keeping accounting books and 60% (95 out of 171 households) did not show any balance in their saving. In addition, only 20% of the CPEs (37 out of 171) had saving over 300,000FGN (about 4,000 yen)[31] at the time of the Ex-Post Evaluation Study excluding the ones that spent a significant amount on facility repairing in the past six months. Therefore, CPEs' financial management capacity has room for improvement in the future.

With regard to the Level 2 facility, demand for water skyrocketed by additional home connection after 2007 and increased population of Yembering to 3,856 due to recent development of new residential areas[32]. As a result, fuel cost for power generation was increased enough to pressure operation of water system. However, CPE responded to this situation by raising metered water tariff from 200 FGN (2.7yen) to 300 FGN (4 yen) in response to the increased fuel cost. Accumulated fund is saved in a bank and a set amount is kept all the time. Therefore, there is no problem with the financial capacity of CPEs.

3.5.4 Current Status of Operation and Maintenance

The functioning rates of the level 1 facilities constructed by this project were 93% (53/57) for Gaoual, 98% (53/54) for Koundara, and 95% (57/60) for Mali. The average for the three prefectures was 95% and surpassed the national average of 84% (2007). These high rates are attributed to the following five factors:

---

[28] Water facility maintenance could potentially be reinforced by allocating budget monitoring of the CRD secretary general following the policy of new SNAPE strategy although such budget has never been allocated as of now.

[29] Source: The data from 133 out of 171 CPEs that the study team was able to check collection status of water tariff.

[30] In the beneficiary survey, 72% (71 out of 98 households) reported that water charge has increased after facility installation and 8% (8 out of 100 households) answered that they had experienced difficulties in payment in the past.

[31] 300,000 FGN is the amount deemed necessary for sustaining basic facility maintenance at the time of project planning. Background for lack of balance include; 1) low collection rate, and 2) problems in financial management and operation: over 80% of the villages did not keep accounting book; fund could have been used for other purposes. Factors that affect collection rate include; 1) existence of alternative water sources, 2) CPE losing its substance, 3) inability to use facilities due to failures and lowered water level, and 4) poverty.

[32] Source: Results of interview survey to the CRD that manage the Level 2 facility

1) Immediate response to problems under the partnership between CPEs and ARs

The project organized a technical training to CPE technicians in the presence of ARs for the purpose of strengthening the relationship between CPEs and ARs. The result of the beneficiary survey showed that all 20 CPEs were aware that two ARs were allocated to each sub-prefecture and are in contact with one or two ARs. Nine out of 20 CPEs notified their ARs of problems in the past six months among which seven CPEs answered "The AR took care of the problem within the day." Also, as shown the fact that ARs have performed over 70% of the total 28 repair cases in the six months, ARs have continued to pursue facility maintenance in cooperation with CPEs after the project was completed.

Most of the ARs received technical training provided by SNAPE and other donor-project repeatedly. They are usually the mechanics and blacksmiths who have been working as repairmen in the community, and are highly motivated in repairs and maintenance. On top of that, they are invaluable to the areas where technicians are rare, and are completely trusted by local residents. Thus, a high functioning rate in the project can be explained as a result of a synergistic effect created by highly motivated ARs and their communities' deep trust in them.

2) Publicity for parts distributors and immediate availability

The Guinean government has long been working to develop a network for parts supply with support from KfW and other donors. As a result of their efforts, there are Vergnet parts shops, with which the SNAPE headquarters exchanged a distributorship agreement, in all prefectural capitals in western Guinea where Vergnet-made pumps have been widely introduced. The questionnaire survey for CPEs found that existence of the Vergnet distributors is widely known as shown in the fact that 113 (76%) out of 149 CPEs purchased the parts from Vergnet distributors. However, due to the location of villages, 70% (104/149) of the CPEs procure parts through ARs and the rest, about 30% (41/149), procure by themselves.

While the parts prices are seriously affected by the currency fluctuation, the SNAPE headquarters and distributors adjust prices with each other to avoid a sudden price surge. As Table 7 shows, even though there are not enough types or parts in stock, the time required to obtain parts after receiving requests is short. Usually it takes 3.5 days for Gaoual, 1.8 days for Koundara, and 1.2 days for Mali. The Factorial Analysis on Successful Maintenance (BOX) in the following section shows a positive relationship between parts procurement and facility maintenance. Selecting Vergnet pumps that have an extensive parts procurement network throughout the West Guinea including remote areas as well as allowing parts arrangement through local distributors contributed to the sustainable maintenance of water facilities.

Table 7 Inventory Holdings at Vergnet Shops （Unit: CPE）

	Gaoual	Koundara	Mali	Total	%
Sufficient	4	7	28	39	33%
Scarce	25	24	3	52	44%
No stock / Order needed	17	1	6	24	20%
N/A	2	0	2	4	3%
No Answer	0	16	16	32	

Source: Result of Ex-Post Evaluation Study

3) Availability of basic parts in CPEs

In the Soft Component program, the project designated each village to put 300,000 FGN in reserve as their initial costs for maintenance so that a portion of the reserve would be used for purchasing parts and supplies. Purchased parts were officially handed over to CPEs when technicians from the manufacturer gave instructions on repair techniques to CPE repairman after pumps were installed. Even at the time of the Ex-Post Evaluation Study, over half the CPEs (85/147) had basic parts and used them for routine maintenance. Thus, the fact that CPEs held spare parts in stock for regular replacement in addition to the fact that Vergnet parts were available through their distributors contributed to a desirable state of maintenance.

4) Residents' routine participation in facility maintenance

Facility inspection is performed daily not only by CPE technicians but also by all CPE members. Moreover, CPEs encourage user households to participate in cleaning inside and outside the facility as part of their routine maintenance activities. The beneficiary survey shows that most of the households (99/100) were "participating in cleaning activities around the facility[33]." CPEs regarded such residents' participation in the facility maintenance as "very active" (16/20 CPEs) in their answers for the questionnaire.

As a result of cleaning activities by local residents, no pollutants were found within 30m from water facilities except for some villages (7/171). The hygienic condition was kept at a desirable level at the most of the facilities (165/171) in which fences were set up around the well.

The following points are considered as background factors to the establishment of operation and maintenance system based on the User-Pay-Principle. Firstly, water facilities were constructed based on the needs and willingness of the residents in the project target areas. In this project, the BD Study identified their needs for installing water facilities, their willingness to set up CPEs and to reserve for maintenance cost, and their motivation to carry out their obligations

[33] About 90% of the households that participates in cleaning have experienced in providing labor or supplies when the facility was constructed. A strong sense of ownership of the facility could have led to continuous and active involvement in the facility maintenance activities.

with the water facility maintenance in order to secure proactive involvement by residents in facility maintenance in future. Then the project selected the villages where such needs were identified and where residents showed willingness to take initiative to maintain facilities and gave them priority in constructing facilities.

Second factor is that the timeframe of constructing water facilities was closely associated with each Soft Component activity during the implementation period. In this project, residents were given certain conditions and duties according to the content of construction. They could not move on to the next stage of construction until those duties were fulfilled[34].

Thus, the gradual and long-term work schedule during the Soft Component along with the construction of water facilities based on residents' demand and their willingness for facility maintenance enhanced residents' initiative in maintenance and resulted in sustaining desirable facility performance.

5) Facility construction in areas without existing wells (alternative water sources)

The Study for detailed analysis found that one of the factors that could affect community-based maintenance activities was the "availability of alternative water sources" (BOX). In this project, existing facilities, their types, and their numbers were surveyed during the BD Study. At the same time, unavailability of existing facilities was set as one of the criteria for selecting project sites. As a result, many of the selected sites included villages that did not have existing facilities at the time of the BD Study.

Importance of water facilities among residents continued due to the lack of existing facilities, and as a result, their motivation for facility maintenance was sustained. The high functioning rate in these project sites are thus explained in this context.

On the other hand, the Ex-post Evaluation Study found that eight of the 171 target facilities were not functioning (Table 8). Major causes of non-functionality included pedal breakdown and lowering of the water level. The following factors are considered to be prolonging downtime of non-functioning facilities:

[34] As a condition for installing pumps, fences had to be built around the pump beforehand (Source: The BD Study Report (2003)).

Table 8 Present Situations at Non-Functioning Site

	Site No.	Sub-prefecture	Technician	Ex-trainee	Repair work	Reserve	AR Monitoring	CR Monitoring
1	G-12	Kakony	Yes	No	AR	280,000	2	0
2	G-8A	Kakony	Yes	No	AR	25,000	1	0
3	G-70B	Tamby	Yes	No	AR	1,500,000	0	0
4	G-59A	Goungouroun	Yes	Yes	CPE	200,000	0	N/A
5	K-8-2	Guingan	Yes	No	AR	0	0	0
6	M-72	Donghel Sigon	Yes	Not Know	CPE /AR	-	0	0
7	M-223	Yembering	Yes	No	CPE /AR	-	1	2
8	M-205	Yembering	Yes	Not Know	CPE /AR	-	1	0

Source: Result of the Ex-Post Evaluation Study

1) Lack of skill at CPEs

Facilities have been maintained well at 73 out of the 74 CPEs that allocate ex-trainees. On the other hand, seven CPEs among the eight that manage non-functioning facilities either did not allocate such ex-trainees as their technical staff, or were unaware of their history of training at the time of Ex-Post Evaluation Study. Thus, lack of technical skills in CPEs that manage these non-functioning facilities is considered as one of the factors for prolonged downtime.

2) Insufficient patrolling inspection and instruction by ARs and CRDs

As Table 8 indicates, the seven non-functioning sites with the exception of one site (G-12) recorded no or only one inspection conducted by patrolling ARs in the past six months. Furthermore, regular patrolling by the CRDs that are the superintendents of water facility maintenance in sub-prefectures was not recorded at all except for one CPE in the past six months. While CPEs lack technical skills, insufficient patrol by ARs or CRDs could have delayed the identification of problems, and caused a delayed reaction for proper solutions to defects.

3) Insufficient reserve-fund

The project required each village to reserve funds for future maintenance by collecting a water tariff regularly at facility sites. The reserve was expected to be used for a patrolling allowance for ARs, repair costs, and purchasing spare parts. However, the study found that seven out of the eight CPEs that manage non-functioning facilities had saved less than 300,000 FGN. Some could not even recognize the balance. Such financial issues could have negatively affected their responses to defects.

Level 2 facility is functioning without a problem. This is because 1) the CPEs have a strong sense of ownership and a structure for cooperation with village communities for notification, reporting and consultation, and 2) the division of tasks and the roles of CPE members are clear. Therefore, each member pursues one's responsibility based on the tasks and roles.

Judging from the above, some problems have been observed in terms of its maintenance system, and technical and financial aspect, Therefore sustainability of the project effect is fair.

BOX - Factorial Analysis on Successful Maintenance -

[Purpose]

As part of the Ex-Post Evaluation Study, a quantitative analysis was conducted in order to concretely validate the factors that affect the maintenance of the water facilities provided by the project.

[Method]

The Study team

- Established hypothesis on the availability of alternative water sources, residents' commitments, the availability of spare parts, and the allocation of ARs from the demand and supply aspects while referencing factors that have been confirmed to be affecting the level of facility maintenance in past researches and studies,
- Selected dependent variables on facility maintenance (α1: facility functioning, α2: downtime, α3: frequency of defects after the provision) as well as independent variables based on the hypothesis,
- Established a multiple linear regression analysis model in order to validate this hypothesis,

$$\alpha 1\text{-}3 = \beta 0+\beta 1M+\beta 2C+\beta 3A+\beta 4CV+\beta 5IH+\beta 6P+\beta 7CH+\mu$$

α1-3	: dependent variable	P	: participation of residents
M	: quality and defects of water facility	CH	: characteristics of household
C	: CPE	β0	: intercept
A	: alternative water sources	β1,…, β7	: slope
CV	: characteristics of village	μ	: random error
IH	: improved sense of hygiene		

- Selected the 150 sites from the 160 sites excluding 13 sites equipped with iron remover among the 173 total sites in the three prefectures, and conducted the questionnaire survey at a total of 1,039 households of the 149 sites where field study was able to be carried out, and

- Conducted the multiple linear regression analysis with the above model based on the data obtained from the field study.

[Results]

The multiple linear regression analysis using the dependent variables above (α1-α3) clarified the factors that affect the facility maintenance.

1) Active involvement of user households in CPE activities (voting/have voted)
2) Availability of alternative water sources including wells, rivers and rainwater
3) Year-to year rainfall comparison
4) Availability of sanitary facilities at households including a latrine
5) Possibility on procurement of spare parts
6) Existence of CPE repairmen
7) Allocation of ARs and the frequency of their visits
8) Distance from a paved road

[Conclusion and lessons learned]

As a result of the analysis, the following points were found to be important for sustainable water facility maintenance.

- Carrying out thorough preliminary studies on the availability and the number of alternative water sources at potential water facility construction sites,
- Developing a network for spare parts procurement,
- Reinforcing the allocation of CPE repairmen and ARs, and
- Encouraging residents' involvement,

4. Conclusions, Lessons Learned and Recommendations

4.1 Conclusion

This project developed water facilities and operation and maintenance system by community participation for the purpose of increasing the population with access to safe and stable supply of drinking water in three prefectures in middle Guinea, namely Gaoual, Koundara, and Mali. The objective of the project is highly relevant to the country's development policy, development needs, as well as the aid policy that Japan upholds. In addition, the actual number of population who were provided with water as well as constructed water facilities by implementation of the project reached more than 90% of the target value. As a result, expected positive effects of this project were observed during the Ex-Post Evaluation Study such as the followings: water related disease rates in the project target areas has decreased; and opportunities to effectively utilize time for daily activities by reduced water-fetching workload has increased. On the other hand,

although the project cost was executed within the plan, it was slightly higher than planned considering the actual outputs generated by the project. Thus, the efficiency of the project is fair. While the maintenance of the facilities leaves room for improvement in terms of personnel deployment, the operation and maintenance skills, and financial capacity, the sustainability of the project effect is fair based on the fact that the functioning rate of water facilities constructed by the project was at 95% as of this Study, which is higher than the 84% of the national average.

In light of the above, this project is evaluated to be satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Implementing Agency

1) Updating information data on facility usage and functionality status

The SNAPE headquarters regularly collects information and data from its branches on the functionality of water facilities, and the database at the SNAPE headquarters is supposed to be updated with the latest information. However in the present circumstances, data including the number of existing facilities and their functionality are not always consistent even in the government publications. It is necessary to reinforce the capacity for managing the information as well as the notification and reporting systems among the headquarters, branches and CRDs in order to advance follow-ups for operation and maintenance of existing projects effectively.

2) Reinforcing facility monitoring and follow-up activities

CRDs' regular patrolling and the SNAPE branches' follow-up activities on problematic sites are considered essential for identifying and resolving problems at an early stage. However these activities were rarely done. Thus, in order to encourage the administrative authorities to perform facility monitoring and follow-up activities, it is necessary for CRDs and the SNAPE branches to; 1) allocate officers responsible for water facility monitoring, 2) disseminate information regarding the role and responsibility of the administrative authorities as well as monitoring methods, and 3) secure a budget for monitoring activities .

3) Reviewing ARs' patrolling systems

The result of the Ex-Post Evaluation Study shows that 40% of the CPEs in the surveyed 171 villages (61/171 CPEs) received regular inspections by ARs. However the other 60% received less than one visit in the past six months due to the several reasons including the bad road conditions, geographical conditions of the sites, the number of water facilities in charge per AR, and sharp increase of the fuel price. Based on these conditions, it is necessary to reexamine the appropriateness of existing system that requests two ARs for patrolling all the water facilities in the sub-prefecture "on a regular basis", and to reconstruct more realistic and feasible patrolling systems.

4) Reinforcing skills of CPE technicians

The study showed that lack of skills among CPE technicians was one of the causes for prolonging downtime. Routine maintenance inspection and immediate responses to problems are essential for keeping the facility conditions at a desirable level. Therefore, technical training should be given to technicians at the CPEs in charge of maintenance and inspection in villages, especially the said 79 CPEs that currently do not allocate ex-trainees.

5) Supporting repair of non-functioning facilities

The study found that there were eight nonfunctioning facilities. However, due to lack of skills of CPEs as well as insufficient support from ARs, it will be difficult for the CPEs to repair the facility on their own. Therefore, in order to ensure safe and stable water supply in the project sites, it is necessary to provide information to concerned CRDs via the SNAPE branches, and to repair these eight non-functioning facilities at an early stage with the support of a SNAPE branches office and CRDs.

4.2.2 Recommendations to JICA

No recommendations.

4.3 Lessons Learned

1) Promoting resident participation in facility maintenance at the project sites

The study found that resident-led maintenance work including cleaning around the facility has been carried out continuously under the instruction of CPEs in the villages with functioning facilities. Such proactive commitment by the people and also their initiatives are essential in maintaining the facility condition at a desirable level.

In order to promote the active involvement of residents in maintenance activities, the project assessed the residents' needs for water including construction of water facilities, as well as their willingness to reserve money for future maintenance, to establish CPEs, and to fulfill their required duties on facility maintenance during the BD Study. Based on results of the assessment, potential construction sites were selected. Then during the Soft Component, the local people were involved in decision-making on selection of CPE members, establishment of the water tariff, and development of rules on facility-use. In other words, the project provided opportunities for the residents to participate in decision-making at an early stage of the project implementation so as to promote implementation of operation and maintenance activities by reflecting the opinions and requests of the beneficiaries as a whole. A series of efforts undertaken before and after the project is launched would be a good practice for similar projects in the future.

2) Conducting preliminary research on existing wells

The project added the availability of alternative water sources including existing facilities to the criteria for site selection and conducted a social survey to grasp the situation of residents' water use in all target areas. Based on findings from the said survey, construction sites were selected by giving priorities to those villages where no or only a couple of facilities existed, and thus demand for construction of water facilities was high.

The study identified that the facilities were in continuous use and operation at most of the target sites. This high functioning rate is a result of the fact that a lack or shortage of existing wells actually sustained the importance of water facilities and the motivation for facility maintenance among residents.

When similar projects are implemented, a detail assessment on residents' water usage and on the availability of alternative water sources in particular, should be carried out in consideration of the relationship between the availability of existing water facilities and the residents' willingness to maintain the facility as described in Lesson 1.

3) Holding spare parts

The government of Guinea has taken initiative to develop and promote a network for spare parts procurement. As a result there are now parts distributors in each prefectural capital in Middle Guinea where this project targeted. However, this does not guarantee that the parts are obtainable when they are most needed for repairs due to a number of reasons including the locations of the villages, road conditions from village to stores, limited modes of transportation, and insufficient number of parts in stock. The project focused on these issues and required each CPE to purchase a spare parts kit during the project period so that CPEs could change consumable seals by themselves or with the help of ARs when necessary. Parts procurement beforehand made routine maintenance by CPE easy and led to sustaining the functionality of facilities as a result.

Therefore, in order to sustain the functioning rate of facilities at a desirable level, advance procurement of spare parts should be considered when a similar project will be implemented in a country like Guinea where one type of pump has been in use for a long time.

4) Regular patrolling by ARs

The project positions ARs in each sub-prefecture as a stakeholder in operation and maintenance, based on the existing water facility maintenance systems in Guinea. As previously described, on top of their main works as blacksmiths, electricians, or car mechanics, ARs visit the villages equipped with water facilities in their sub-prefectures, check the functionality of facilities, take preventative maintenance measures including lifting and cleaning the pump,

changing and repairing parts, and giving instructions on CPE operation. The Factorial Analysis on Successful Maintenance (BOX) found that functioning sites have more AR visits than nonfunctioning sites, and that proved that regular patrolling by ARs had a decisive impact on the successful operation of facilities.

Thus, in order to sustain a desired level of facility functionality in a similar project in the future, regular patrolling visits by technical staff with sufficient skills in water facility maintenance should be encouraged. This also requires consideration on how to secure a source of budget funds for such activities in creating a system of regular patrols by technicians[35].

5) Reinforcing monitoring during the Soft Component of the project

One month after the water facilities started supplying water, the project designated one month of monitoring during the Soft Component period. However such monitoring was done only once per village; moreover some villages were even out of reach of the survey during the designated period depending on the timing or seasons.

As a consequence, outcomes of regular-patrolling by ARs and CRDs, or maturity of maintenance system in other words, were not well understood among the related stakeholders, especially the implementing agency, by the end of the Soft Component program. It also prevented additional research and follow-up activities to ARs and CRDs by an implementing agency after the project. Therefore no improvement was observed in terms of CRDs' regular patrolling even in this evaluation study.

As noted above, results of monitoring activities affect the future activities by implementing agencies. Therefore, when implementing similar projects in the future, it is necessary to determine the monitoring period as well as the monitoring system carefully so that project outputs are clearly understood and feedback is ensured by implementing agencies after the project.

[35] In Guinea, there has been a unique system based on the beneficiaries-pay principle to avoid placing a financial burden on the administrative agency by paying an allowance for ARs from the CPE reserve at each village for their patrol inspection.