Republic of Guinea

Ex-Post Evaluation of Grant Aid Project

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

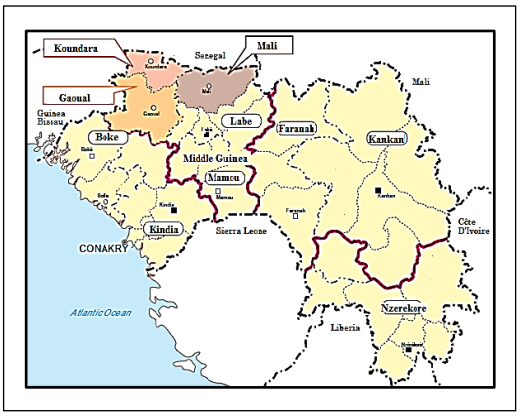
External evaluator: Yumiko Nakamura, Binko International Ltd.

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

[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)

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 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.

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

[3] ③: High, ②: Fair, ①: Low

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 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

[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)).

"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 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.

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

[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

[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.

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.

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.

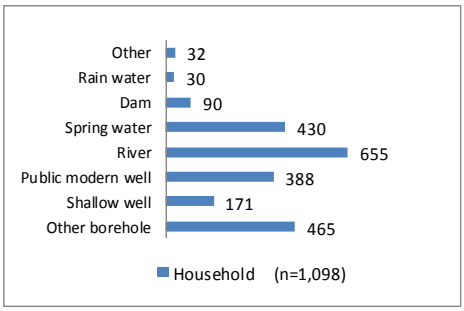

Figure 1: Major water source before the project

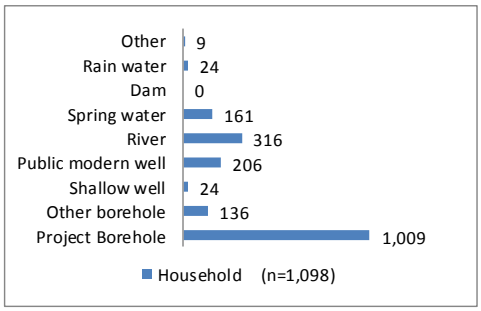

Figure 2: Major water source after the project

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.

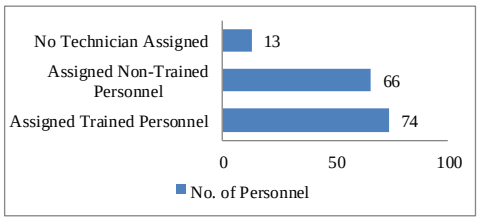

Figure 3: Allocation of technicians by CPE

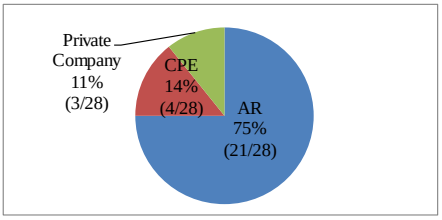

Figure 4: Actual repairers in the past 6 months

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

[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.

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 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

[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).

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 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%)

[16] Source: Results of the questionnaire survey

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.

[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.

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 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.

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

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.

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

[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.

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.

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

[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.

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.

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

[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.

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 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.

[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.

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.

[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.

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:

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

[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

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.