Ex-Post Project Evaluation 2016 :
Package Ⅰ-8
(Ghana, Togo, Sierra Leone)

February 2018

JAPAN INTERNATIONAL COOPERATION AGENCY

ALFAPREMIA CO., LTD.
GLOBAL LINK MANAGEMENT, INC.

EV
JR
17-21

Ex-Post Project Evaluation 2016:
Package Ⅰ-8
(Ghana, Togo, Sierra Leone)

February 2018

JAPAN INTERNATIONAL COOPERATION AGENCY

ALFAPREMIA CO., LTD.
GLOBAL LINK MANAGEMENT, INC.

Disclaimer

This report compiles the result of the ex-post evaluations. These are conducted by external evaluators to ensure objectivity, and 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 report is posted on JICA's website.

Comments by JICA and/or the Borrower (including the Executing Agency) may be added at the end of the evaluation report when the views held by them differ from those of the external evaluator.

The Republic of Ghana

FY2016 Ex-Post Evaluation of Japanese Grant Aid Project

"Project for Rehabilitation of National Trunk Road N8"

External Evaluator: Noriyo Aoki, Alfapremia Co., Ltd.

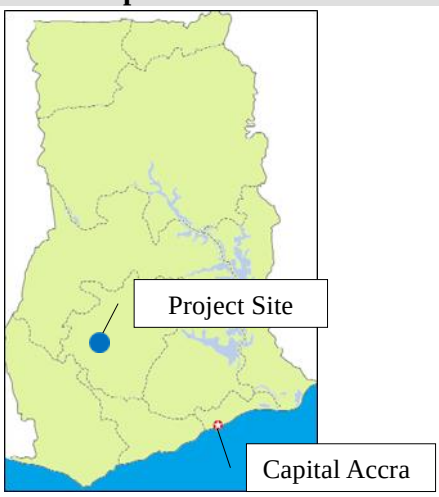
0. Summary

The project was implemented to secure a smooth and stable traffic by improving the road between Assin Praso and Bekwai, thereby contributing to maintaining access of local residents to social services in the target area, and promoting the distribution of goods between the target area and the surrounding areas.

This project is highly relevant, as it is consistent with priority areas in the development policy of Ghana and Japan's ODA policy and the development needs are also high. Though the project cost was within the plan, the duration of the project slightly exceeded the plan; thus, the efficiency of the project is fair. Improvements in the roughness of the road surface resulted in smooth vehicle travel and improved average travel speed. Reduction of travel hour was realized. The effects such as an increase in traffic volume were also observed. This project improved the access of the residents to social services such as medical services, mitigated the cost of transportation services, and vitalized commercial activities and agricultural production in the area surrounding the road. For these reasons, the effectiveness and the impacts of the project are high. An operation and maintenance system for the road has been established. No problem was found with respect to the maintenance technical skills, and the current status of maintenance is mostly favorable. However, some concerns remain in terms of financial aspects; thus the sustainability of the effects emerged from this project is judged as fair.

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

1. Project Description



Project Location

Pedestrian on Crosswalk and Bus
(Adansi South District)

1.1 Background

In Ghana, road networks are major keys for socio- economic activities. An economic zone surrounding the second largest city, Kumasi, exists along the target road section, which serves as a production site and logistical center for timber, cacao, gold, manganese, bauxite and so on. The National Trunk Road N8 is a major traffic route to Kumasi. Exports that accumulated at Kumasi are transported southbound by the N8 and are exported from the second largest port in Ghana, Takoradi, while imported goods are carried to Kumasi from Takoradi port via the N8. As shown in Figure 1 (p. 3), N8 links to N10, which leads north of Kumasi to the northern savanna area and Burkina Faso. When neighboring countries such as Burkina Faso and Côte d'Ivoire were politically unstable, N8 also functioned as an international logistical route to landlocked countries. At the time of the ex-post evaluation, its role as an international transport road decreased along with the stabilization of the political situations in neighboring countries. Instead, it has become a trunk road used primarily for domestic transport.

1.2 Project Outline

This project was implemented to secure smooth and stable traffic by improving the road between Assin Praso and Bekwai in the target area, thereby contributing to maintaining access of local residents of the target area to social services, and promoting the distribution of goods between the target area and the surrounding areas.

E/N Grant Limit or G/A Grant Amount /Actual Grant Amount	Detailed Design: 110 million yen/110 million yen Construction: 8,714 million yen/8,694 million yen
Exchange of Notes Date/ Grant Agreement Date	Detailed Design: Feb. 2009/Feb. 2009 Construction: Jul. 2009/Jul. 2009
Executing Agency	Ghana Highway Authority (hereinafter referred to as " GHA ")
Project Completion	December 2013
Main Contractor	Tokura Corporation
Main Consultant	Construction Project Consultants, Inc. Ingerosec Corporation (January 27, 2009: took over the duties from construction project consultants)
Basic Design	Basic Design Study: Mar. 2008
Related Projects	Japanese ODA Loan Project *Anwiankwanta-Yamoransa Road Rehabilitation Project* (1987–1994)

2. Outline of the Evaluation Study

2.1 External Evaluator

Noriyo Aoki (Alfapremia Co., Ltd.)

2.2 Duration of Evaluation Study

Studies for this ex-post evaluation were conducted during the following periods:

Duration of Study: July 2016–February 2018

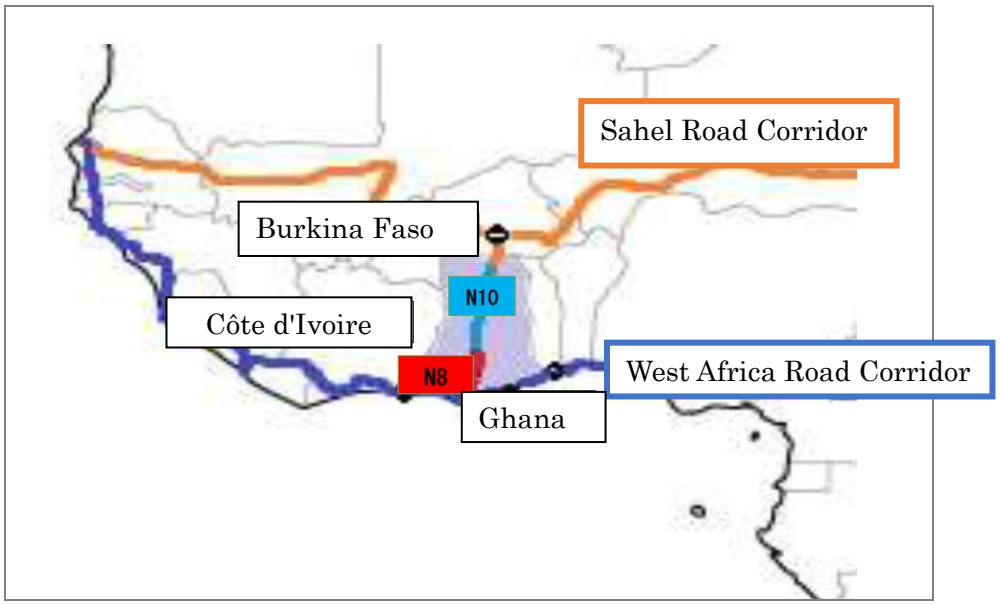
Duration of Field Study: October 17–November 1, 2016; February 5–10, 2017

3. Results of the Evaluation (Overall Rating: B[1])

3.1 Relevance (Rating: ③[2])

3.1.1 Consistency with the Development Plan of Ghana

The government of Ghana addressed promotion of transportation infrastructure development for the regional development as a main plan in the national plan *Long-Term Economic and Social Development Plan 1995–2020 (Ghana Vision 2020)* and *Strategies for Second Growth and Poverty Reduction 2006–2009* (Ghana Poverty Reduction Strategy II, hereinafter referred to as "GPRS II")[3]. Under the *Road Sector Development Program 2002–2006*, the government also set a target on road improvement for the development of trunk roads and regional access roads[4]. In terms of the development of international roads, the development of N8 and N10 was regarded as a prioritized policy because both roads connect with the West Africa Road Corridor and the Sahel Road Corridor in the north-south direction, which is promoted by the Economic Community of West African States, hereinafter referred to as "ECOWAS"[5].



Source: Illustrated based on the *Basic Design Study Report* pp. 1–3.
Note: National Trunk Road N8 and National Trunk Road N10 are noted as N8 and N10, respectively.

Figure 1. Road corridor of the West Africa

Ghana Shared Growth and Development Agenda 2010–2013, hereinafter referred to as "GSGDA", was formulated as a plan in a similar position as GPRS II that was in place during the planning stage, and its successor, *Ghana Shared Growth and Development Agenda*

[1] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory
[2] ③: High, ②: Fair, and ①: Low.
[3] *Basic Design Study Report* pp. 1–2.
[4] *Basic Design Study Report* pp. 1–2, Republic of Ghana *Anwiankwanta-Yamoransa Road Rehabilitation Project Preliminary Study Report* (2007) page 9.
[5] *Basic Design Study Report* pp. 1–3.

2014-2017, hereinafter referred to as "GSGDA II", was positioned as the *National Mid-Term Development Plan* at the time of ex-post evaluation.

Under GSGDA II, the government of Ghana set a goal in which its road network would serve as the center of transport in West Africa. The repair of damaged road infrastructure[6] was listed amongst the approaches. Along with GSGDA II, *Road Sector Medium-Term Development Plan 2014–2017*, hereinafter referred to as "SMTDP", was formulated and committed to the efficient and cost-effective development of a transport network that matched the needs of the society in a sustainable manner, thereby playing a role as the center of transport in West Africa. Specifically, *GHA Strategic Plan 2015–2017* was formulated, where road maintenance, axle load control and ensuring of transportation safety were identified as strategic pillars[7]. Additionally, GHA also formulated the *Ghana Highway Authority 20-Year Strategic Plan for 2017–2037*, which addresses that the first goal is timely road maintenance, the second goal is road development with guaranteed cost-effectiveness, the third goal is the efficient axle load control, the fourth goal is the improvement of road safety, and the fifth goal is the establishment of its own funding resource[8].

In light of the above, this project was consistent with the development policies of Ghana both at the time of planning and ex-post evaluation.

3.1.2 Consistency with the Development Needs of Ghana

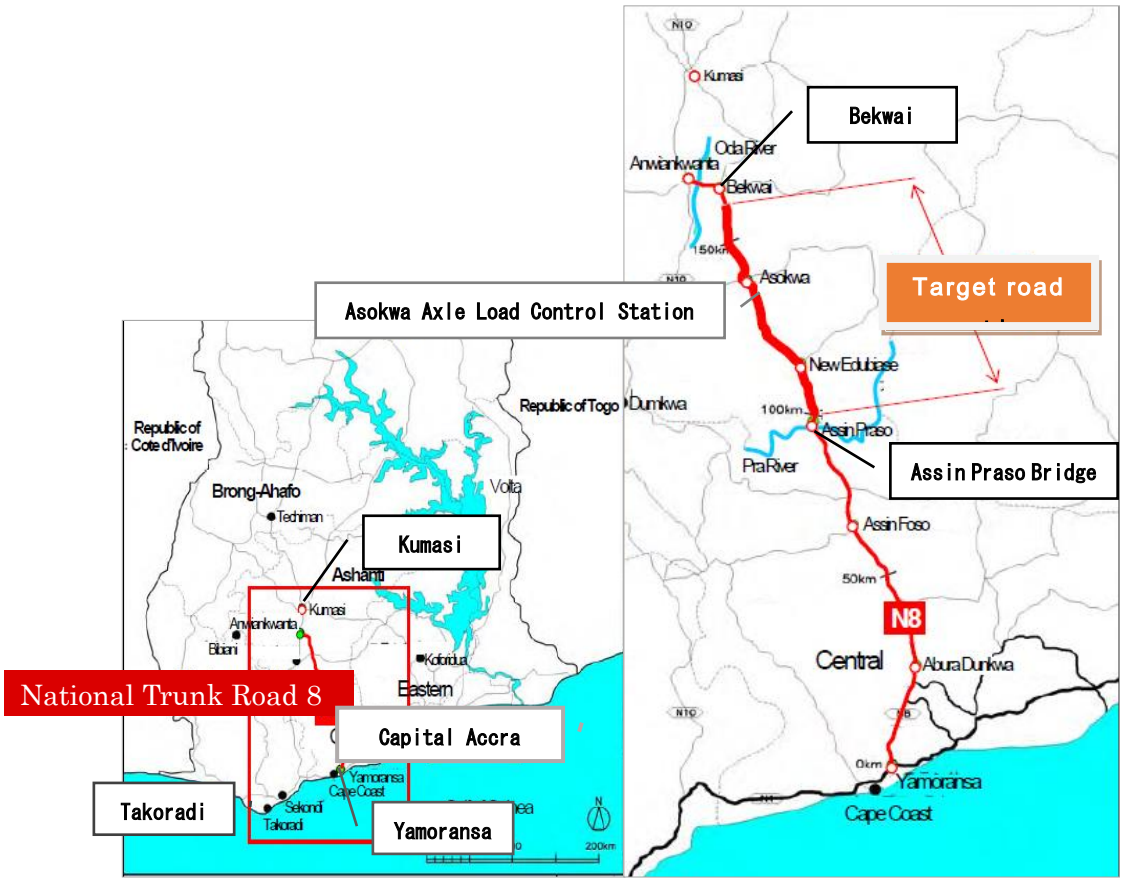
The N8 route which was developed through a Japanese ODA Loan Project from 1987 to 1994 (*Industrial Road Rehabilitation Project*)[9], suffered from significant degradation of the pavement because of overloaded vehicle traffic and remained in a state in which safe and smooth transportation was inhibited and required immediate improvement[10]. N8 is an important transport route that connects the economic zone centered around Kumasi with the port of Takoradi, and development of the road was needed as it is also a part of the international road network that leads to landlocked countries such as Burkina Faso.

The Assin Praso Bridge, which was built 72 years ago, had suffered from significant damage even though the limit of load had been set because many vehicles with loads exceeding the limit had continued to pass over it, and the bridge needed to be replaced to ensure traffic safety[11].

The urgent development need at the time of planning was satisfied by the project at the time of ex-post evaluation, and the priority and relevance of the target selection of the project was judged as high.

---

[6] GSGDA II, pp. 79.
[7] *GHA Strategic Plan*, pp. 2.
[8] *Ghana Vision 2020* at the time of planning was no longer positioned as a national plan at the time of ex-post evaluation. Instead GSGDA II is the national development plan.
[9] N8 Yamoransa–Anwiankwanta, 175 km. Anwiankwanta is the name of a site in Bekwai.
[10] *Basic Design Study Report*, pp. 1–6.
[11] *Basic Design Study Report*, pp. 3–13.



Source: Formulated map based on that of *Basic Design Study Report*

Figure 2. Target road section along National Trunk Road N8

3.1.3 Consistency with Japan's ODA Policy

The government of Japan positioned the development of road networks as one of the development issues within its prioritized assistance area "improvement of the livelihood environment through development of basic infrastructure" in its *Country Assistance Plan for the Republic of Ghana* formulated in June 2000. The development of economic infrastructure including the road sector was designated as an important development issue to promote the development of the private sector from the perspective of industrial growth.

The assistance for the economic infrastructure development was also addressed in the *Yokohama Action Plan* adopted during TICAD IV in 2008[12].

3.1.4 Appropriateness of the Project Plan and Approach

In addition to the promotion of logistics, the target section was selected appropriately since many villages were found along the N8 and the road would have a great impact on the livelihood and economy of local residents. While these will be discussed later in the Project Outputs and the Effectiveness sections, planned designs for pavement structure, road shoulder

[12] *TICAD IV Yokohama Action Plan*, May 2008.

width, road width, bridge repair, alignment, and sight distance were appropriate for the target sites.

In light of the above, the implementation of the project fully conformed to the development policies and development needs of Ghana in addition to Japan's assistance policy. The project plan and its approach were also appropriate; therefore, the project was highly relevant.

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

Table 1 shows the outputs developed and provided by Japan, and Table 2 shows the Ghanaian side duties.

Table 1 Outputs developed and provided by Japan (planned and actual)

Planned Item	Contents of Plan	Actual
Road design		
Planned target section	Assin Praso–Bekwai (59.9 km)	As planned
Road width	11.3 m (roadway, 3.65 m × 2; road shoulder, 2 m× 2; climbing lane, 3.5 m)	As planned
Design axle load	Design axle load: 13 t, cumulative 27 million standard load-bearing class	As planned
Climbing lane	Right lane: 1.68 km from the 43.5 km point Left lane: 1.29 km from the 45.2 km point	As planned
Pavement	Roadway pavement: 14 cm thick (4-cm asphalt concrete surface layer, 5-cm base layer, 5-cm leveling layer) Roadway base course 20 cm (crushed stone for mechanical stabilization) Roadway base course 20 cm (materials generated on-site)	As planned
Road shoulder surface layer	3 cm (asphalt concrete surface layer)	As planned
Structure		
Cross drainage structure	127 locations	As planned
Bridge (Assin Praso Bridge)	One location (three spans, 98 m in total length) Repair details: Replacement of an existing bridge (Existing bridge remains on site to be used as a pedestrian bridge by Ghanaian side)	As planned
Incidental facilities		
Drainage ditch	Concrete waterway, unlined waterway	As planned
Guardrail	Rigid protective wall, guard post	As planned
Improvements on intersection	Major intersection between endpoints: one location (42.4 km from starting point)	As planned
Traffic safety facilities	Road surface markings, humps, crosswalks, road signs	As planned
Bus stop	40 locations (3.5 m width, 30 m length) Two locations (3.5 m width, 100 m length)	As planned
Slope protections	Drainage berms, culverts, sodding (45.4 km from starting point)	As planned

Source: Results from interviews with Ashanti Regional Office, and documents provided by implementing consultants.

Table 2　Items of duties of Ghanaian side (planned and actual)

Planned	Actual
1) Relocation of obstructing buildings for road construction	As planned
2) Resettlement of houses within road site for road construction	As planned
3) Land acquisition and land rental for construction yard in some sections for alignment improvement	As planned
4) Relocation of electric wires, telephone poles, and water pipes	As planned
5) Registration of local construction vendors	As planned

Source: *Basic Design Study Report* (pp. 3–55), results from interviews with stakeholders, and documents provided by implementing consultants.

Outputs developed and provided by Japan were almost delivered as planned. Design for the retaining wall of a cut section was altered from masonry style to large concrete blocks. The reason is that a retaining wall was constructed in a steep mountainous section where large vehicles had to take detours for safety precautions during construction and construction had to be efficient. Retaining walls for the inlet and outlet of pipe culverts were also changed from masonry to reinforced concrete. These changes were intended to minimize the impact on general traffic since the pipe culvert to be changed was located at a key traffic congestion point. In addition, a request was made by the project implementing agency to minimize the impact on the general traffic and resulted in a change in surface protection of the earthen gutter from masonry to concrete. In either case, no impact on cost or construction time was found.

As a result of a slope collapse during the rainy season within the construction period in a mountainous area, another survey and design was needed to convert the temporary soil retention measures into a permanent solution. Cost of the survey and design increased by 5.24 million yen, but it did not affect the construction time. Fundamental measures were taken against landslides by adding preventive measures in areas where mountainous slopes had collapsed. For these purposes, 46.98 million yen was spent additionally, but the expenditure was fully covered by the contingency within E/N agreement, and the constructions had appropriate changes despite their impact on the construction period.

Duties of the Ghanaian side were executed as planned. The procedures for resettlement of residents and land acquisition were completed as planned before construction began but payment for land acquisition was delayed in some areas[13].

3.2.2 Project Inputs

3.2.2.1 Project Cost

The planned project cost for the Japanese side (E/N grant limit) was 8,824 million yen, while the actual project cost was 8,804 million yen. Since the actual cost was 100% of what was planned, it was within the plan.

The estimated project cost on the Ghanaian side was approximately 109 million yen (983,000 GHC[14])[15], but the actual cost was approximately 71 million yen (1,347,000 GHC) or

[13] From an interview with implementing consultants, payment was delayed in some areas because of a delay in expenditures by Ghana Ministry of Finance.

[14] Calculated using the following average exchange rate from November 2007 to April 2008: 1 USD = 107.97 JPY, 1 GHC = 110.71 JPY (GHC: Ghanaian cedi) (from *Basic Design Study Report*). Ghanaian cedi can be noted as GHC, GHc, or GHS; this report uses GHC.

65% of the planned cost[16].

The actual total project cost combining the Japanese and Ghanaian costs was 99% of the planned value *(Table 3, ②÷①), which did not exceed the planned budget.

Table 3　Comparisons between planned and actual project costs

Item	Planned	Actual
Japan		
Detailed design	110 million yen	110 million yen
Main construction	8,714 million yen	8,694 million yen
Total of Japanese side	**8,824 million yen**	**8,804 million yen**
Ghana		
Land acquisition cost, etc.	109 million yen	71 million yen
(in Ghanaian currency)	(983,000 GHC)	(1,347,000 GHC)
Total cost of both countries	**8,933 million yen** ①	**8,875 million yen** ②

Source: GHA

3.2.2.2 Project Period

The project period was planned for 51 months (from the start of the detailed design to the completion of construction)[17], but the project was delayed by 7 months[18], exceeding the planned period by 14%. The actual detailed design and tender period was 9 months while the planned period was 12 months. The construction period took for 46 months while the plan was for 42 months. The major reason for the delay was the time required to implement preventive measures for slopes in the mountainous area, and particularly that construction was avoided during the rainy season. As described earlier, delays of payments for land acquisition in some areas also caused construction delay.

In the light of the above, though the project cost is within the plan, since the project period exceeded the plan, its overall efficiency is fair.

3.3 Effectiveness (Rating: ③)

3.3.1 Quantitative Effects (Operation and Effect Indicators)

3.3.1.1 Improved Roughness

As shown in Table 4, there was 9 km of distance that faced difficulty in passing because of issues of roughness, but the roughness of the target section is improved by this project as

[15] *Basic Design Unit 1*, pp. 3–55.

[16] Calculated using the average exchange rate of 1 GHC = 53.01 JPY from March 2009 to December 2013. The GHC fell from 1 GHC = 110.71 JPY at the time of planning and was weaker during project implementation. The Ghanaian cost increased because of soaring prices that was caused by GHC being a weaker currency against US dollars, while a drop in the calculated cost after conversion to yen was because of the downfall of the GHC against the US dollar and the Japanese yen that continued to be weak during the implementation period (GHA).

[17] Calculated as 51 months, including detailed design and bidding as well as the construction period in the project planning period from the project implementation scheduling chart in the *Basic Design Study Report*. However, the project period did not include the period for administrative procedures from the date of the G/A to the start of the detailed design, and the ex-post evaluation defined the starting point of the project as the start of the detailed design which was clearly identifiable for both plan and actual.

[18] 58 months from the beginning date of the detailed design (contract conclusion with consultants) in March 2009 to the completion date in December 2013.

shown in Table 5. The international roughness index, hereinafter referred to as "IRI[19]", measured at the sites decreased from 3.8 at the time of planning to 1.3 after project completion, thereby improving the roughness. According to both the road users in the target section and GHA Ashanti Regional Office staff, severe damage found before the project was improved, eliminating the subduction of front and back of culverts, puddles on the road, potholes, bumpy patches, and alligator cracks, thereby improving the roughness of the road. According to the results of the beneficiary survey, every respondent said that road roughness improved[20].

Table 4 Changes in distance that is difficult for passage because of road roughness

Indicator	Baseline (2008)	Target (2013)	Actual (2013)	Actual (2016)
	Planned Year	Completion Year	Completion Year	Ex-post Evaluation
Distance that is difficult for passage because of roughness	9 km	0 km	0 km	0 km

Source: GHA

Table 5 Changes in the IRI for the target section

Indicator	Planning Stage (2008)	After Completion (2014)
Assin Praso–Bekwai1)	3.8	1.3

Source: Road Condition Registry for Year (GHA)
1) Average value of sectional measurements

3.3.1.2 Improved Travel Speed and Reduced Travel Time

As Table 6 shows, running speed was 10 km/h at the time of planning, and the target was set at 80 km/h. Twenty-two villages were scattered on both sides of the road throughout the target section, and crosswalks were made near schools, health centers, and district halls. Speed-control tables were established at 45 locations between Assin Praso and Bekwai (59.9 km) for the safety of local residents, which required the drivers to take time for deceleration and acceleration. Where residents cross the road frequently, the speed limit had been set at 50 km/h since 2013. Establishment of these speed-control tables and crosswalks were decided based on the road surface construction completion and before the beginning of service after discussions between the Road Safety and Environment Department of GHA, the Ashanti Regional Office, the local administrative institutions (mainly district halls adjacent to the target section), and resident representatives. Police checkpoints for maintaining public security and traffic safety were established in two locations. Vehicles having to stop temporarily slightly influenced the fact that sections of road on which vehicles can travel at the planned 80-km/h target speed were limited. For these reasons, as shown in Table 6, vehicle speed was

[19] An indicator that measures the roughness of a road surface.
[20] Beneficiary surveys were conducted by defining the target population as users of the target road and by using a quota sampling method. The surveyed population consisted of effective responses by drivers of 40 freight vehicles, 14 minibuses, 4 motor coaches, 16 sedans, 5 motorcycles, 2 bicycles, 1 tractor, and 40 pedestrians. A total of 122 effective responses were obtained; 96 respondents were male and 26 were female. All of the female respondents were pedestrians. Female vehicle drivers could not be found as a sample target.

in the range of 50–80 km/h at the time of ex-post evaluation. The baseline value of a safe travel speed on the bridge at the time of planning was 10 km/h and the target speed was 80 km/h, but the actual speed remained at 50 km/h at the time of ex-post evaluation. This was largely because a 50-km/h speed limit was set in the areas surrounding the bridge to maintain safety, as a market had been developed in a relatively large area surrounding the bridge.

Table 6 Major operations and effect indicators

Indicator	Baseline (2008)	Target (2013)	Actual (2013)	Actual (2016)
	Planned Year	Completion Year	Completion Year	Ex-post Evaluation
Vehicle driving speed	10 km/h	80 km/h	50–80 km/h	50–80 km/h
Safe driving speed on bridge section	10 km/h	80 km/h	50 km/h	50 km/h
Travel time required in the section	90 min.	47 min.	NA	61 min.

Source: *Basic Design Study Report*, GHA. Travel time required between the section was measured with 4WD vehicles both at the time of planning and ex-post evaluation.

As shown in Table 6, the baseline of the time required to travel through the section was 90 minutes at the time of planning, and the target was 47 minutes at 80 km/h, but the road required for 61 minutes to travel at the time of ex-post evaluation. This is because of the speed-control tables and crosswalks established across the road, police check points that required vehicles to stop temporarily, and the speed limit at 50-km/h in residential areas. However, while the three indicators above did not reach the target values, actual values at the time of ex-post evaluation did improve compared to the baselines at the time of planning.

3.3.1.3 Increased Traffic Volume

As Table 7 shows, daily average traffic volume was 2,143 vehicles at the time of planning, while the number was 3,748 at the time of ex-post evaluation, exceeding the planned target value of 2,600–3,000 vehicles. Among vehicle types, daily average traffic volume of motorcycles significantly increased by 5.7 times of the initial volume because of the traffic safety ensured by establishing the road shoulders. The number of general vehicles such as passenger cars, pickups, and 4WDs increased by 2.5 times of the initial volume.

Table 7 Daily average traffic volume

Indicator	Baseline (2008)	Target (2013)	Actual (2013)	Actual (2016)
	Planned Year	Completion Year	Completion Year	Ex-post Evaluation
Daily average traffic volume (number of vehicles)	2,143 1)	2,600–3,000	NA	3,748 2)

Source: Traffic volume survey at Assin Praso at the time of basic design and ex-post evaluation

1) Baseline for the plan year was 2,577 vehicles at Assin Praso at basic design, but the traffic was measured from 8:00 am Friday to 8:00 am of the following Saturday, and the number was adjusted using a coefficient for days of a week based on actual measurements by GHA.
2) Actual value at the time of ex-post evaluation was measured from 8:00 am Monday to 8:00 am of the following Tuesday, and the number was adjusted using a coefficient for days of a week based on actual measurements by GHA.

Table 8 Daily average traffic volume by vehicle type (measured 24 hours)

Indicator	Planning Stage1) (2008)	Ex-post Evaluation Stage (2016)
Motorcycle	64	**365** 5)
General vehicle 2)	728	**1,807**
Minibus 3)	470	**662**
Motor coaches 4)	420	**518**
2-axle truck	163	**219**
3-axle truck	29	45
4-axle truck	**64**	52
5-axle truck	**113**	42
6-axle truck	**92**	38
Total	2,143	3,748

Source: Traffic volume survey of *Basic Design Study Report* (pp. 2–6), and traffic volume survey results at the time of ex-post evaluation
1) Traffic volume reported by the *Basic Design Study Report* adjusted by the coefficient based on measurements by GHA.
2) Taxis, sedans, pickup trucks, 4WDs and so on.
3) Includes station wagon omnibuses.
4) Medium- and large-sized buses.
5) Bold underlines suggest a different trend in traffic volumes between the time of planning and ex-post evaluation.

Comparison between types of vehicle at the time of planning and those at the ex-post evaluation shows that while the number of buses, two-axle trucks, and three-axle trucks increased, the number of large-freight vehicles with four axles or more decreased. This is because of a decrease in the number of transport freights to Burkina Faso via inland Ghana as a result of subsided conflicts in neighboring countries (Côte d'Ivoire and Togo), an increase in vehicles that chose to avoid Ghana and take a long-distance transport route in neighboring countries, the establishment of police checkpoints for maintaining public security and traffic safety, and

establishment of the new speed-control tables in the country[21]. In particular, large-load vehicles are affected by the increased fuel costs when they pass through the speed-control tables as they have to decelerate and accelerate, and the larger the freight, the more likely they take a route other than that in Ghana[22]. Compared to neighboring countries, regulations on axle loads are stricter in Ghana and amount of penalties is higher[23].

A comparison of changes in traffic volume across Ghana and the target section were attempted, but according to GHA, statistics on the number of registered vehicles and vehicles entering and leaving Ghana lacked reliability, and a comparison could not be made.

As shown in the daily traffic volume distributions in Table 8, the volume of vehicles with three or less axles increased, but the volume of large-freight vehicles with three or more axles decreased. During the interviews with drivers of large-freight vehicles at the time of the beneficiary survey, the majority of vehicles with four or more axles were used for long-distance transport[24]. As for trucks with three axles or less, the intended promotion of distribution of goods in the target region and surrounding areas was confirmed despite a decline in international long-distance logistics since goods distribution to and from the Kumasi regional economic zone was plentiful[25].

3.3.1.4 Smooth Travel by Installing Climbing Lanes in Mountainous Area

As the result of installing climbing lanes for large vehicles whose speed decreases in mountainous area, congestion in the climbing section was solved and smooth vehicular travel except large scale vehicles was secured. Road alignment and sight distance between mountainous sections were also improved.

3.3.1.5 Secured Sight Distance during Passage by Improving Intersection

Through the improved design of this project, the outlook at the three-way junction intersection at Obuasi -Asokwa improved, thereby improving the sight distance for pedestrians and vehicle drivers and decreasing collisions at the crossing.

3.3.1.6 Smooth Passage by Replacing Bridge

On the old bridge, road width was limited and there was only a single lane, resulting in frequent congestion of vehicles waiting to cross the bridge. The road width on the new bridge was expanded as well as the road shoulder to secure safe passage.

[21] From interviews with GHA, and road & traffic experts.
[22] From interviews with axle load control station operators and large-freight truck drivers.
[23] Examples of overload fines: 500 GHC for 14 tons per 1 axle (over 2.5 tons); 1,500 GHC for 16 tons per 1 axle (over 4.5 tons); and 3,000 GHC for 18 tons per 1 axle (over 6.5 tons).
[24] For example, vehicles for long-distance transport from southern Ghana near Abidjan to northern Ghana, from Burkina Faso to southern Ghana, and from southern Ghana to northern Nigeria.
[25] Distribution to and from the economic zone around Kumasi was confirmed by the beneficiary survey, but it was also confirmed by bus drivers at the minibus stop near Assin Praso.

Waiting time was no longer required, and the waiting hours to cross the bridge was reduced from 1/3 to 1/2[26]. Stores and residences surrounding the old Assin Praso Bridge and the connecting roads were submerged under water about three times a year. The new bridge was constructed at a higher position and flooding no longer influences vehicle travel[27]. According to the results of the beneficiary survey, 99% of respondents said that its convenience improved.

New (left photo) and old (right) Assin Praso Bridge

The new bridge has specifications based on the B-live load of the technical standard *Road and Bridge Specifications* formulated by the Ministry of Land, Infrastructure, Transport and Tourism of Japan[28], which also satisfies Ghanaian bridge standards[29].

3.4 Impacts

3.4.1 Intended Impacts

3.4.1.1 Suppression of Traffic Accident Occurrence

While the number of traffic accidents was not confirmed at the time of planning, there was no clear increase in the number of traffic accidents after project completion compared to the construction period. Of the effective responses in the beneficiary survey, 96% said that traffic accidents decreased, 2% said there was no change, and 3% said the number of accidents increased[30]. According to interviews with district police and local residents, the incidence of traffic accidents was suppressed by the presence of speed-control tables. Improved road shoulders (2 meter per one side) also contribute to the safe travel of pedestrians and motorbikes. According to interview with police, many of the accidents occur when vehicles and motorcycles entering from roads connected to the target road section made contact with the vehicles traveling on the target section. While detailed data on the accident rate could not be obtained, changes in the rate of fatal accidents from the rollover of speeding vehicles did not increase compared to one before the project although there was an increase in traffic

[26] From interviews with road users and surrounding residents.
[27] Old bridge still exists as a walkway.
[28] Standards used for bridges with heavy large-vehicle traffic. Specifications applied to speedways, national trunk roads, and prefectural roads.
[29] Information from an interview with implementation consultants.
[30] Those who said the accidents increased were pedestrians. The sum of effective respondents was not 100% because each numbers was rounded.

volume[31].

Table 9 Number of traffic accidents in target section (2011–2015)

Year	Fatal Accidents 1)	Minor Accidents 2)
2011	48	117
2012	44	122
2013	50	110
2014	55	136
2015	53	113

Source: GHA, number of reports to district police stations.
1) Serious accidents with significant damage to the brain, internal organs and so on.
2) Accidents in which a person was injured and required time for treatment and recovery.

3.4.1.2 Access to Medical and Social Services

According to interviews with local residents, transport or access to general hospitals outside the section became easier, as well as to district hospitals located along the road. Visits during illness and transport of women for pregnancy tests and childbirth became possible with private cars as well as motorcycles[32]. Local residents are able to choose and receive medical services from several nearby medical institutions. The commute to the district office along the road for submission of various administrative forms also became easier. The results of the beneficiary survey showed that 98% of respondents responded that access to medical and other social services improved. Convenience of access to educational facilities improved with an increase in the number of bus traveling services.

3.4.1.3 Transport Cost

Transport cost can be separated into the cost for vehicle maintenance and fuel cost. According to the beneficiary survey, 100% of respondents who drive vehicles said that the cost of vehicle maintenance had reduced. Fuel consumption may have reduced because of an improvement in travel performance, but the fluctuation of fuel cost could not be verified through the survey considering the significant inflation in recent years, fluctuations in crude oil prices, and the fact that there are speed-control tables and other areas in which a vehicle needs to decelerate and then accelerate.[33]

3.4.1.4 Changes in Number of Bus Travel Services in the Section

According to minibus drivers at bus stops in Assin Praso, the number of minibus service companies that commute between Assin Praso and Etobiase (19 km) increased, and the amount of minibus traffic quadrupled since the planning stage. Users were now able to choose a bus company in search for a better service. However, bus charges did not change, as they are determined by the Ghana Private Road Transport Union, hereinafter referred to as GPRTU. According to an interview at a bus stop in Kumasi operated by GPRTU[34], the number of minibus services between Kumasi and Elubo (a point along the national border towards

[31] From an interview with police at a police station.
[32] After improvement, rickshaws (tricycles used as makeshift taxis) started to provide services on road shoulders.
[33] 15.5% in 2014, 17.2% in 2015 (IMF, World Economic Outlook Database).
[34] Kumasi Afaso Station.

Abidjan, the capital of Côte d'Ivoire) doubled since the planning stage. The coach service between Kumasi and Elubo, which did not exist at the time of planning, is now offered twelve times a day by a new bus company founded in 2012 along with the opening of the target section[35]. As a result of this project, long-distance bus traffic and commutes by residents in the surrounding area are triggered to increase.

3.4.1.5 Impacts on Local Industries by Improving Travel Performance

Approximately 90 percent of local residents in the target section work in the agricultural industry, cultivating cacao, oil palm, and plantains (a staple food), which serve as a source of income through sales on the roadside and at periodic markets in various locations within the target section. According to interviews with local residents, post-harvest loss (loss through disposal of agricultural products because of a decline in freshness or damage at the distribution stage) decreased because of the improvement in logistics[36]. In the beneficiary survey, 93% of respondents said that damage caused by transport decreased. Transport of goods to other regions became possible, and the area in which products were sold was expanded. According to local residents[37], revenue from the sale of products increased after the project completion[38]. Daily necessities, miscellaneous goods, and crops produced in the surrounding areas that could not be purchased before the project were now sold in nearby areas, and local residents were now able to choose what to purchase from a diverse selection of goods. According to roadside sellers, trade among local industries became active, and the local economy was revitalized after the project completion. However, greater trade activities at markets that were opened periodically within the target section also caused a wait period of a few minutes to pass the road, since the stores sprawled on both sides of the road, although it has not been causing a traffic congestion.

3.4.1.6 Induction of Newly Developed Local Business by Improving Road Reliability

While an increase in cacao and oil palm production within the target section was confirmed, the induction of new businesses could not be verified through interviews with the head of district hall and the mayor of Bekwai. It was confirmed that a newly established bus firm joined into the bus business and it induced a competition.

3.4.2 Other Positive and Negative Impacts

3.4.2.1 Impact on Natural Environment

[35] The creation of a new bus company was confirmed from interviews with bus operators.
[36] Ten local residents who sell goods at long-distance bus stops and trade goods at market were interviewed.
[37] Ten people who sell goods on the roadside and retailers (repair parts for motorcycles and bicycles, electrical appliance repair, and processed farm produce) around the Assin Praso Bridge were interviewed.
[38] Degree of increase in income could not be confirmed (the results from interviews).

Scrap from the removal of existing structures (crisscrossing drainage structures) was disposed of at a designated processing plant. Stripped asphalt was taken by city and district governments and reused for parking spaces at public facilities such as a police station and health centers. For measures against turbid runoff from the road and bridge construction, a shallow sump was installed for water plumbing and treatment of the runoff. Surplus soil was unloaded to a spoil bank to be reused. Construction was limited to daytime hours to minimize the impact of noise, vibration, and dust on surrounding residents. Dust was controlled by spraying water periodically from a sprinkler truck.

Based on the results of the environmental impact assessment, implementation consultants and construction vendors implemented the aforementioned measures for items which may cause impacts on the environment, and GHA monitored the environmental impact during the construction and after the commencement of the service.

As a result, there was no negative impact on the natural environment.

3.4.2.2 Resettlement and Land Acquisition

Land was acquired by a committee consisting of GHA Environment Division, Land Evaluation Division, local government representatives, and a land-evaluation committee. Acquired land reached up to 88.8 acres and 203 households and businesses were affected[39]. Many houses that needed to be resettled were moved to the backyard of their unused land. According to interviews with the owners of houses and businesses around the Assin Praso Bridge who had to relocate themselves, compensations were sufficient, and complaints, protests against measures and lawsuits, etc., were not reported.

3.4.2.3 Safety Measures during Construction

Construction was conducted on one side of the road at a time to avoid traffic severance as much as possible, and traffic control personnel were placed to guide and give cautions to passing vehicles. However, speed-control tables were not in place on the roadway because the roads had been just completed, and some vehicles on the new paved road were involved in accidents because of the accelerated velocity. To prevent accidents, construction guide and notice boards warning of the danger of speeding were placed in appropriate places to prevent accidents. For measures against HIV and other infections among construction laborers, GHA staff handed out preventive goods for HIV infections and gave cautions against infections by parasitic guinea worms and other means[40].

In relation to the effectiveness, the driving and transport time required to pass the rehabilitated road did not reach the planned target because of the introduction of 50-km/h speed-limit, etc. The project provided a great improvement in road roughness, smooth travel by vehicles, elimination of waiting time to cross a new bridge, and a large increase in traffic

[39] From interviews with GHA employees.
[40] Human immunodeficiency virus.

volume of motorcycles, general vehicles, and freight trucks with three or less axles and so on.

Overall, the expected project effect was generally achieved except for the effect indicator that was not achieved because of safety measures.

In relation to the impact, the negative impact of the road rehabilitation was mitigated by traffic-accident prevention measures taken based on discussions of the appropriate parties. In addition, positive impacts included improved access to social and medical services, reduced vehicle maintenance costs, positive effect on local industries, reduced post-harvest loss of agricultural produce, revitalization of local commercial activities and agricultural production, the entry of new business into transportation industry and ensued competition, and revitalization of logistics with surrounding regions. There was no negative impact on the natural environment.

In light of the above, the effectiveness and impact were high.

3.5 Sustainability (Rating: ②)

3.5.1 Institutional Aspects of Operation and Maintenance

GHA was the executing agency of this project and is positioned under the Ministry of Roads and Highways, which is the government ministry in charge[41]. GHA manages the construction and maintenance of national roads, regional roads, and inter-regional roads in Ghana[42]. GHA consists of a headquarters and 10 regional offices. The target section of this project was under the jurisdiction of the Ashanti Regional Office.

The Road Maintenance Division of the Maintenance Department at GHA headquarters plans and allocates budgets for the maintenance of trunk roads. Long-term and large-scale repairs are managed by the headquarters, and road repair work is outsourced through a bidding process. Other maintenance work is handled by the regional offices across the country, of which 90% is being performed through outsourcing. The Ashanti Regional Office which is in charge of this project plans maintenance schedules, outsources work, and performs periodic inspections.

After evaluation, the total number of GHA staff was 1,480, of which 309 were engineers, 94 were technicians[43], and 1,077 were general staff. At the time of planning, the total number of staff was 1,995, of which 242 were engineers, 107 were technicians, and 1,646 were general staff. The number of staff decreased to 75% since the planning stage. The number of staff decreased naturally through retirement and those that left their jobs, in addition to cuts in the number of public employees across the entire Ghanaian government. The decline in the staff

[41] The Ministry of Roads and Highways consists of the Department of Feeder Roads and the Department of Urban Roads.

[42] Total trunk road extension under the supervision of GHA is 14,047 km. The breakdown is 4,426 km for national trunk roads, 2,738 km for regional roads, 6,203 km for inter-regional roads, and 680 km for town roads. National trunk roads connect the capital with regional centers as well as strategic sites such as ports and airports and include roads that connect to neighboring countries.

[43] Technicians with a diploma.

number did not affect the work because the amount of outsourced work increased. The number of engineers increased because some technicians were encouraged to obtain a degree and become engineers, while staff with technical skills at which level is as high as that of engineers were being hired preferentially. There were no changes in the maintenance administrative system from the planning stage to the ex-post evaluation stage, and according to GHA, there was no impact on structural reform by the IMF for loan purposes[44]. The staff number at the time of planning could not be verified by the Ashanti Regional Office, but the number at the time of ex-post evaluation was 128, of which 29 were engineers and 8 were technicians. According to the Ashanti Regional Office, the staff number decreased compared to the planning stage, but the quality of staff for the work of maintenance and supervision had been secured by an increase in outsourcing and supervision of outsourced vendors.

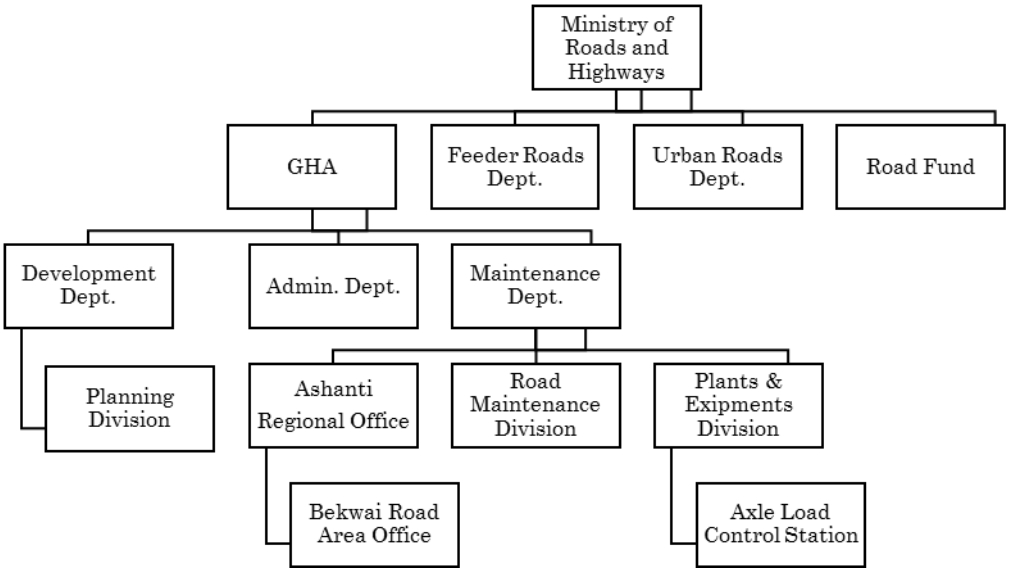


Figure 3. GHA and related ministry & departments

3.5.2 Technical Aspects of Operation and Maintenance

Engineers with college degrees and technicians with diplomas accounted for 27% of GHA staff, and according to local road experts and implementing consultants, the technical level for operation and maintenance was at a certain level of expertise. Regional staff were also deemed to be at a similar level. According to regional office staff, outsourced vendors have sufficient knowledge for early damage repair and were competent to conduct daily checks and inspections. Training and technical guidance for basic knowledge of road maintenance and improvement of supervising capabilities were introduced by the other donor, and training on new maintenance management techniques was also provided. For example, a pavement maintenance and management system, hereinafter referred to as "PMMS", was introduced, and

[44] Owing to the fact that reduction in government expenditure is included as a condition for loan by the IMF (3-year loans for financial relief, starting from 2015).

staff were trained to use the system. As for manuals, Maintenance Operating Manuals (February 2001) and a Surface Dressing Technique Manual (May 2005) were developed through the cooperation of the other donors and are still in use today.

3.5.3 Financial Aspects of Operation and Maintenance

3.5.3.1 GHA

GHA sources of revenue are general government accounts, road funds, and donors. Taking inflation into account, the source of revenue has been increasing every year[45] even though it has not been significant. For 2016, however, donor funds decreased as Ghana is now categorized as a "lower middle income country," and total revenue has decreased.

Table 10 GHA revenue [1)] (Unit: million GHC)

	2013	2014	2015	2016
Government general account	606.9	780.0	920.7	1019.7
Road funds	104.5	198.7	247.0	326.5
Donors	249.2	730.9	744.2	317.3
Total	960.6	1709.6	1911.9	1663.5
		YoY 1.78	YoY 1.19	YoY 0.87

Source: GHA
1) Fiscal year is from January to December.

The major sources of revenue for road funds are fuel tax, tolls, vehicle licensing, inspection fees, and national border tolls and are used mainly to cover road maintenance costs; however, some revenue is allocated to other institutions apart from GHA, such as the Department of Urban Roads and the Department of Feeder Roads. Road funds are also allocated as the budget for the National Road Safety Authority and the Driver and Vehicle Licensing Authority. GHA receives 25.1% of road funds as its budget (average budget for the road funds from 2011 to 2015).

Annual maintenance costs calculated during the planning stage equaled to 0.9% of the annual maintenance cost of GHA[46], but as Table 11 shows, only 0.11%, 0.11%, and 0.18% of the budget were secured in 2014, 2015, and 2016, respectively. In 2017, the budget increased slightly to 0.35%, but GHA considered it would be difficult to secure 0.9% of the annual maintenance budget as planned for the target road because of the high priority given to the maintenance of other road sections of the Ashanti Regional Office.

[45] According to the World Economic Outlook Database by IMF, the average inflation rate from 2012 to 2016 was 13.7%.
[46] *Basic Design Study Report*, pp. 3–56.

Table 11 GHA maintenance budget (Unit: million GHC)

	2014	2015	2016 [2)]	2017 [3)]
Routine maintenance [1)]	22.500	18.700	13.580	57.531
Periodic maintenance	60.200	70.100	71.616	88.144
Total ②	82.700	88.800	85.196	145.675
Budget secured for target road ①	0.091	0.093	0.153	0.508
①÷②	0.11%	0.11%	0.18%	0.35%

Source: GHA
1) Routine maintenance cost includes the cost of maintaining the surroundings, such as mowing grass and cleaning ditches.
2) Budget for construction was greater since it was a presidential election year. Maintenance budget was cut.
3) Larger budget was secured the year after the presidential election because it included the maintenance that was cut the previous year.

While the overall budget for GHA is on the rise, securing the budget for annual road maintenance as defined at the time of planning is difficult, and minor issue remains in terms of financial sustainability.

3.5.4 Current Status of Operation and Maintenance

3.5.4.1 Road Maintenance

From visual observation, the road is maintained in a generally favorable state and the PMMS data show that road surfaces are in a good condition. As noted in Table 12, periodic and routine maintenance operations are being performed favorably by outsourced contractors. Contractors handle periodic maintenance such as cleaning drainage structures and trimming grass and shrubs on the road shoulder every quarter. Surface dressing, road shoulders, drainage structures, guardrails, and bus stops are all in good condition. However, letters on the speed-limit signs have faded and the white markings for crosswalks and speed-control tables are starting to fade in some places. In the beneficiary survey, 100% of road users, including pedestrians, said that road signs were easy to understand and were installed at appropriate locations.

Table 12 GHA maintenance system (At the time of ex-post evaluation)

Maintenance Type	Frequency and Commission Type	Maintenance Details	Condition
Occasional maintenance	Once every few years Outsourced	Pavement repair, partial painting repair	Good
Routine maintenance (includes periodic maintenance)	Frequent checks of road surface For routine maintenance, as needed (periodic maintenance is once every quarter) Outsourced	Checks for pot holes and patching (periodic maintenance includes grass mowing and ditch cleaning)	Good

Source: Questionnaire responses

According to the beneficiary survey, 96% of road users believed that road repairs and maintenance were being performed periodically.

3.5.4.2 Supervision at Axle Load Control Station

An axle load control station measures the weight of large vehicles 24 hours a day and enforces a 12-ton limit per axle load. Fines are imposed on vehicles that exceed this limit. Supervision of overloaded vehicles is thorough. Information on fined vehicles is sent to GHA headquarters electronically, and overloaded vehicles must transfer the fine to a designated account of GHA headquarters. Overloaded freights are ordered to pay a fine at this point, but they continue to travel in an overloaded state without unloading any cargo, which may cause asphalt deformation in speed-control tables. However, the degree of overload on the target road is not significant compared to that before the project, and little road damage has been inflicted by such vehicles.

Adansi Asokwa
Axle load control station
(located 42 km from Assin Praso)

Axle load control station
Excess charge bill

Speed-control table within target section
(Adansi South District)

In the light of the above, no issues were found regarding the maintenance of the project from both systematic and technical perspectives, and the state of operation and maintenance are generally favorable, but minor financial concerns remain in terms of securing a budget for maintenance costs. Therefore, the sustainability of the effects of this project is deemed fair.

4. Conclusion, Lessons Learned and Recommendation

4.1 Conclusion

The project was implemented to secure a smooth and stable traffic by improving of the road between Assin Praso and Bekwai in target area, thereby contributing to maintaining access of local residents to social services in the target area, and promoting the distribution of goods between the target area and the surrounding areas.

This project is highly relevant, as it is consistent with priority areas in development policy of Ghana and Japan's ODA policy and the development needs are also high. Though the project cost was within the plan, the duration of the project slightly exceeded the plan; thus, the efficiency of the project is fair. Improvements in the roughness of the road surface resulted in smooth vehicle travel and improved average travel speed. Reduction of travel hour was realized. The effects such as an increase in traffic volume were also observed. This project improved the access of the residents to social services such as medical services, mitigated the

cost of transportation services, and vitalized commercial activities and agricultural production in the area surrounding the road. For these reasons, the effectiveness and the impacts of the project are high. An operation and maintenance system for the road has been established. No problem was found with respect to the maintenance technical skills, and the current status of maintenance is almost favorable. However, some concerns remain in terms of financial aspects; thus the sustainability of the effects emerged by this project is judged as fair.

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

4.2 Recommendation

4.2.1 Recommendation to Implementing Agency

Markings on crosswalks, center lines, and kilometer signs

White markings such as crosswalks, centerlines, and speed-limit signs were not repainted since the completion of the project and are beginning to fade. The road needs to be maintained more thoroughly by periodic repainting of the signs on the road surface so that both pedestrians and vehicles can see them clearly. The Ashanti Regional Office needs to apply for and secure funding for maintenance of this project from the Maintenance Department at GHA Headquarters, hire outsourcing vendors to ensure that such repairs will be performed appropriately, and supervise the vendors. Such periodic maintenance would enhance safe travel over the road.

4.2.2 Recommendation to JICA

None.

4.3 Lessons Learned

Prevention of increase in traffic accidents right after the road opening

Fatal accidents caused by speeding usually increase after roadwork is completed. There are also cases in which accidents occur as vehicles speed up before the work is completed and before speed-control tables are established. Speeding vehicles' hazardous overtaking, contact accidents with vehicles in the opposite lane, and rollover accidents are likely to occur. In particular, residents in villages surrounding a new road are at risk while walking along the road shoulder or crossing the road.

After completion of the road construction and before service began, a discussion took place between GHA Road Safety and Environment Division, local police department, Ashanti Regional Office, regional administrative institutions (mainly districts adjacent to the target section), and representatives of the residents to decide on the placement of crosswalks, speed-limit signs, and speed-control tables. Opinions of district halls and residents were formed regarding safety measures in the target section based on traffic accident statistics provided by the police department (data on points and areas of frequent accidents). With the appropriate safety measures in place, safe vehicular and pedestrian travel were secured without an increase in fatal accidents.

Such safety measures can prevent fatal accidents on roads where residents live in surrounding areas and where schools, district halls, health centers, and hospitals are located.

Republic of Togo

FY2016 Ex-Post Evaluation of Japanese Grant Aid Project

"Rural Water Supply Project in Maritime and Savanes Regions"

External Evaluator: Noriyo Aoki, Alfapremia Co., Ltd.

0. Summary

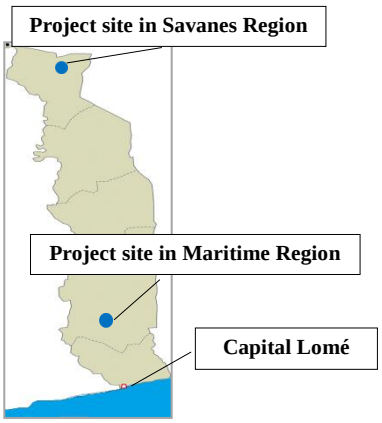
The project was implemented to improve access to safe drinking water, and thus improve the living environment, by constructing and rehabilitating water supply facilities in rural areas[1] and semi-urban areas throughout the Maritime and Savanes regions.

It was identified that the project is consistent with the policies of Japan and Togo. However, in terms of development needs and the project's plan and approach, while there were no problems in Savanes Region, the selection of sites and facility types in Maritime Region did not necessarily reflect the needs of users or the feasibility for maintenance and management; thus, the relevance of the project is fair. The project cost was within the plan, and the duration of the project was also within the plan; thus, the project's efficiency is high. Regarding the effectiveness of the project, the target population served in Maritime Region was not achieved because the type of water supply in some of the rehabilitated facilities was not suited to residents' needs. However, over 80% of the target water population was served. In Savanes Region, the facilities' operating rate was high, and the target of the population served was met. Regarding the impact of the project, in both regions, the project achieved a reduction in water-borne diseases an improvement in hygiene situation and a reduction of water fetching labor, which freed up time for productive activities and utilization of time for learning activities. Therefore, both the effectiveness and impact of the project are deemed high. As for sustainability, an institutional system for maintenance was established in Maritime Region, and no technical problems were observed. However, Maritime Region has an increasing number of privately financed simplified water stations, which are more convenient and cheaper to maintain than the manual pump facilities rehabilitated under this project. In relation to this trend, the payment of water user fees to the water committees was delayed in some of the project sites situated in the urban outskirts. This situation is predicted to have an impact on financial sustainability. In Savanes Region, an institutional system for maintenance was in place, and maintenance had been performed favorably. There are generally no technical and financial issues. Taking all these points into account, the sustainability is evaluated as fair.

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

[1] Rural, semi-urban, and urban areas are defined by population size. A rural area has a population of less than 1,500 and a semi-urban area has a population of at least 1,500 (excludes prefectural capitals and county seats). An urban area is a major town such as regional capitals, or prefecture seats.

1. Project Description



Project Location

Level-2 Communal Taps in Cinkassé Prefecture, Savanes Region

1.1 Background

Togo adopted *the National 10-Year Water Supply Improvement Plan* starting from 1991 until 2000 and formulated a plan to construct deep wells in 10,099 locations across the country by 2000. Togo pursued this objective with support from major donors, including Japan. However, the country subsequently fell into a financial crisis and from 1993, experienced political strife and democratic impasse, which prompted major donors to withhold funding and the target achievement for provision of water facilities was merely 40%. Consequently, even by 2010, the water supply coverage rates in rural and semi-urban areas, including in Maritime and Savanes regions, remained low at around 43%. In response to the Togolese government's request, this project was implemented for improving access to safe drinking water.

1.2 Project Outline

This project was implemented to improve access to safe drinking water by constructing and rehabilitating water supply facilities in rural and semi-urban areas in the Maritime and Savanes regions, thereby contributing to improving the living environment.

E/N Grant Limit /Actual Grant Amount	899 million yen / 848 million yen
Exchange of Notes Date/ Grant Agreement Date	Feb. 2012 / Feb. 2012
Executing Agency	Ministry of Agriculture, Livestock and Water Resources (after June 2015) (*Ministère de l'Agriculture, de l'Elevage et de l'Hydraulique*) (hereinafter referred to as " MAEH ")
Project Completion	March 2014
Main Contractor	JV : Nissaku Co., Ltd. and Tone Engineering Corporation
Main Consultant	Sanyu Consultants Inc.

Preparatory Study	Preparatory study (1) Oct. 2009 to Jan. 2010 Preparatory study (2) Nov. 2010 to Nov. 2011
Related Projects	[Grant Aid Project] Rural Water Supply Project (1980) Groundwater Development Project (phase Ⅰ, 1985; phase Ⅱ, 1986) Groundwater Development Project (phase Ⅰ, 1990; phase Ⅱ, 1991) Rural Water Supply Project (phase Ⅰ, 1997; phase Ⅱ, 1998)

2. Outline of the Evaluation Study

2.1 External Evaluator

Noriyo Aoki (Alfapremia Co., Ltd.)

2.2 Duration of Evaluation Study

Studies for this ex-post evaluation were conducted during the following periods:

Duration of Study: July 2016–February 2018

Duration of Field Survey: April 2–April 25, 2017; July 17–20, 2017

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

3.1 Relevance (Rating: ②[3])

3.1.1 Consistency with the Development Plan of Togo

In May 2007, Togo formulated *the Long-term National Development Strategy Based on the Millennium Development Goals*. This strategy outlined the priority tasks for developing the nation's water and sanitation sector, namely, improving access to basic drinking water and hygiene environment, and rehabilitating existing water facilities and strengthening operation and maintenance. In 2010, Togo came up with *the National Action Plan for the Water and Sanitation Sector*, setting the goal of 64% water supply coverage rate in rural areas, and 62% in semi-urban areas, by 2015. To achieve this goal, Togo pushed forward construction and rehabilitation of a number of water facilities and an improvement of operational system.[4]

Prior to the above plans, in 2006, Togo had formulated *the National Policy for Water Supply and Sanitation in Rural and Semi-rural Areas* to comply with t*he Poverty Reduction Strategy Papers (PRSPs)* and *the Millennium Development Goals (MDGs)*. Under this policy, the government endeavored to improve the water coverage rate, encourage residents to participate in water services, and enhance the facilities' operational system.[5] At the time of ex-post evaluation, the above policy was still the country's basic policy for water supply in rural and semi-urban areas.[6]

At the time of ex-post evaluation, Togo was following *the Strategy for Boosting Growth and Promoting Employment (2013–2017)* as *the National Five Year Development Plan*, which

[2] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory
[3] ③: High, ②: Fair, and ①: Low.
[4] *Preparatory Study Report (2)*, 1-3 and A5-3.
[5] *Preparatory Study Report (1)*, 1-2.
[6] Materials provided by MAEH.

addresses securing people's access to safe drinking water. In January 2017, *The National Policy for Water and Sanitation (2017–2030)* for 2030 which is the year of achievement, with the aim of complying with *the Sustainable Development Goals (SDGs)* is under development.[7] In this long-term policy, further improving the water supply coverage rate, improvement of water facilities, building water facilities powered by new energy sources, and strengthening facilities' operation and maintenance are highlighted as priority targets, and these items are regarded as major policy by the Togolese government.

In light of the above, this project is consistent with the development policies of Togo both at the time of planning and ex-post evaluation.

3.1.2 Consistency with the Development Needs of Togo

During the project's planning stage, the average water supply coverage rates of the Maritime and Savanes regions were 37% and 40%, both of which are below the national average in rural and semi-urban areas of about 43% (2010), and an urgent need for water demand was high.[8] Many residents fetched water from unhygienic sources like ponds, shallow wells, and rivers, leading to the prevalence of water-borne diseases. According to data from the Ministry of Health, the incidence rate of water-borne disease[9] was 8.9% in Maritime Region (2009) and around 10% in Savanes Region (2003–2008).[10]

At the time of ex-post evaluation, the water supply coverage rates of the Maritime and Savanes regions were 44% (2015) and 54% (2015) respectively, the national average being around 50% (2015). While these rates marked an improvement from the time of planning, they are still low. The water supply needs were still high at the time of ex-post evaluation. Water-borne disease incidence rates had declined in both regions at the time of ex-post evaluation, the total rate for Maritime Region being 1.4–2.1% (2014–2015), and that for Savanes Region being 5.6–7.8% (2014–2015).[11]

At the time of planning stage, the outskirts of Lomé, the capital, were undergoing a period of major change after democratization, making it easier to introduce capital funding and aid from overseas. At the time of ex-post evaluation, there was still a strong need for water supply in the northern part of Maritime Region and in Savanes Region; thus, it was confirmed that the project had met water supply needs to a certain extent. On the other hand, in communities neighboring urban areas of Maritime Region, which are more influenced by urban lifestyles, people have been pursuing more convenient and user-friendly facilities. They showed preference for privately financed autonomous water stations (postes d'eau autonome in French, hereinafter referred to as " PEAs")[12] and door-to-door water facilities. Accordingly, there was a reduced

[7] Materials provided by MAEH.
[8] Ex-ante Evaluation Sheet.
[9] Includes amebiasis, ascariasis, dysentery, gastroenteritis, abdominal typhus, and diarrhea.
[10] *Preparatory Study Report (1)*, pp. 2–66.
[11] Ministry of Health statistics.
[12] The PEAs feature overhead water faucets similar to the motorized pump facilities that the project newly installed in Savanes Region. The height of the faucets are adjusted for easy operation by children and adults of small and large

demand for manually operated pumps (such as foot-operated[13] and hand-operated pumps), which are physically burdensome for the children and women, particularly pregnant women who fetch the water. As mentioned in Section 3.1.4 Appropriateness of the Project Plan and Approach, because of a limit on the extent to which the old water facilities could be rehabilitated, the selection of sites, and facility models[14] did not accord with demand. As a result, some of the facilities rehabilitated in the project used by residents were limited. Furthermore, the PEAs are cheaper to maintain than manually operated water facilities and do not require community-led joint management. Accordingly, for some facilities near city center rehabilitated in this project, there were delays in the payment of water user fees to the water committee. It is concluded that a study should have been done particularly on the needs of the facility users in city outskirts, and more examination of the feasibility of maintenance was needed.

If we look at the project from a development needs perspective, in terms of water supply needs, safe water supply was delivered in both regions, leading to reduction of water-borne diseases among the beneficiaries; however, water supply coverage rates were still low and water supply needs were high at the time of ex-post evaluation. In terms of the demand for specific types and operation models of water facilities, the project sites, the types, and models of facilities in Savanes Region were generally selected in line with residents' needs, and thus appropriate. In the areas surrounding urban city of Maritime Region, the selection of project sites, the types, and models of facilities did not accord with residents' needs owing to the restrictions mentioned above; thus, there were some problems from a development needs perspective.

3.1.3 Consistency with Japan's ODA Policy

Since 1981, Japan has contributed to improving water supply coverage rates by providing Grant Aid Project for improving water supply facilities and procuring materials four times. Togo became politically unstable in the 1990s, resulting in a temporary suspension of aid, but aid resumed after the country made progress in democratization from 2007. During the project's planning stage, Japan's ODA policy for Togo was placing priority on supporting the country's efforts to strengthen basic social infrastructure such as water supply services.[15] Thus, the support measures taken under the project matched Japan's ODA policy at the time of the project's planning stage. The project also accorded with *the 2008 Yokohama Action Plan*[16]

---

stature, which are customized precisely to the needs of users, for more convenient water-fetching. According to the executing agency's interview survey, PEAs were introduced in 2015 following a 2014 EU pilot survey, and were becoming increasingly prevalent in Lomé at the time of ex-post evaluation. The survey also found that the Portable Water Supply Directorate had established a subsidy system for investments with the aim of diffusing PEAs. Given that PEAs are cheaper when compared to a water committee's operation and maintenance costs, it is anticipated that they will become widely used throughout Maritime Region (local water supply expert).

[13] It was pointed out that there is a cultural and customary reluctance to draw water by foot (information from a women's focus group). Furthermore, while foot-operated pumps are the only model capable of drawing water from groundwater in depths up to 100m, there is a limit to how much water users can draw.

[14] In this report, a facility's "type" describes whether the facility is a manually operated facility or motorized facility. Among the manually operated facilities, "operation model" describes whether the manually operated facility is hand-operated or foot-operated.

[15] *Japan's ODA Data by Country, 2011*.

[16] Developing water-related infrastructure was highlighted as one of the actions to be taken under the item "Accelerating Economic Growth" in *the Yokohama Action Plan*.

adopted by the Fourth Tokyo International Conference on African Development (TICAD IV).[17]

3.1.4 Appropriateness of the Project Plan and Approach

The project's plan and approach were appropriate in Savanes Region in that, by installing the water facilities, the project succeeded in delivering improved access to safe drinking water in this region as planned. In Maritime Region, although various restrictions of rehabilitating the old well facilities exists, which are degradation inside the well, contamination following deterioration of perforations in the borehole,[18] change in ownership status due to the lapse of time, and the unavailability of spare parts owing to the well type and model becoming obsolete and thus being no longer in production, rehabilitation work were only conducted focusing on those wells that were installed in the 1980s under Grant Aid Project (only the surface portions of the old wells were replaced). Thus, the manually operated pumps (hand-operated and foot-operated) that were rehabilitated as before, failed to meet the changing needs of the peri-urban people neighboring Maritime Region's capital (Lomé), and usage of some facilities were limited. The rehabilitation of old pumps under the project did not necessarily lead to improved access to drinking water among the peri-urban communities of Maritime Region's capital. As noted in the sustainability section, the project also did not necessarily secure sustainable use among the target rural communities in the rapidly developing capital state.

From this perspective, from the plan development stage onward, an examination should have been done in relation to the relevance of renovating old wells, and the matter of how to improve facilities in such a way as to incorporate the changing needs of residents. Thus, there were problems regarding the relevance of the project plan and its approach.

In light of the above, the implementation of this project is fully conformed to the development policies of Togo as well as Japan's assistance policy. However, there are problems concerning the consistency of the project with Togo's development needs and the appropriateness of the project's plan and approach. Therefore, the relevance of the project is judged to be fair.

3.2 Efficiency (Rating: ③)

3.2.1 Project Outputs

Table 1 shows the outputs developed and provided by Japan in this project. In accordance with the water facility classification system in JICA Grant Aid Projects, this report refers to manually operated deep well pump as "level-1 facilities" and motorized deep well pump for communal taps as "level-2 facilities."[19] There are two models of level-1 facility: hand-operated and foot-operated deep wells.

[17] Ex-ante Evaluation Sheet, p. 1.

[18] In this project, the water quality of the wells was examined before any rehabilitation work, and the rehabilitation work was only performed on those wells that were found to have no contamination issues.

[19] In the water facility classification system used in JICA Grant Aid projects, level-1 facilities are defined as point-source water facilities (deep wells with manually operated pumps) and level-2 facilities are defined as communal faucet water supply facilities (deep wells with electric pumps).

Table 1: Outputs Developed and Provided by Japan (planned and actual)

Planned Item	Number	Region	Actual
1) Development of level-1 facilities			
・Rehabilitation of existing manually operated pump-type deep well facilities Note 1) (replacement of manually operated pumps, additional rehabilitation work of incidental components, repair of mortar)	50	Maritime	As planned
・Installation of manual pump-type deep well facilities Note 2) (well-digging, installation of manually operated pumps, additional installation of incidental components)	100	Savanes	As planned
2) Development of level-2 facilities			
・Installation of motorized pump-based deep well water supply network facilities (8 water facilities with generator, 2 water facilities with solar panel system) (Installation of power source, pumping system, overhead tank, water distribution pipeline facilities, and communal tap)	10	Savanes	As planned
3) Capacity building program (soft component) Note 3)			As planned

Source: *Preparatory Study Report (2)*, materials provided by JICA, information from main consultant.
Note 1) 37 manual-operated pumps, 13 foot-operated pumps.
Note 2) 97 manual-operated pumps, 3 foot-operated pumps.[20]
Note 3) Raising residents' awareness about operating and maintaining the deep well water supply facilities and hygiene. Those activities were implemented for both Maritime and Savanes Regions.

There were some alterations to the plan. Of the 50 targeted villages in Maritime Region for level-1 rehabilitation work, two were replaced with another village. As to the reason for their replacement, the two villages expressed reluctance to accept the rehabilitation work at the construction stage and desired a newly constructed different type of water facility. It was, therefore, concluded that there was a concern about the prospects for sustainable use and maintenance of the water facilities after their rehabilitation, and two alternative villages were selected. Another alteration to the plan concerned level-2 facilities. Specifically, drainage openings were fitted on the overflow pipes of water tanks. There was a concern that human error, such as forgetting to switch off the pump or operation error might cause an overspill or discharge, so a flow-end treatment system was fitted as a safety measure.[21]

At the time of completion, the power sources for level-2 facilities were as planned. However, by the time of ex-post evaluation, commercial power facilities were becoming increasingly prevalent in semi-urban area. Accordingly, seven of the level-2 facilities used an additional commercial power source.[22] The regional directorate of water and sanitation had conducted a

[20] In Savanes Region, some areas their aquifers were deep as a geological feature, meaning that only foot-operated pumps were capable of drawing the water.
[21] Materials provided by JICA.
[22] At the time of ex-post evaluation, six of the level-2 facilities were using both a generator and a commercial power source. The additional use of commercial power was also observed in one of the solar-powered facilities.

technological inspection of these seven facilities, and an agent had then connected them to a commercial power source. These charges were being borne by the relevant "Association of Users of Drinking Water and Sanitation Services" (*Association des Usagers du Service d'Eau Potable et Assainissement*, hereinafter referred to as " AUSEPA").

The objective of the soft component in Grant Aid project was "to strengthen the capacity of the resident-led organizations in charge of operating and maintaining the community water facilities, which are the water committees (level-1 facilities) and AUSEPAs (level-2 facilities), through the self-driven efforts of beneficiary residents and the sustained support of the regional directorates of water and sanitation."[23] The soft component activities were mostly implemented as planned. However, the soft component's outcomes were limited in some areas of the Maritime Region. For example, some residents were not paying water user fees to their water committee, which was related to the fact that their needs regarding water facilities had changed.

Duties on the Togolese side were executed as planned. Table 2 shows the duties on the Togolese side.

Table 2: Duties on the Togolese Side (planned and actual)

Planned	Actual
1) Payment of personal expenses of counterpart and travel expenses during construction of the facilities	As planned
2) Construction of site offices and bearing the expenses	As planned
3) Monitor sites after construction and bear the expenses (counterpart personnel costs and expenses for activities)	As planned

Source: *Preparatory Study Report (2)*, 3-55, interview survey with officials, materials provided by the main consultant.

In light of the above, the project was mostly implemented as planned. The site and design alterations were appropriate to the needs on the ground. These alterations did not have any particular impact on project duration or project expenditure.[24]

[23] Materials provided by JICA.
[24] Information provided by the main consultant.

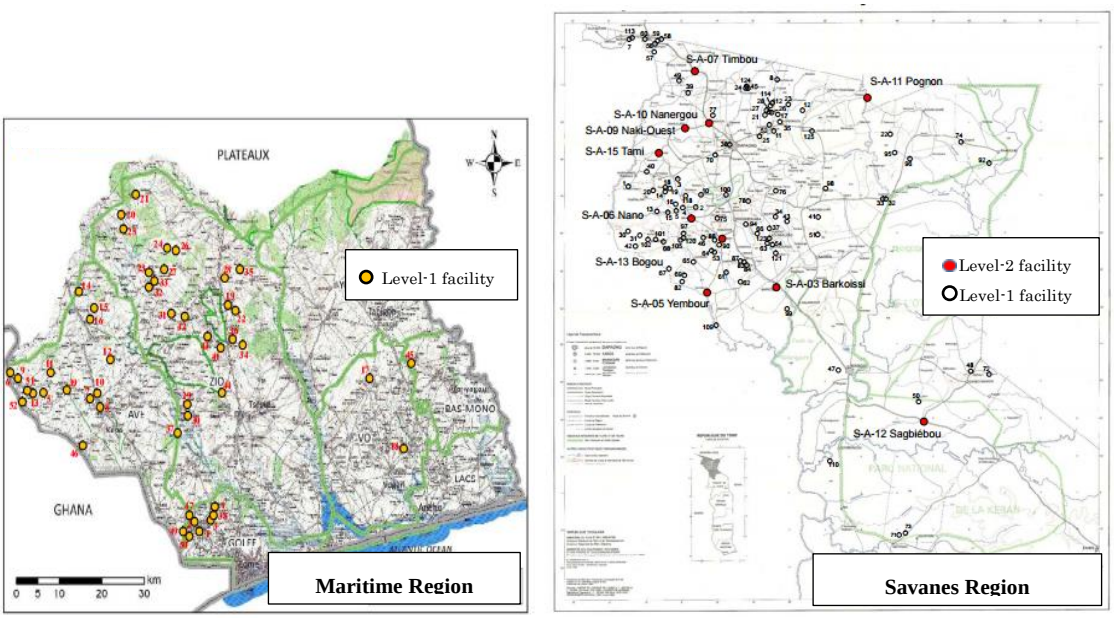


Figure 1: Location of Facilities in Maritime Region (left) and Savanes Region (right)

3.2.2 Project Inputs

3.2.2.1 Project Cost

The planned project cost for the Japanese side (E/N grant limit) was 899 million yen, while the actual project cost was 848 million yen.[25] The expenditure on the Togolese side could not be confirmed, so only the Japanese expenditure was used for ascertaining the proportion of actual total project costs against the planned project cost; the actual project cost was 94% of the planned value, which is within the planned budget.

3.2.2.2 Project Period

The project period was scheduled to take 26 months,[26] which included the envisaged time for procuring consultants, producing detailed designs, and organizing tenders. The actual project period was 26 months,[27] which was 100% of the planned period. The duties on the Togolese side were also implemented as planned.

The project remained within the planned budget and period. The outputs were mostly as planned, and the site and design alterations were appropriate considering that the utmost effort was made to reflect the circumstances on the ground. The site alterations did not have a significant impact on the project outcomes. There was no impact on the project cost or project period that was attributable to site or design alteration. In the light of the above, the project efficiency is judged as high.

[25] Materials provided by JICA.
[26] Total of 26 months from February 2012 (G/A) to March 2014 (Ex-ante Evaluation Sheet).
[27] Total of 26 months from February 2012 (G/A) to March 2014 (Materials provided by JICA).

3.3 Effectiveness[28] (Rating: ③)

3.3.1 Quantitative Effects (Operation and Effect Indicators)

The main indicator adopted during the time of planning was population served, but in this evaluation, the operating rate of water facilities is additionally used as an operation indicator. It should be noted that the region-wide water supply coverage rate has not been considered in this evaluation; the reason for this is that, since region-wide water supply coverage rate is affected by water facilities installed under other projects, it is difficult to determine the outcomes of this project.

3.3.1.1 Operating Rate

As shown in Table 3, the operating rate of facilities in Maritime Region was 96%, and that of Savanes Region was 98%.[29] Operating rate is based on the number of operating facilities[30] against the total number of facilities.

Table 3: Operating Rate of Each Facility

	Actual Value	
	2014	2017
	Project completion	Ex-post evaluation
Maritime Region Level-1 facilities Note)	100%	96% (48/50)
Savanes Region Level-1 facilities Level-2 facilities Note) Solar power Generator	100% 100% 100%	98% (98/100) 100% (2/2) 100% (8/8)

Source: Executing agency's responses in questionnaire, on-site survey.
Note) The planned unit of water supply amount was 20 liters / day / person. The each operating facility fulfilled this standard.[31]

3.3.1.2 Population Served

At the time of planning stages, population served included users of facilities not installed under this project, and was set based on the rates of population growth in the target villages and settlements. Accordingly, this ex-post evaluation adopted as the target value the total number of people designed to use the project's facilities. Regarding the population served at the time of ex-post evaluation, the actual value was calculated based on the number of people using the project's facilities at the time of the field survey.

In Maritime Region, restorable facility types were not always suited to the needs of the residents. This was particularly evident in peri-urban communities, where communal foot-

[28] In determining the effectiveness rating, consideration is also given to impact.
[29] Regarding the two non-operating facilities in Maritime Region, the residents opted to fetch water using a nearby PEA faucet, and thus did not use or maintain the rehabilitated facility. As for the two non-operating facilities in Savanes, these were not operating at the time of ex-post evaluation because it was taking time to order and receive spare parts for these manually operated pumps manufactured in India (India Mark II).
[30] Facilities in operation at the time of ex-post evaluation.
[31] Based on the results of the beneficiary survey. The details regarding volume of water per person are outlined in 3.3.2.2 Stable Supply of Water Volume.

operated pumps yielded only a limited volume of water, and where the residents, being more accustomed to urban lifestyles, preferred to use water faucets of door-to-door water facilities or private water facilities, which meant that the number of users was limited. However, in rural communities in the northern prefectures of Maritime Region, demand for water was high, and water facilities, particularly hand-operated pumps, were being used extensively. Accordingly, the population served in Maritime as a whole was 83% of the target. In Savanes Region, both level-1 and level-2 facilities were seeing extensive usage. The population using the facilities exceeded the projected figure by 137%, reflecting a new demand for water, one that was driven by population growth.

Table 4: Population Served
(Designed Population of Facility and Actual Facility-using Population)

(Unit: No. of people)

	Target	Actual	
	2017	2017	
	3 years after project completion	Ex-post evaluation	
Maritime Region	12,500 Note 1)	10,412	83%
Savanes Region	59,000 Note 2)	80,602	137%
Total	71,500	91,014	

Source: Executing agency's responses in questionnaire, on-site survey by local assistant survey staff.
Water output standard: 20L/day/person
Note 1) For Maritime Region, the figure of 12,500 persons (250 persons × 50 facilities) was used as the target performance figure. The projected figure at the time of planning took into account the rate of population growth in the villages (*Preparatory Study Report*).
Note 2) For Savanes Region, the figure of 59,000 persons ([250 persons × 100 facilities] + [68 communal faucet facilities × 500 persons]) was used as the target figure for population served in term of facilities. The 10 level-2 facilities include a total of 68 communal faucet facilities. The standard of 500 persons per communal faucet (consisting of two faucets) is the standard adopted in *the National Development Strategy (2007)* based on the Millennium Development Goals. The target values in t*he Preparatory Study Report* include existing population, and it is more accurate to count the number of persons using the project's facilities; therefore, the method of finding the population served was changed for this ex-post evaluation.

3.3.2 Qualitative Effects

3.3.2.1 Improvement in Water Quality

Because the water sources of all the facilities were in deep strata, many people reported that the water quality had improved significantly compared to the sources they used previously, which included ponds, shallow wells, and rivers, etc.[32]

[32] Results of interview survey. Results of beneficiary survey.

Table 5: Water Sources Previously Used (Unit: %)

	Maritime Region	Savanes Region	
	Level-1 facilities	Level-1 facilities	Level-2 facilities
Pond	9	4	15
Shallow well (no cover) Note 1)	12	12	8
Shallow well (with cover)	38	45	38
River/stream Note 2)	36	35	39
Other Note 3)	5	4	0
Total	100	100	100

Source: Results of beneficiary survey.
Note 1) including traditional hand-dug wells.
Note 2) In the Japanese-language version, the word used for "stream" is ogawa." It differs from the ogawa.in Japan.
Note 3) As the other water source, hand-operated pumps were previously used by users of the level-1 facilities in Maritime Region and the four level-1 facilities in Savanes Region.

3.3.2.2 Stable Supply of Water Volume

As mentioned in 3.3.2.1 (Improvement in Water Quality), since the water sources were in deep strata, most of the facilities provided a stable water supply that was unaffected by the dry season.[33] Actual performance, as measured by average usage volume per person, varied between the facilities in each region. Among level-1 facilities in Maritime Region, the average supply volume per person was 25 liters per day; among level-2 facilities in Savanes Region, an average of 26 liters was used per person per day; and among level-1 facilities in Savanes Region, an average of 22 liters was used per person per day. Thus, the planned water output standard was met.[34] Regarding the solar-powered level-2 facilities, one of the facilities secured a stable water supply regardless of the weather because it additionally used a commercial power source. Seven of the 10 level-2 facilities generally managed to provide a stable water supply by sourcing their power from a commercial power source in addition to a generator. According to the results of the beneficiary survey,[35] 87% of level-1 facilities in Maritime Region, and 97% of level-1 and

[33] Results of interview survey.
[34] Results of beneficiary survey.
[35] This survey was conducted in Maritime and Savanes regions between April 3 and April 25, 2017. The respondents were users of operating facilities and members of a water committee or AUSEPA.
Regarding the selection of facilities for the survey, the level-1 facilities were selected in such a way as to represent as proportionately as possible the numbers of facilities in each prefecture. Regarding the level-2 facilities, all 10 facilities were included. Regarding the selection of the facility users for the survey, included were those who were fetching water at the time of the survey (effective respondents: 102). These individuals were interviewed using a questionnaire form. The number of facilities surveyed and the respondent sample size were limited considering the total number of facilities and the size of the population covered in the project. This beneficiary survey was a case study conducted with the aim of capturing the conditions among as many facilities as possible and collecting various unquantifiable data. It does not adopt the sampling method to confirm statistical significance. In addition, the survey only included those users of operating facilities and thus did not capture data on users of non-operating facilities. To compensate for this, interviews were conducted with the water committees of non-operating facilities and the people who were expected to be the beneficiaries of such.

There were 102 effective respondents who were users of operating facilities; 16 (16%) were male and 86 (84%) were female. The gender and age breakdown was as follows: among male respondents, 13% were in their teens; 44% were in their 20s; 25% were in their 30s; 12% were in their 40s; and 6% were in their 50s. Among female respondents, 16% were in their teens; 24% were in their 20s; 31% were in their 30s; 21% were in their 40s; 4% were in their 50s; and 4% were in their 60s. Regarding regions, 87 respondents were from Savanes Region (73 were users of a level-1 facility, and 14 were users of a level-2 facility), and 15 were from Maritime Region.

100% of level-2 facilities in Savanes Region, achieved an increase in water supply volume after the project. As for those respondents who reported that their facility had not achieved such an increase, the facility concerned was a level-1 facility in all such cases. The reason for not achieving an increase was that a queue of users would form at the facility, hindering the users from fetching a large volume of water in one go.[36]

3.3.2.3 Change in Water Fetching Time

Before the project, the beneficiaries used distant water sources or water sources that were difficult to fetch water from. Thus, at the time of ex-post evaluation, water fetching time was significantly reduced.[37] The average reduction in water fetching time among users of level-1 facilities in Maritime Region was 2 hours 29 minutes, daily water fetching time per person. In Savanes Region, reduced on average by 2 hours and 25 minutes among level-1 facility users, and by 5 hours and 26 minutes among level-2 facility users[38].

3.3.2.4 Securing Safety for Water Fetching

Before the project, the accidents included cases in which a child fell into a pond, stream, or traditional hand-dug well (uncovered), etc. It is confirmed that there were cases in which the project secured the safety of water fetching where accidents had previously occurred. [39]

A traditional hand-dug well that was previously used in Tône Prefecture, Savanes Region.

3.3.2.5 Improvement in the Capacity of the Water Committees and AUSEPAs to Operate and Maintain Water Facilities

In relation to the capacity of the water committees and AUSEPAs to operate and maintain the water supply facilities, the project's soft component provided concrete management guidance. Such guidance contributed to strengthening the capacity of the operation and maintenance of the facilities.[40]

3.4 Impacts

3.4.1 Intended Impacts

3.4.1.1 Reduction in Water-borne Diseases

There were 47 effective respondents who were members of the water committees or AUSEPA; 37 were male (79%), and 10 (21%) were female. Among male respondents, 9% were in their 20s; 23% were in their 30s; 50% were in their 40s; 14% were in their 50s; 0% were in their 60s; and 4% were in their 70s. Among female respondents, 20% were in their 20s; 30% were in their 30s; 10% were in their 40s; and 40% were in their 50s. Regarding region, 32 were from Savanes Region (22 were responsible for a level-1 facility and 10 were responsible for a level-2 facility), and 15 were from Maritime Region.

[36] Results of the beneficiary survey.

[37] Results of interview survey.

[38] Results of the beneficiary survey.

[39] Results of interview survey with beneficiaries.

[40] Results of interview survey with water committees and AUSEPA.

Before the project, the residents used sources wherein the water quality was poor, such as ponds, shallow wells including traditional hand-dug wells, streams, etc. Many residents suffered from stomach pain and diarrhea caused by parasitic and gastrointestinal diseases. It is confirmed that the number of such complaints declined after the project.[41] In addition, water supplied by project facilities was being used not only for drinking but also for washing the body, which had resulted in lower numbers of skin diseases. Survey respondents cited, as a positive impact, a reduction in medicinal expenses.

3.4.1.2 Improvement in Hygiene Situation

According to the interview survey and beneficiary survey, the hygienic guidance provided in the project as part of the soft component led to a more strict observance of handwashing compared to before the project; moreover, the increase in amount of water use led to a rise in the times of body washing and laundry washing. There was a respondent that the residents were complying with rules such as prohibitions on children going to the toilet near the facility and disposing of garbage in the vicinity.[42]

Table 6: Water and Hygiene-related Behavior (multiple responses allowed) (Unit: %)

	Savanes Region		Maritime Region
	Level-1 facilities	Level-2 facilities	Level-1 facilities
Boil water	0	0	0
Wash hands frequently	100	100	100
Increase times of laundry washing	91	100	100
Wash body frequently	98	100	100

Source: Results of beneficiary survey.
Note) When asked whether there had been any changes in their behavior regarding water use or their attitudes toward hygiene, 100% answered that a change had occurred. The respondents then selected one or more of the above four items to indicate the specific changes.

3.4.1.3 Use of Surplus Time by the Reduction in Water Fetching Time

As mentioned in 3.3.2.3 Change in Water Fetching Time, because the residents, prior to the project, used distant water sources or water sources that were difficult to fetch water from, water fetching time had significantly reduced at the time of ex-post evaluation. Table 7 shows how the surplus time was spent according to the respondents.

[41] Results of the beneficiary survey, interview survey, and focus group discussion.
[42] Results of the field survey.

Table 7: Utilization of Surplus Time by Reduction in Water Fetching Time
(multiple responses) (Unit: %)

	Savanes Region		Maritime Region
	Level-1 facilities	Level-2 facilities	Level-1 facilities
Doing housework	81	84	86
Doing farm work	66	31	60
Doing income generating activities (non-farming)	45	38	33
Participate in a community activity	15	5	0
Have a rest	16	38	0

Source: Results of beneficiary survey.

As for children's water fetching time, in the beneficiary survey, 97% of the respondents said that children's water fetching time was reduced. Table 8 shows how the surplus time was spent according to the respondents.

Table 8: Influence on Children's Life by Reduction in Water Fetching Time
(multiple responses[43]) (Unit: %)

	Savanes Region		Maritime Region
	Level-1 facilities	Level-2 facilities	Level-1 facilities
Children can now help parents in their housework	84	77	67
Children can now go to school	46	39	13
Children now have more time to study	80	92	87

Source: Results of beneficiary survey.

Tône Prefecture, Savanes Region

Water fetching by a household with a person with disability

There were cases in which the installation of water supply facilities saved the labor involved in water fetching, freeing up time for livelihood improvement activities; for example, some women used the surplus time to obtain qualifications that would allow them to improve their earning capacity. There were also AUSEPAs' cases in which both male and female residents got involved in communal O&M activities, which made them actively engaged in community improvement projects.

3.4.1.4 Impact of Droughts on Groundwater Resources

According to a local hydrogeological specialist, the water sources are capable of bearing sufficient water even in the dry season because the water sources were not aquifers that are easily affected by the abundance of underground water resources and rainfall. Since many of the aquifers-served in the project lay in bedrock, the hydro fracking technique was used. Thus, even during the dry season, sufficient amount of pumping water was secured.[44]

[43] A person is defined as a child if they are of an elementary school age.
[44] Results of the field survey.

3.4.2 Other Positive and Negative Impacts

3.4.2.1 Impact on Natural Environment

Under Togolese domestic law, the project was not required to produce an Environmental Impact Assessment (EIA) document for level-1 facilities, but it was required to produce an Initial Environmental Examination (IEE)[45] document for level-2 facilities. Accordingly, the executing agency submitted an IEE document to the Division of Environmental Assessment (*Bureau d'étude d'impact*) in April 2011, and received permission to execute the project in the end of October 2011. None of the project sites were situated in or near national parks or similar areas, wherein natural scenery could be affected by construction works; thus, the project did not entail any undesirable environmental impacts.[46] Pumping water did not result in any ground subsidence or cause water sources to dry up, and the piping work did not damage the natural environment.[47] The regional directorate of water and sanitation and the Division of Environmental Assessment performed environmental impact monitoring during and after the construction work, and it found no particular points of concern.

As a result, there was no negative impact on the natural environment.

3.4.2.2 Resettlement and Land Acquisition

In this project, after a building appeal was issued, private land was provided as communal land voluntarily and free of charge. As such, the executing agency did not acquire land, and no residents needed to be relocated.[48]

3.4.2.3 Other Impacts on Residents during Construction

To minimize the impact of cross-drainage works on transport and economic activities at the time of construction, diversion routes were set up as a traffic-calming measure. The land on which the facilities were constructed was mostly vacant land, and so there was no impact on agricultural produce. To avoid influencing residents' lives, construction work was halted during the night, midday, and evening.[49]

In relation to the effectiveness, the facilities in Maritime Region had a high operating rate, but the model of water supply in some of these rehabilitated facilities was not suited to residents' needs, and so the population served fell short of the target; that said, the project achieved over 80% of the target. In Savanes Region, the operating rate was high and the targeted population served was met. Overall, the targeted figure for population served for both regions combined

[45] An IEE uses relatively accessible data (such as existing data) and, where necessary, conducts a simple field survey to produce alternative plans, predict, or evaluate environmental impact; formulate mitigation measures; and prepare an environmental monitoring plan.

[46] Results of beneficiary survey, interview survey, and focus group discussion. Also based on the results of an interview survey with the executing agency.

[47] Results of an interview survey with beneficiaries and stakeholders from beneficiary villages.

[48] Results of a questionnaire with the executing agency.

[49] Information provided by the main consultant.

was met, and the operating rate of the facilities was high; therefore, the effectiveness of the project is evaluated as high.

In relation to the impact, a number of positive impacts were confirmed, including a reduction in water-borne diseases, improved hygiene, a reduction in time required to fetch water, and the consequent free time was used for productive activities and learning opportunities. As regards the impact on the natural environment and other impacts, the project did not entail any destruction on the nature, and the impact of construction work on residents' lives and transport was minimized. Thus, the impact is comprehensively judged to be high.

In light of the above, the effectiveness and impact are high.

3.5 Sustainability (Rating: ②)

3.5.1 Institutional Aspects of Operation and Maintenance

3.5.1.1 MAEH Portable Water Supply Directorate

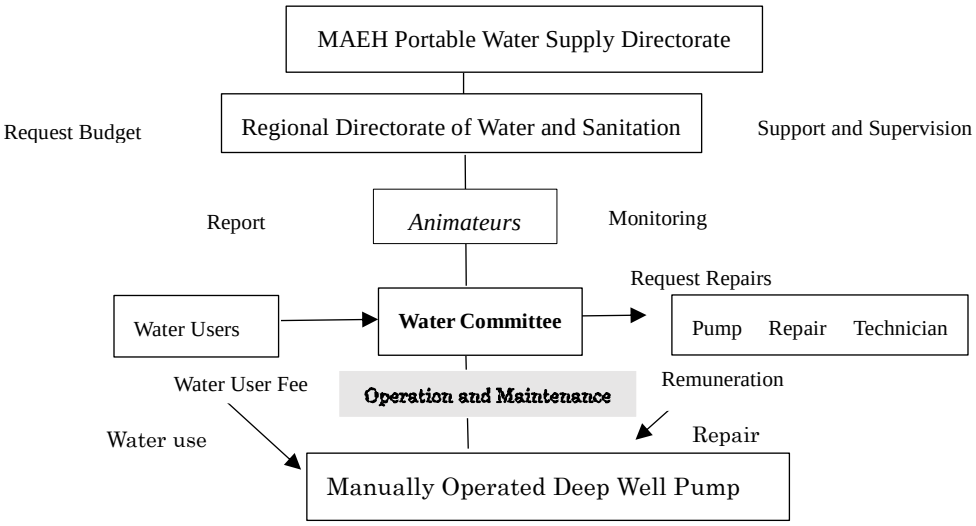
The Portable Water Supply Directorate of the MAEH's predecessor, Rural Water Supply Department under Ministry of Water, Sanitation and Rural Water Supply (*Ministére de l'Eau, de l'Assainissement et de l'Hydraulique Villageoise*), was in charge of the project, while the construction work was underway in 2012, but from June 2015 onward, the Portable Water Supply Directorate of the MAEH was in charge of coordinating and controlling all activities related to drinking water supply. However, despite the reorganization of the ministry, the fundamental institutional structure remained the same, so there was no notable impact.

3.5.1.2 Regional Directorates of Water and Sanitation

The regional directorates of water and sanitation were in charge of operating and maintaining regional water supply projects. Each directorate comprises three divisions: community, technology, and finance. The community division is staffed by community outreach officers called "*animateurs,*" and the technology division is staffed by technicians. Table 8 shows the division of duties among those involved in maintenance under the jurisdiction of the Regional Directorate of Water and Sanitation.

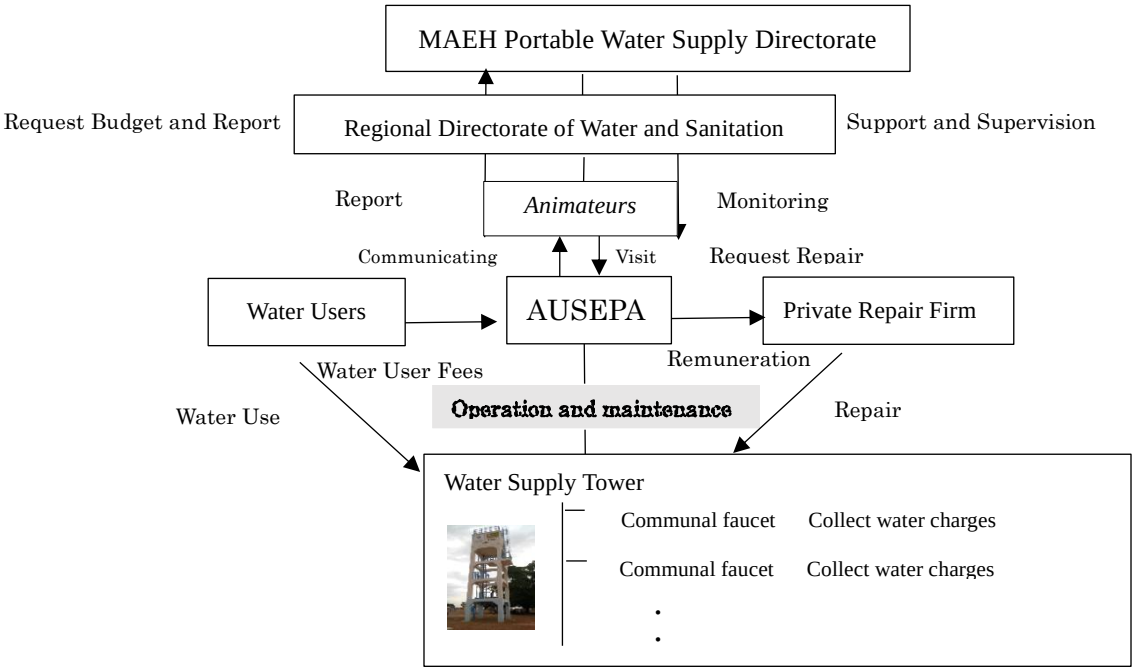
The decentralization of the water sector[50] had achieved little progress in Togo as a whole, and there were no communes in any of the rural or semi-urban areas in the target regions. At a policy level, there is a plan to further decentralize the water sector, but at the time of ex-post evaluation, the regional directorates of water and sanitation still played a central role in supervising maintenance and it is functioning.

[50] From 2003, Togolese water policy moved toward a commune system, and aimed to give communes independence over the execution, operation, and maintenance of water supply projects (information from a regional directorate of water and sanitation).



Source: Illustrated based on the results of on-site survey

Figure 2: Maintenance System for Level-1 Facilities



Source: Illustrated based on the results of on-site survey

Figure 3: Maintenance System for Level-2 Facilities

.

Table 9: Division of Duties among Stakeholders (Actual)

	Roles and Duties	Reporting System, etc.
[Governmental personnel]		
Regional water supply specialists or sociologists (*sociologues*) Note 1)	Coordinate and supervise the activities of the animators of the region.	Submit quarterly and annual reports to the Portable Water Supply Directorate.
Animateurs Note 2)	Visit, guide, and monitor water supply sites. The sociologist or regional director organize a monthly reporting meeting in principle for *animateurs* at a regional level.	Submit quarterly reports to the Portable Water Supply Directorate.
[Resident-led maintenance framework]		
Water committees	Operate and maintain level-1 facility. Take action in the event of malfunction or other trouble.	Liaise with *animateurs* and AR.
AUSEPAs	Operate and manage level-2 facilities. Take action in the event of malfunction or other trouble. As part of their management of communal faucet facilities, AUSEPAs recruit local residents as "water supply facility operators," who are responsible for operating, suspending, and maintaining a generator and pumps, and it recruits people to clean the facilities and collect water charges.	Liaise with *animateurs* and private firms.
[Private contractors]		
Pump repair technician (*Artisan Réparateur*; AR)[51] (Level-1 facilities)	The water committee orders the purchase of spare parts and places them by pump repair technician. The *animateur* can support acquiring spare parts.	Respond to calls from an *animateur* or water committee in the event of malfunction or other trouble.
Repair contractors (Level-2 facilities)	Repair problem area after being contacted by an *animateur* or AUSEPA.	Respond to calls from an *animateur* or AUSEPA in the event of malfunction or other trouble.

Source: Results of interview surveys with the two regions' regional directorates of water and sanitation.
Note 1) Sociologists hold a Master's degree and specialize in social issues and community development.
Note 2) To be registered as an *animateur*, one must have at least completed high school, have a deep understanding of water supply and sanitation, and have a personal character that is suited to community work.

Each prefecture would have one *animateur* who visits and monitors water supply sites, but there was not a water supply-related office at a prefectural level. *Animateurs* in Maritime Region were in charge of 218 wells and facilities, and in Savanes Region, they were in charge of 375. In addition to water supply, *animateurs* also supervised sanitation (toilets). As shown in Table

[51] When a level-1 facility requires repair, the relevant regional directorate of water and sanitation would contract the repair work to a designated AR. The AR would procure the necessary spare parts from a sales agent and repair. The AR would be paid by the relevant water committee (according to the results of the field survey). ARs are private agents, but they had attended training seminars organized by the MAEH Water Supply Directorate and were listed as official ARs by the regional directorates of water and sanitation.

10, the numbers of personnel in Maritime Region increased slightly, and those in Savanes Region decreased slightly, compared to the planning stage, a situation that reflects Togo's tight finances. Nevertheless, their duties were not affected by the situation; indeed, many fulfilled their duties conscientiously.

Table 10: Change in Numbers of Technical Personnel in Each Region

(Unit: no. of persons)

	Planning	Ex-post evaluation	Planning	Ex-post evaluation
	Savanes Region		Maritime Region	
Sociologists	1	1 Note 1)	1	1
Geologists	1	1	1	1
Water supply specialists	1	1	1	2
Hand-operated pump technicians	1	0	1	2
Electronic machinery specialists (level-2 facilities)	0	0	0	0
Animateurs	6	6 Note 2)	6	6

Source: Results of interview surveys with the two regions' regional directorates of water and sanitation, questionnaire survey with executing agency.

Note 1) This sociologist was not full-time but a contracted volunteer (Agent Forment).[52]

Note 2) Three of the animateurs were full-time, while the other three were contracted volunteers (Agent Forment).

3.5.1.3 Water Committee and AUSEPAs

The water committees were in charge of maintaining level-1 facilities. Each water committee generally had five or more members, including a president, secretary, accountant, auditor, technical officer, and hygiene officer.

AUSEPAs were in charge of operating and maintaining level-2 facilities. Each AUSEPA had five or more members, including a president, secretary, treasurer/accountant, technical officer, and hygiene officer. Where necessary, supervision was undertaken by two advisors. Among communal faucet facilities (level-2 facilities), water charge collectors were employed by an AUSEPA to carry out cleaning and other maintenance work in the water facility. In addition, AUSEPAs would recruit residents as "operators"[53] to provide round-the-clock regulation of the water levels (impoundment levels) in the overhead tank by operating the pumping water.

The method for electing president varied between the water committees and AUSEPAs. In some cases, community beneficiaries would elect nominees. In other cases, members would be determined by the high-ranking members of the community, as per the community's customary tradition.

As regards the gender balance in the membership of water committees and AUSEPAs, women accounted for 39% of the membership. By type of membership, women made up 98% of accountants and 91% of hygiene officers,[54] but only 1% of presidents.[55]

[52] Contracted staff (Agent Forment) refers to someone who is recruited on a contract basis to perform water supply-related duties.

[53] AUSEPAs selected and recruited as operators from local residents who had technical expertise.

[54] Results of beneficiary survey.

[55] Results of questionnaire to executing agency.

3.5.2 Technical Aspects of Operation and Maintenance

The ARs who are responsible for repairing level-1 facilities, were technicians well-experienced in repairing pumps of deep wells; thus, there were no technical problems. At the time of ex-post evaluation, each AR in Maritime Region had responsibility for 38 facilities, and each AR in Savanes Region had responsibility for 78 facilities.

The operators that AUSEPAs employed for level-2 facilities had fully mastered the operation of level-2 facilities, having studied the theory and practice of such operation during the execution of the soft component, according to the interview survey. However, among the facilities that subsequently started using a commercial power source in addition to solar power or a generator, there were cases in which the AUSEPA had failed to balance the hours of generator or solar-powered operation with commercial power-based operation in such a way as to ensure that the level of water in the overhead tank (impoundment tank) was adequate for morning and evening water fetching. In another case, there was a need for a regional or state-level technician to provide guidance, such as how, under the blazing heat of the late dry season, a generator will require some cooldown time after six hours of operation, and that this problem can be overcome by adeptly combining the use of a generator with a commercial power source or solar power.[56]

For technical issues with level-1 facilities, the water committee concerned would first consult an *animateur* and then assign an AR to conduct the repairs. If the AR was insufficiently qualified to perform the repair work, the regional directorate of water and sanitation would step in. For technical issues with level-2 facilities, an operator of water facilities would first be assigned to perform repairs if only simple work was required, and where more extensive work proved necessary, the AUSEPA would assign an *animateur* to contact a technician from the regional directorate of water and sanitation, who would then perform the repairs. If a higher level of technical skill was required, the AUSEPA would hire a private agent.

3.5.3 Financial Aspects of Operation and Maintenance

3.5.3.1 Finance of the MAEH Portable Water Supply Directorate

Table 11 shows the budgeted revenues of the MAEH Water Supply Division. Regular expenses were on the decline due to a reduction in personnel expenses. The amount allocated for investment varied with each fiscal year. In addition, while the amount of aid from overseas donors fluctuates by fiscal year, a fiscal official from the MAEH Water Supply Division reported that there was an increasing trend on the whole.

[56] Results of on-site inspection by local water expert and interview survey.

Table 11: Budgeted Revenues of the MAEH Portable Water Supply Directorate Note)

(Unit: FCA)

	2015	2016	2017
Regular expenses	1,502,304,000	1,105,391,000	1,017,623,000
Budget allocation for investment	20,718,853,000	24,924,034,000	14,604,800,000
Amount provided by donors	21,173,820,000	13,490,590,000	35,564,490,000

Source: MAEH Portable Water Supply Directorate

Note 1) Since the ministry underwent a reorganization in fiscal 2015, the above table shows the data from 2015 onward. The above amounts represent the budgeted (estimated) amounts and not the actual amounts.

Note 2) The MAEH Portable Water Supply Directorate's accounting year is from January to December.

3.5.3.2 Collection of Water User Fees

Generally speaking, each facility was financially independent.[57] There were two methods for collecting water charges: flat-rate system and meter-rate system. For both level-1 and level-2 facilities, the regional directorates of water and sanitation calculated the amounts based on maintenance cost, number of users, and water output volume. For level-1 facilities, the water committees, under the guidance of their regional directorate of water and sanitation, would select whether to adopt a meter-rate system or flat-rate system. As an example of a meter-rate system, two 30-liter tubs carried on the head would be charged 25 FCA, and as an example of a flat-rate system, there would be a monthly rate of 100 FCA per person. All level-2 facilities adopted a meter-rate system.[58]

Regarding reserve funds, the level-1 facilities of Maritime Region held on average 98,635 FCA (18,740 JPY) in reserve. In Savanes Region, the average amount of reserve was 130,000 FCA (24,700 JPY) among level-1 facilities, and 1,535,635 FCA (291,770 JPY) among level-2 facilities. On the whole, the facilities had managed to secure the reserves to meet future spending requirements. Among the operating facilities in Maritime Region, the average collection rate was 73%, and around half of the water committees had accrued a reserve fund.[59] Among the level-1 facilities of Savanes Region, the average collection rate of water user fees was 98%, and around 80% of the water committees had accrued a reserve fund. Among the level-2 facilities in Savanes, the collection rate was 100%, and every AUSEPA had accrued a reserve fund.

In Savanes Region, the regional directorate of water and sanitation ascertained the balance in the saving bank. The directorate would enable funds to be withdrawn when necessary of expenditures by issuing a notice of permission to withdraw to the bank.[60] Such a system was not adopted in Maritime Region.

In Savanes Region, when a water committee or AUSEPA had uncollected water charges, an

[57] Information from the executing agency.

[58] Results of interview survey with regional directorates of water and sanitation. Regarding exchange rate, as of April 2, 2017, 1 EUR = 125 JPY, 1 EUR = 656 FCA, 1 FCA = 0.19 JPY.

[59] Results of beneficiary survey.

[60] Results of interview survey with the Savanes Regional Directorate of Water and Sanitation.

animateur would instruct the water committee or AUSEPA to make the residents duly pay the outstanding charges. If a large number of the residents were not paying the charges for their facility, they would be informed that, for example, no warranty would be provided for repair work in the case in which repairs became necessary within the facility's service life.[61] In Maritime Region, such a strict approach would have little prospect for ensuring the maintenance of the facilities. Each director for regional directorate of water and sanitation adopted a different policy. However, the MAEH Portable Water Supply Directorate had access to a state subsidy for large-scale repair expenses, and stated that it was able to invoke this subsidy when necessary.[62]

3.5.3.3 Users' Opinion about Water User Fees and Measures to Households that Have Difficulties to Pay the Charges

The water charges were considered appropriate by 100% of the users of the level-1 facilities in Maritime Region. In Savanes Region, they were considered appropriate by 97% of level-1 facility users and 92% of level-2 facility users. Regarding support for households that struggled to pay the charges, 73% of the water committees in the beneficiary survey had an exemption system. In Savanes Region, 54% of the water committees and AUSEPAs had a special exemption system.[63] According to the interview survey, there were cases in which users offered their labor as a substitute for paying water charges.

3.5.4 Current Status of Operation and Maintenance

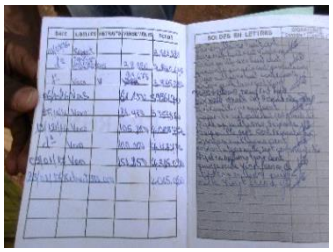
3.5.4.1 Current Status of Operation and Maintenance in Each Facility

The operation and maintenance of each facility was generally favorable. From visual observation, the status of cleaning and drainage among facilities in both regions was generally favorable. With the guidance of *animateurs*, facility rules were being upheld, except among non-operating sites. Each *animateur* would submit a monthly monitoring report to the regional directorate of water and sanitation describing the operation and maintenance status of facilities. *Animateurs* were visiting facilities at least once a quarter and preparing visiting guidance records and repair records. The regional directorates of water and sanitation would log these records on a digital database called "Programme." When a malfunction occurred, the directorates of water and sanitation would issue a repair request to an AR, who would then perform the repair swiftly. ARs would take one to two days to complete the repair in the case of level-1 facilities. In the case of level-2 facilities, repair time varied depending on the repair location, but it would generally take as long as a week or so because the hired private firms were based in Kara[64] or Lomé.[65]

[61] Results of the field survey.
[62] Results of interview survey with regional directorates of water and sanitation.
[63] Results of beneficiary survey.
[64] Kara is the closest city to Savanes Region, situated 413 kilometers to the north of Lomé,
[65] Results of interview survey with *animateurs*. Results of interview survey with beneficiaries.

Tône Prefecture, Savanes Region
Water fetching
at a level-1 facility

Capital of Savanes Region
A retailer of spare parts
for level-1 facilities



Cinkassé Prefecture, Savanes Region
A record of reserve funds from water user fees payments pertaining to level-2 facilities

In Maritime Region, the regional directorate of water and sanitation and water committees have put in place an institutional system for maintenance, and there were no major problems related to maintenance at the time of ex-post evaluation. Neither were there any technical problems. There were, however, some issues with finance; around 30% of water committees experienced difficulty collecting water charges for the operating facilities. Another issue concerned PEAs; peri-urban residents showed preference for PEAs, which have lower maintenance costs than the manual pumps rehabilitated in the project and do not require community-led joint management, and the Togolese government has been subsidizing private investment into PEAs, suggesting that PEAs will become even more prevalent in the future. The diffusion of PEAs may have an influence on the operation and maintenance of the rehabilitated facilities in Maritime Region, and this may pose an issue to sustainability.

In Savanes Region, a maintenance system has been established based on the supervision of the regional directorate of water and sanitation, and the monitoring report system was functioning. The maintenance status was favorable. At a technical level too, the ARs had adequate repair skills necessary to maintain level-1 facilities, and the AUSEPAs were able to maintain level-2 facilities thanks to the technical expertise of operators; thus, there were generally no technical problems. On the financial side, each facility was financially independent and had accrued from the collected water charges a reserve fund for major future repairs. In addition, the Togolese government provides a subsidy for future repair work. There are no financial concerns. Therefore, the sustainability of Savanes Region is judged high.

In light of the above, the project’s overall sustainability is judged fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The project was implemented to improve access to safe drinking water, and thus improve the living environment, by constructing and rehabilitating water supply facilities in rural areas and semi-urban areas throughout the Maritime and Savanes regions.

It was identified that the project is consistent with the policies of Japan and Togo. However, in terms of development needs and the project's plan and approach, while there were no problems in Savanes Region, the selection of sites and facility types in Maritime Region did not necessarily reflect the needs of users or the feasibility for maintenance and management; thus, the relevance of the project is fair. The project cost was within the plan, and the duration of the project was also within the plan; thus, the project's efficiency is high. Regarding the effectiveness of the project, the target population served in Maritime Region was not achieved because the type of water supply in some of the rehabilitated facilities was not suited to residents' needs. However, over 80% of the target water population was served. In Savanes Region, the facilities' operating rate was high, and the target of the population served was met. Regarding the impact of the project, in both regions, the project achieved a reduction in water-borne diseases an improvement in hygiene situation and a reduction of water fetching labor, which freed up time for productive activities and utilization of time for learning activities. Therefore, both the effectiveness and impact of the project are deemed high. As for sustainability, an institutional system for maintenance was established in Maritime Region, and no technical problems were observed. However, Maritime Region has an increasing number of privately financed simplified water stations, which are more convenient and cheaper to maintain than the manual pump facilities rehabilitated under this project. In relation to this trend, the payment of water user fees to the water committees was delayed in some of the project sites situated in the urban outskirts. This situation is predicted to have an impact on financial sustainability. In Savanes Region, an institutional system for maintenance was in place, and maintenance had been performed favorably. There are generally no technical and financial issues. Taking all these points into account, the sustainability is evaluated as fair.

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

4.2 Recommendation

4.2.1 Recommendation to Executing Agency

<u>Strengthening technical level of technicians of the regional directorates of water and sanitation, and conducting walk around inspections</u>

Among the level-2 facilities that used a commercial power source in addition to a generator or solar panels, there was one facility for which the AUSEPA needed to have operated the facility more adeptly, specifically, by balancing the hours of generator or solar-powered operation with the hours of commercial power-based operation in such a way as to ensure that the level of water in the overhead tank (impoundment tank) was adequate for morning and evening water fetching. There was also a facility that was in want of expert guidance on operation and management from

a technical specialist, including advice on how a generator requires some cooldown time after six hours of operation during the late dry season, when the temperature rises to over 40 degrees Celsius. It is recommended that efforts be made to enhance the skills of the technicians assigned by the regional directorates of water and sanitation, and that regular inspection tours be carried out by technically proficient technicians. Impounding water into the overhead tank at the appropriate times will enable residents to access water as needed, which will in turn increase the water charge revenue. With collected water charges as their source of funds, AUSEPAs will be able to make provision for future O& M expenses. Operating the pumps correctly and in accordance with seasonal conditions will also help ensure that the pumps have a long service life. Efforts to enhance the skills of technicians and thus ensure they are equipped to provide technical guidance for the facilities should be made at a regional level.

4.2.2 Recommendation to JICA

None.

4.3 Lessons Learned

<u>The rapid change of water supply needs in the capital region and the future demand projection of facilities</u>

With Capital Lomé's rapid development, the needs (preferences) of residents in places such as Maritime Region – a region that is home to the capital and that is expected to be rapidly transformed by urban expansion – are set to change as they become increasingly exposed to urban lifestyles. These residents are becoming less interested in water supply facilities that are maintained by the community, such as communal faucet facilities and deep well facilities, and are showing greater preference for door-to-door water distribution systems and water supply facilities that do not require community-led management. Since private water supply systems and door-to-door water distribution systems are likely to become widely used in the future, there is little prospect for the sustained use of level-1 facilities. If a project is taking place in a country or region (particularly a region that is home to the national capital) where rapid development is anticipated, it is essential to forecast demand and to survey needs appropriately, bearing in mind that urbanization will bring changes to the social environment and raise income levels, and that this will be accompanied by a rapid change in residents' needs.

<u>Constraints on the rehabilitation of old wells</u>

In Maritime Region, the project implemented the rehabilitation of the old wells, which had been constructed under the Grand Aid Projects since the 1980s. In this project, however, there were various problems, including deterioration of the wells, water quality contamination inside the wells, the inaccessibility of the spare parts necessary for replacing old facilities, the withdrawal from production of the well models, and changes in the ownership of the land residing the wells. The responded measures to these issues were taken to undertake a simple renewal by replacing the models of pumps – hand-operated and foot-operated pumps – with

another of the same type. Foot-operated pumps were problematic in that there was a limit of the amount how much people could fetch water, more time is required to fetch the water compared to hand-operated pumps. Moreover, this placed a strain on the lower body of pregnant women who used them. One lesson to learn is that rehabilitating the same types of facilities again no longer match the water fetching needs of many residents. When it comes to rehabilitating old well facilities, there needs to be a feasibility study regarding the rehabilitation of the facilities before the project formulation.

The case of women's involvement in the water committee

While carrying out the ex-post evaluation, the external evaluator also investigated women's empowerment in the rural water supply project as well as some cases in which women are either positively or negatively influenced.[1]

Among 160 water committees in the Savanes and Maritime regions that are supported by the project, there is only one committee with a woman as the chairperson. This committee is collaboratively run by men and women, and the water supply facilities are more actively used to improve the living environment, which is the community's asset, in a manner that also reflects the villagers' needs.[2]

Nano Village (Level 2 facility), Savanes Region

In the majority of cases, the members of a water committee are either appointed by a traditional chief or decided by influential people of the village. However, in Nano Village, Nano Canton, Tandjouaré Prefecture, Savanes Region (population of beneficiaries, 394 persons), when selecting a chairperson of the water committee, seven people put their name forward, and from those candidates, a woman was elected as the chairperson. The rest of the candidates were men. The woman chair, while she understands French, is illiterate, and so a male secretary of the water committee supports her by describing documents in French, and thus there is no problem in the running of the water committee.[3] Cleaning of the water storage tank and maintenance of communal taps are strictly carried out. Both male and female villagers are actively involved in the water committee's activities, and information is shared equally between men and women.

In contrast, in other water committees, the posts of chairperson and secretary are usually taken up by men, and "women's involvement" often means appointing women as a treasurer or hygiene officer. In terms of decision-making in the committee, the chairperson and secretary usually have the most authority in making decisions, and in many cases, because women are a treasurer or hygiene officer, they are separated from decision-making and are not at all involved in it. The external evaluator has also confirmed that when the main committee posts are taken up by men, female members often find it difficult to speak out on the condition of water supply. The external evaluator have also seen cases in which there is little transparency in decision-making and finance. The group interviews with women in these villages suggested that the patriarchal division of labor is deeply rooted and that men control the finances. Many women voiced their concern that they are forced to follow men's decisions with regard to land, money, and other family issues, and they cannot even speak out their views. On the other hand, in the case of Nano Village, unlike other villages in the rural area, because it is situated on the trading route in sub-urban area and because they have been trading with many ethnic groups, women have had the opportunity to participate in society and economy. The external evaluator speculates that this is the background for the appointment of a woman chair.

Pogno Village, (Level 2 facility), Savanes Region

[1] The external evaluator conducted group interviews and focus group interviews with the residents and members of the water committee (including AUSEPA) who operate, maintain, and manage the water supply facilities.

[2] In Nano Village whose committee is led by a woman, when making decisions about the timings of the use of water and additional places for communal taps (an additional work carried out by the villagers after the completion of the project with approval and supervision from the region's Water Safety Board), views of men and women of the village were reflected in the operating, maintenance, and management of the committee.

[3] While the villagers use a tribal language, official documents are written in French. The woman chair, who has not received education in French, asks the French-speaking secretary to create official documents.

When influential people exist in the community, women who occupy the weaker position in the power relationship still find it difficult to express their views or comment on their needs at the water committee meetings. However, it has been confirmed through the discussions and interviews with women that women's involvement in the committee as members enhances the function of the water committee and increases the transparency of the decision-making process and accounting, because they express their views and put forward proposals about the water supply facilities as women, the main users of the facilities. The case of Nano Village has confirmed that it is important to reflect residents' needs, especially women's needs, who are the main users of the facilities, in order to sustainably continue the maintenance of the facilities in a community.

Apeyeme Village
(Level 1 facility), Maritime Region

Republic of Sierra Leone

FY2016 Ex-Post Evaluation of Japanese Grant Aid Project

"The Project for Establishment of Rural Water Supply System in Kambia Town"

External Evaluator: Yasuo Sumita, Global Link Management, Inc.

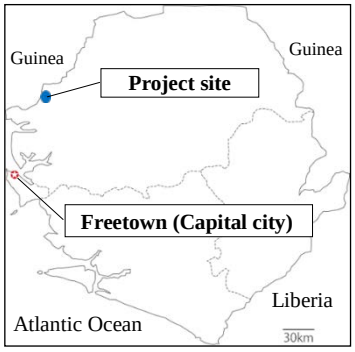
0. Summary

The project was implemented for the purpose of contributing to the improvement of the living environment and hygiene of the residents by providing a stable supply of safe drinking water by rehabilitating and improving water supply facilities in the target areas in Kambia Town.

The project was consistent with the development policies of Sierra Leone and the priority areas of the Japan's ODA policy for Sierra Leone. The development needs of Sierra Leone was high. Therefore, its relevance is high. Although the project cost was within the plan, the project period was slightly longer than planned. Therefore, the efficiency is judged as fair. Treated water, which was safer than the previous water source, was supplied throughout the year by the project, but the water supply for each area was provided during a limited timespan every other day. The population served at the time of ex-post evaluation was slightly lower than the target population, but it improved significantly with the project implementation. In addition, although it did not reach the target value for water supply per person per day, it was not much lower than the target value for water supply volume if it was limited to users of public water taps. The public water taps were operating in 96 out of all the installed 100 locations. Positive impacts such as the reduction of water-borne diseases and reduction of water fetching labor, among others, were realized due to improved hygiene conditions and better water quality. Although the project's implementation had an effect to a certain degree, the effectiveness and impact are fair because the water supply for each area was provided during a limited timespan every other day. There are no major problems concerning technical aspects of operation and maintenance, but the sustainability of the institutional and financial conditions is fair. The operation and maintenance status of facilities and equipment has some problems. Accordingly, the sustainability of the project is fair.

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

1. Project Description



Project Location

Constructed water treatment plant

1.1 Background

Due to the civil war[1] that lasted ten years from 1991, much of Sierra Leone's social infrastructure was devastatingly destroyed and sufficient services were not provided. In the water sector, water supply facilities equipped with a rapid sand filtration system were built and operated in provincial towns under the cooperation of the World Bank, France, Japan, and others during the 1970s and 1980s, but those water supply facilities in every town were destroyed by the civil war and did not function at the time of project planning and the water supply rate of the country was at a low level. In the target area of the project, Kambia Town[2], the provincial capital of Kambia Province, 60% of the residents were using dug wells and wells with hand pumps. Dug wells became dry during the dry season, and the quality of the water has a problem by infiltration of such as sewage from daily life. This caused water-borne diseases. In addition, the remaining 40% of the residents were using unhygienic river and stream water.[3]

JICA implemented the technical cooperation project "Establishment of Water Supply Management System in Kambia District" (December 2006-December 2008 at Rokupr in the province. Water supply facilities were restored with the construction of a water treatment facility using the slow sand filtration system[4], and the project also supported the strengthening of their operation capacity through the establishment of a water supply and sanitation board. These activities aimed at establishing models related to water supply projects in provincial towns in line with the decentralization and independent management of the Sierra Leone government's water and sanitation policy after the civil war in principle. The Government of Sierra Leone expressed its intention to disseminate the model above nationwide as a method for improving water supply facilities in provincial towns, and requested implementation of the project with Grant Aid for the improvement of water supply facilities in Kambia Town.

1.2 Project Outline

The objective of the project is to ensure stable supply of safe drinking water by rehabilitating and improving water supply facilities, thereby contributing to improvements in the living standards and hygiene of the residents in the target area, Kambia Town in Kambia Province, Sierra Leone.

---

[1] The civil war ended on March 1, 2002.

[2] Kambia Town consists of three areas, namely Kambia 1, 2 and 3, and the target area of the project consists of two areas, Kambia 1 (Old Town) and Kambia 2 (New Town). According to the project consultant, Kambia 3, which is outside of the target area, was made up of 10 households at the time of project planning. However, at the time of ex-post evaluation, the population of Kambia 3 had increased to about 1,000 people. The residents used rivers, streams and traditional wells as water sources, and safe water supply was required in Kambia 3.

[3] *JICA Preparatory Survey Report*

[4] This is a water treatment method in which raw water is slowly passed through filter layers made up of sand with a naturally-generated biological filter of micro-organisms and gravel. Although it is not as quick or efficient as rapid sand filtration, which uses large amounts of chemicals, it is less costly and is easy to operate and maintain. This makes it an appropriate water treatment method for developing countries suffering from a shortage of both technology and financial resources if the conditions such as raw water quality and water quantity are satisfied. (Source: JICA Multimedia-based Learning Material *"Slow sand filtration: creating clean, safe water"*)

G/A Grant Amount / Actual Grant Amount	805 million yen / 703 million yen
Exchange of Notes Date /Grant Agreement Date	January 2011 / January 2011
Executing Agency	Ministry of Water Resources[5]
Project Completion	January 2013
Main Contractor	Dai Nippon Construction
Main Consultant	Eight-Japan Engineering Consultants Inc.
Preparatory Survey	April 2010 to January 2011
Related Projects	Dispatch of Expert[6] - Dispatch of Expert on Water Supply Management for Rural Towns (February 2012-March 2013) Technical Cooperation Project - Establishment of Water Supply Management System in Kambia District (December 2006 - December 2008)

2. Outline of the Evaluation Study

2.1 External Evaluator

Yasuo Sumita, Global Link Management, Inc.

2.2 Duration of Evaluation Study

This ex-post evaluation study was conducted with the following schedule:

Duration of the Study: July 2016 to February 2018

Duration of the Field Study: November 5 to19, 2016 and March 11 to 21, 2017

3. Results of the Evaluation (Overall Rating: C[7])

3.1 Relevance (Rating: ③[8])

3.1.1 Consistency with the Development Plan of Sierra Leone

At the time of project planning, the First (2005) and Second (2008) *Poverty Reduction Strategy Paper*, the development policy of the government of Sierra Leone, identified "construction of safe water supply and sanitation facilities for poor communities in rural and urban areas", "restoration

[5] At the time of project planning, it was the Water Supply Division of the Ministry of Energy and Water Resources, but it became the Ministry of Water Resources when the Government ministries were reorganized from January 2013.

[6] It was necessary to newly establish the Kambia Water Supply Sanitation Board in Kambia province, which is an organization for the operation and maintenance of water supply facilities. The Kambia Water Supply Sanitation Board was required to strengthen its technical and operational capacity, and it was also necessary to supervise and monitor operations and maintenance for a while after the start of operations at the water supply facility. Thus, an expert was dispatched under a technical cooperation scheme. The purpose of dispatching experts is "An appropriate management system at the Kambia Water Supply and Sanitation Board is established, and an institutional condition for sustainable water supply is established". The activities include supporting for establishment of Kambia Water Supply and Sanitation Board and education of staff, public awareness to residents by the water supply project and the necessity of water user fee payment, and awareness of hygiene, etc.

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

[8] ③: High, ②: Fair, ①: Low

and reconstruction of existing water supply facilities damaged by the civil war" and "hygiene improvement and sensitization about fetching-water and storage of drinking water. *The Poverty Reduction Strategy Paper* (2013-2018) at the time of ex-post evaluation states, "Expansion of piped water supply and improvement of access to safe drinking water".

The National Water and Sanitation Policy (2008), the policy for the water sector that was formulated at the time of project planning, recommended piped water supply rather than water supply by a point source such as wells with hand pumps. This policy laid out strategies through 2015, but as of the ex-post evaluation, the results of these strategies were being evaluated and had not been updated.

In Sierra Leone, *The National Ebola Recovery Strategy for Sierra Leone* was formulated at the time of the Ebola outbreak[9] in West Africa from 2014. The first phase was implemented as *The 6-9 months Recovery Programme* (July 2015-March 2016), and at the time of ex-post evaluation, *The 10-24 months Recovery Programme* (April 2016-June 2017) as the second phase was underway. These programs note that providing safe water to 700,000 in provincial areas by June 2017 is a policy goal of the regional water supply sector.

As seen above, the project is consistent with the development policy of the Sierra Leone government at the time of planning and ex-post evaluation.

3.1.2 Consistency with the Development Needs of Sierra Leone

In Sierra Leone, water supply facilities were destroyed during the civil war and most of them remained unrestored, so many people were unable to access safe water and were forced to live with this obstacle. At the time the project was planned, the target area of the project, Kambia Town, had a water supply facility constructed in the 1970s, but it was inoperable. For this reason, 84% of residents used either traditional wells (44%) that were dug out using unsanitary methods or river and stream water (40%) as their source of water supply. Only 16% of residents were able to use deep wells with hand pumps, which are considered to be relatively hygienic.[10]

At the time of ex-post evaluation, water treatment was carried out by the water supply facility constructed in the area, replacing the unhygienic water supply available before the project with a water supply that is comparatively safe. However, the water supply has been provided every other day in each area. In addition, the area where water supply facilities are needed has expanded due to the population increase in recent years, which means that further increases in water supply volume and construction of water supply facilities would be required. From the time of planning, the water supply rate in rural areas was lower than in urban areas, and improving the water supply

[9] The declaration of the end of the epidemic in Sierra Leone by the WHO (World Health Organization: WHO) was November 7, 2015. However, after that, a new infected person was confirmed and the WHO issued a second declaration of the end of the epidemic of Sierra Leone on March 17, 2016.

[10] *JICA Preparatory Survey Report*

rate was a problem even at the time of ex-post evaluation.[11]

In light of the above, the need to expand and improve water supply services in the area was high both at the time of planning and ex-post evaluation; therefore, the consistency of the project is high.

3.1.3 Consistency with Japan's ODA Policy

Among the Rural Development in Kambia District Program[12], the project was positioned as a Rural Development Project, a priority development subject for support of Sierra Leone at the time of project planning. This contributed to the improvement of the living environment in the area. In addition, the project was strongly related to the achievement targets in the field of "Water and Sanitation" in *The Yokohama Action Plan*[13] adopted at the 4th Tokyo International Conference on African Development (TICAD IV) in 2008, as well as the achievement of the *Millennium Development Goals* (MDGs)[14], which Japan prioritizes.

In light of the above, implementation of the project has been relevant to the development policies and development needs of Sierra Leone as well as Japan's ODA policy. Therefore, its relevance is high.

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

In the project, water facilities were constructed and installed[15] to supply water to the residents of the target area through public taps, where raw water taken in was treated at the water treatment facility and transferred from the elevated tank through a transmission pipe and distribution pipe. Two facilities from two sources, a river and a swamp[16], were constructed as water intake facilities which can be selected depending on seasonal water volume and water quality (turbidity). The slow sand filtration system was adopted for water treatment as it allows for easy operation and maintenance at low cost. 100 public water taps having three faucets each were installed to supply water to residents, and private connections were provided to three public facilities, Kambia Hospital, Kambia District Council and Resource Centre[17]. The water supply plug connection to

[11] Urban area is from 47% (2008) to 85% (2015). Rural area is 32% (2008) to 49% (2015). (Source: Ministry of Water Resources)

[12] *JICA Ex-ante Project Evaluation Sheet*

[13] May 2008 *Yokohama Action Plan*, Tokyo International Conference on African Development (TICAD) IV

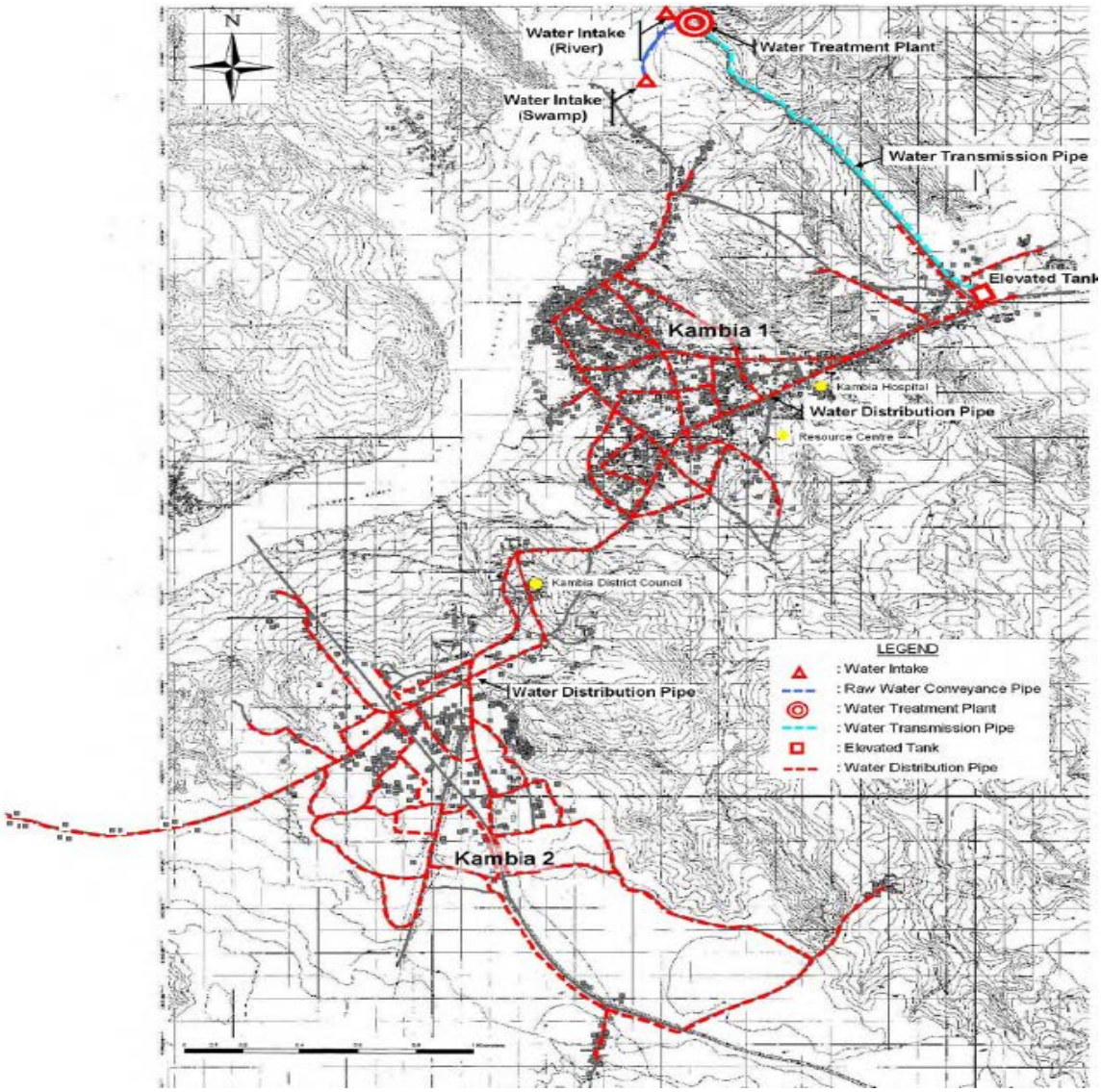
[14] Target 7C: Cut in half the proportion of people without sustainable access to safe drinking water and basic sanitation by 2015.

[15] Existing facilities (water intake facility, water treatment facility, elevated tank, transmission pipe, distribution pipe, public taps, etc.) were destroyed during the civil war and left without being or maintained for a long time, so deterioration was marked and only a few facilities were renovated and utilized, such as raw water conveyance channels, ancillary facilities for water tanks, basic foundation of operator's dormitory and warehouse, and others.

[16] The swamp that was taken as a water intake site in the project is a wetland located in a low geographical position, and it is turbid in the dry season and there is little flow, but there is clear and abundant groundwater runoff in the rainy season.

[17] Community center that is used for training of community residents, community activities, events, etc.

houses and other facilities, carried out after the completion of the project, was done by Sierra Leone. In addition, support was provided, including some equipment for the operator's dormitory at the water treatment plant and for water supply taps for private connections after starting the project.



Source: JICA Preparatory Survey Report

Figure 1 Target area and outputs of the project

[Japan side]

The outputs of the Japan side are as shown in Table 1. All were carried out as planned.

Table 1 Plan and actual outputs of Japan side

Planned Items	Contents	Actual
1. Water intake facility	Intake pump：0.84 m^3/min×14.8m×3.7KW×2sets（River） Intake pump：0.84 m^3/min×17.5m×3.7KW×2sets（Swamp）	As planned
2. Raw water conveyance facility	Conveyance pipe: DCIP ϕ 150mm×100m (Rive to Waterworks） Conveyance pipe：DCIP ϕ 150mm×400m (Swamp to Waterworks）	As planned
3. Water treatment facility	Capacity：1,200 m^3/day Receiving well：22 m^3×1 basin Sedimentation basin：400 m^3×2 basins Slow sand filter：60 m^2×4 basins Clear water reservoir：150 m^3 Sand wash and dry：84 m^3×1 no. Sand washer：1 set Chlorination device：2 sets Sludge & drainage basin：9 m^3×1 basin Generator：60KVA×3 sets Lighting device：1 Ls. (outdoor (mercury lump) and indoor)	As planned
4. Water transmission facility	Transmission pump：0.42 m^3/min×60.9m×11KW×3 sets Transmission pipe：DCIP ϕ 200mm×1,715m (Waterworks to Elevated tank)	As planned
5. Water distribution facility	Elevated tank：400 m^3×1 no. Distribution pipe：PVC ϕ 250mm to 75mm×29km Public water tap：100 places (3-faucet type) Private connection：3 places (Kambia Hospital, Kambia District Council and Resource Centre)	As planned
6. Buildings	Pump house：2 buildings (3.0m×5.0m） Generator room：1 building (10.0m×7.0m） Store：1 building (12.0m×6.0m） Staff quarter 1：1 building (18.0m×7.5m） Staff quarter 2：1 building (22.0m×8.2m）	As planned
7. Equipment	Water meter： ϕ 40mm×30 sets Piping material：Ls. (for the pluming work of the above water meters) Tools：1 set (for plumbing work) 1 set (for electrical work) 1 set (for mechanical work)	As planned

Source: Document provided by JICA, Answers for the questionnaire from SALWACO and interviews of the project consultant

[Sierra Leone side]

The items to be borne by the Sierra Leone side are as shown in Table 2 All were carried out as planned.

Table 2 Plan and actual costs for Sierra Leone side

Plan	Actual
1. Providing temporary sites (approx. 5,000m^2) for materials, storage, etc.	As planned
2. Securing construction base for water supply facilities ・Water intake facility/Water treatment facility/Elevated tank/Public water taps	As planned
3. Removal of existing water treatment facilities (high speed sedimentation pond, pressure type filtration tank, water treatment tank, elevated tank) and four existing buildings (only walls excluding the foundation) in the water treatment plant	As planned
4. Removal of existing elevated tank (steel gantry and tank part)	As planned
5. Prompt custom clearance and tax exemption to import construction materials for the Project and support the inland transport	As planned
6. The following costs required for implementation of the project that are not covered by grant aid. ・Project management costs of the Ministry of Energy and Water Resources ・Project management costs of the Kambia District Council ・Initial working capital for the operation and maintenance of Kambia Water Supply and Sanitation Board	As planned
7. Exemption from customs duties, domestic taxes and other charges imposed on Sierra Leone domestic procurement of contractual equipment and services	As planned
8. Entry permission and residence permit of Japanese who do business based on contract	As planned
9. Appropriate operation and maintenance, and effective use for the Project facilities	As planned
10. Coverage of notice fee and payment fee for authorization certificate (A/P) to be paid to Japanese banks for banking business based on interbank agreement (B/A)	As planned

Source: Document provided by JICA, Answers for the questionnaire from SALWACO and interviews of the project consultant

3.2.2 Project Inputs

3.2.2.1 Project Cost

As shown in Table 3, the project costs on the Japan side fell within the plan (86% of the plan). This is due to the influence of the appreciation of the yen[18], and there has not been any decline in the quality control and quality of construction and facilities. Although the total project costs borne by the Sierra Leone side are unknown, the items deemed to be the responsibility of the Sierra Leone side and the accompanying expenses were covered as planned.

Table 3 Plan and actual project costs

	Plan	Actual	Ratio to the plan
Japan	805 million yen	703 million yen	86%
Sierra Leone	16 million yen	N/A	－
Total	821 million yen	N/A	－

Source: Document provided by JICA, Answers for the questionnaire from the Executing Agency and interviews with the project consultant

[18] At the time of the basic design, 1 US dollar = 92.13 Japanese yen, and at the time the design was implemented, it was calculated as 1 US dollar = 83.53 Japanese yen.

3.2.2.2 Project Period

The project period lasted 23 months[19], one month longer than the planned 22 months[20] and a slight 5% over the original plan. Although the design period was as planned, the construction period was extended. The reason for the delay in the construction is that when the national road was built in the target area, Sierra Leone promised to carry out the preliminary installation of the pipeline under the road so that the water distribution pipe would cross the national road, but did not do so. Thus, a period of time was needed to renegotiate the road excavation and obtain permission for installation, and the construction period for installing the water distribution pipe was longer than planned.

As noted above, project costs were within the plan, but the project period was longer than planned. Therefore, efficiency of the project is fair.

3.3 Effectiveness[21] (Rating: ②)

3.3.1 Quantitative Effects

The population served set at the time of project planning and the water supply volume per person per day are used as main indicators.[22]

3.3.1.1 Population Served[23]

The project aimed for a population served (population that can access safe water) of 30,000 people (three years after project completion). This figure is the estimated population[24] as the baseline based on the growth rate at the time of project planning with 5,000 people added to represent the non-permanent residents (short-term residents[25])in the target area.

In Sierra Leone, a census was carried out in December 2015. Kambia Town has a population

---

[19] 23 months from March 14, 2011 (consultant contract date) to January 21, 2013 (completion date). According to the process chart described in the *JICA Preparatory Survey Report*, the project period at the time of the project planning is 3.5 months for the design period and 18.0 months for the construction period (including 2.0 months for the bidding work) for a total of 21.5 months. It is calculated as 22.0 months from the contract month to the completion month. In the JICA Ex-ante Project Evaluation, the implementation period is 21 months, and the actual project period will be 24 months (109% of the plan) in case the starting month is the grant agreement month (January 2011).

[20] In this evaluation, the starting date of the project was adjusted at the start of detailed design.

[21] Sub-rating for Effectiveness takes Impact into account.

[22] In the *JICA Ex-ante Project Evaluation*, only the population served is set as an indicator, but the *JICA Preparatory Survey Report* sets the population served and the water supply volume per person per day as the main indicators.

[23] According to the executing agency, all residents of the target areas Kambia 1 and Kambia 2 are beneficiaries (population served). A village outside Kambia Town is also covered by the project, but there are only four households.

[24] According to the project application form from Sierra Leone, the 2007 population was 20,000 people, but the population in 2007 was 12,503 people (estimates from the census conducted in 2004), according to the Statistics Sierra Leone at the time of the ex-post evaluation. Considering the results of the census conducted in 2015 (21,027 people), the evaluator thinks that the population of 20,000 people listed in the project application form is higher than the actual population and that the population figure from the Statistics Sierra Leone (12,503 people) is too low.

[25] According to the Ministry of Water Resources, the Kambia District has the border with neighboring Guinea and there are short-term residents in Kambia Town such as merchants, shipping companies and concerned people who travel to and from Sierra Leone and Guinea. The Ministry estimated this population to 5,000 people / year, and they indicated that there were no figures associated with the calculation basis of the population and it was an estimate calculated also based on the scale of the planned facility.

of 21,027 people[26], according to the Statistics Sierra Leone. The estimated population of the target area (Kambia 1 and Kambia 2) based on the population growth rate is 20,721 people in 2016, which does not include the population of Kambia 3 (approximately 1,000 people). The actual figure at the time of ex-post evaluation is estimated to be 25,721 people (86% of the original plan), which is the Ministry of Water Resources' estimate of 20,721 people and an additional 5,000 people[27] that are non-permanent residents.

Table 4 Population served of target area Unit: Number of people

	Baseline	Target	Estimated	
	2010	2016	2013	2016
	Baseline Year	3 years after project completion	Project Completion	3 years after project completion
Population served (Kambia 1 and Kambia 2)	3,400 (People using wells with hand pumps)	30,000	23,507	25,721

Source: Calculated from the figure (2015 census) provided by the Statistics Sierra Leone

3.3.1.2 Volume of Safe Treated Water Per Person Per Day

At the time of planning, the project set the water supply volume to 36 liters[28] per day three years after the project completion (2016).

At the time of ex-post evaluation, for financial reasons, water was supplied every other day to Kambia 1 and Kambia 2, the target area in Kambia Town, and the water supply volume was 450 m^3/day (450,000 liters/day). Since the estimated population of Kambia 1 and Kambia 2 is 25,721 people and water is supplied every other day, the volume of water supplied per person per day is estimated to be 15.8 liters[29] (44% of the planned volume).

[26] According to the Statistics Sierra Leone, the population is the sum of Kambia 1 to 3 which make up Kambia Town. Also, according to the Statistics Sierra Leone (Kambia District Branch), the estimated population of Kambia 3 in 2016 is approximately 1,000 people. The population growth rate is 3.3% (Northern Province including Kambia District).

[27] Since the target volume includes 5,000 non-permanent residents, 5,000 was also added to the figures at the time of the ex-post evaluation.

[28] The water supply volume for the public tap is calculated as 20 liters/person/day, and the water supply volume of private connection (house) is calculated as 60 liters/person/day. Based on that, 60:40, the desired ratio of public taps and individual connections in local cities as set by the Ministry of Water Resources, is applied, and 36 liters/person/day was calculated using the equation 20 liters/person/day × 60% + 60 liters/person/day × 40%.

[29] According to confirmation by the Statistic Sierra Leone, the population ratio of Kambia 1 and Kambia 2 was "almost the same", and the ratio could not be specified. Therefore, the population of Kambia 1 and Kambia 2 was calculated as having the same ratio. The water supply volume 450,000 × 0.9 (leakage rate 10%) ÷ target population (25,721 ÷ 2) = 31.5 liters/person/day. However, since it was supplied every other day, it amounts to 31.5 ÷ 2 = 15.8 liters per day. Since the leakage rate could not be confirmed during the ex-post evaluation, the rate set at the time of the project plan was used.

Table 5 Water supply volume per person per day for safe treated water

	Baseline	Target	Estimated
	2010	2016	2016
	Baseline Year	3 years after project completion	3 years after project completion
Water supply volume per person per day	0 liter	36 liters	15.8 liters

Source: Estimated by the answers to the questionnaire from the Executing Agency

It should be noted that calculations for the target water supply per person per day was based on the national water sanitation policy. This was calculated at 20 liters/person/day for public water tap users, and at 60 liters/person/day for private connection users. Assuming that private connection users used 60 liters of water per person/day, it is estimated that public water tap user, which account for 99% of water users, were using 15.4 liters/person/day.[30] In other words, if it is limited to public water tap users, we can presume that supply is not far below the target water supply designated in the project.

3.3.1.3 Facility Capacity (Water Supply Volume)

The project constructed a water supply facility with a capacity of 1,200 m^3/day. At the time of ex-post evaluation, the volume of water supplied per day was 450 m^3/day, and the water supply time was about four hours in the morning.[31] The facility capacity was calculated[32] and designed based on the target population served and the target water supply volume per person per day. The required water supply volume was approximately 580 m^3/day, as calculated from the population at the time of ex-post evaluation and the ratio of public water taps to private connections. Therefore, the volume of water supplied per day at the time of ex-post evaluation was about 78% of the required water supply volume.[33] The main reason that the required water supply volume has not been reached is that the water supply time was limited due to a shortage

[30] Of the population of 25,721 at the time of ex-post evaluation, there were 192 private connection users (32 houses x 6 persons per households [according to the Statistics Sierra Leone]) and 25,529 public water tap users (450,000 liters x 0.9 (leakage rate 10%) - (192 x 60 liters)) ÷ 25, 529 = 15.4 liters). However, it should be noted that this does not take into account private connection users other than houses (offices, schools, etc.) because data on the water supply volume could not be confirmed.

[31] Water is supplied from the water treatment facility to the elevated tank from 6:00 am to 10:00 am, but water can be fetched even after 10:00 am on the public water tap that supplies water through the distribution pipe from the elevated tank. The time when water cannot be fetched (water stoppage) depends on the location of the public water tap (the height), but at around 1:00 pm, the water stops at almost all public water taps.

[32] 30,000 people (target population served) × 36 liters/person/day = 1,080,000 liters/day (planned water supply volume); 1,080,000 liters/day ÷ 0.9 (leakage rate 10%) = 1,200,000 liters/day (1,200 m^3/day)

[33] The necessary water supply volume is (192 (users of private connections) × 60 liters/person/day + 25,529 (users of public tap water) × 20 liters/person/day) ÷ 0.9 (leakage rate 10%) = 580,111 liters. Therefore, the actual water supply volume (450,000 liters) is estimated to be about 78% of the required water supply (580,000 liters). However, because it was not possible to confirm data on the water supply volume for private connections other than houses (offices, schools, etc.), the required water supply volume could be more than 580,111 liters.

of funds for the fuel[34] purchases necessary for facility operation.

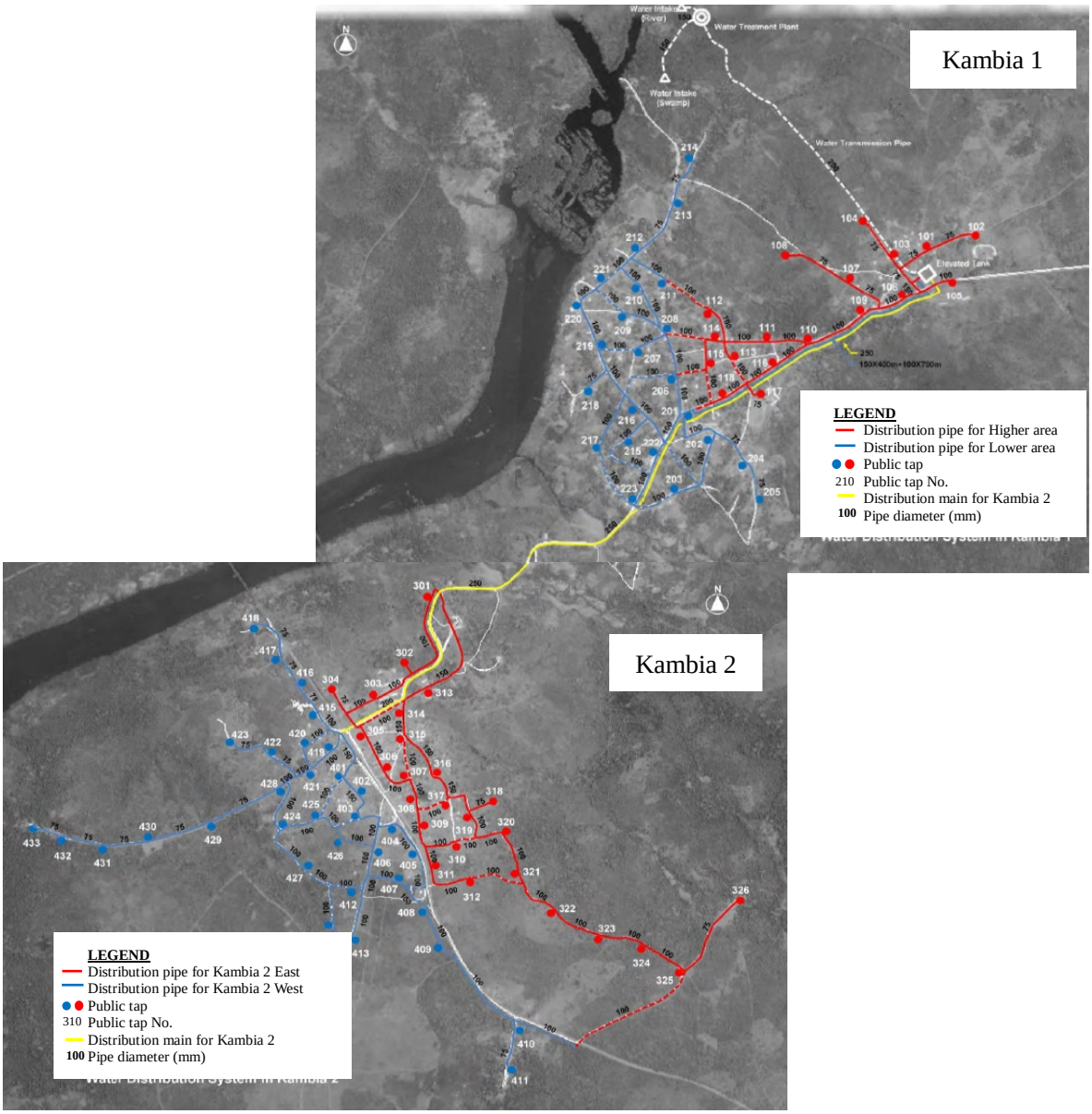
3.3.1.4 Operating Status of Taps

In the project, 100 public water taps were installed to provide the residents with water supply, and only three public district facilities—namely, Kambia Hospital, the Kambia District Council and the Resource Centre—had private connections. Sierra Leone was responsible for the private connections of houses and other facilities. The operation status is described below.

Public water taps

As shown in Figure 2, since there was an altitude difference in Kambia 1, a total of 41 public water taps were installed with the distribution section divided into "High block" and "Low block" in consideration of the stability of water supply. On the other hand, since the water distribution of Kambia 2 is divided into two by the main road, the water distribution area was divided into "East Block" and "West Block" by the main road, and a total of 59 public water taps were installed for supplying water by block.

[34] Commercial electricity is not being supplied to Kambia Town, and fuel (diesel) is required to operate the generator at the water treatment plant.



Source: JICA Preparatory Survey Report

Figure 2 Locations of public water taps in Kambia 1 and Kambia 2

At the time of ex-post evaluation, 96 out of 100 locations of the installed public water taps by the project were operating normally. (There was no water leakage from anything other than the faucet and it was supplied without problems.) As shown in Table 6, all public water taps were in operation in Kambia 1, and four in Kambia 2 were non-operational. There were no public water taps that were out of order. Taps were non-operational because there were few users at those three locations, and the water supply was stopped for one location as a pump attendant[35]

[35] Pump attendants are selected based on recommendations from the community, with one person assigned to each public water tap.

was not assigned to that location.

Table 6 Number of public water taps in operation

		Total		Operation		Non-operation	
Kambia 1	High block	18	41	18	41	0	0
	Low Block	23		23		0	
Kambia 2	East Block	33	59	31	55	2	4
	West Block	26		24		2	
Total		100		96		4	

Source: Results of interviewing with the Executing Agency and field survey

Private Connection

At the time of ex-post evaluation, it was confirmed that the water faucets at the three places (Kambia Hospital, Kambia District Council and Resource Centre) connected by the project were supplying water normally. (However, since the Resource Centre is not always used, it is operated only at the time of facility use.) Also, as of ex-post evaluation, as shown in Table 7, new private connections had been installed and water supplied, in addition to the three aforementioned places.

Table 7 Private connection status

Class[36]	Private connections	Number
Class A	Drinking water sales companies	2
Class B	Hotels	1
Class C	Offices, Guest houses (Including public facilities such as Kambia Hospital, Kambia District Council Resource Centre, etc.)	24
Class D	Schools	2
—	Houses	32

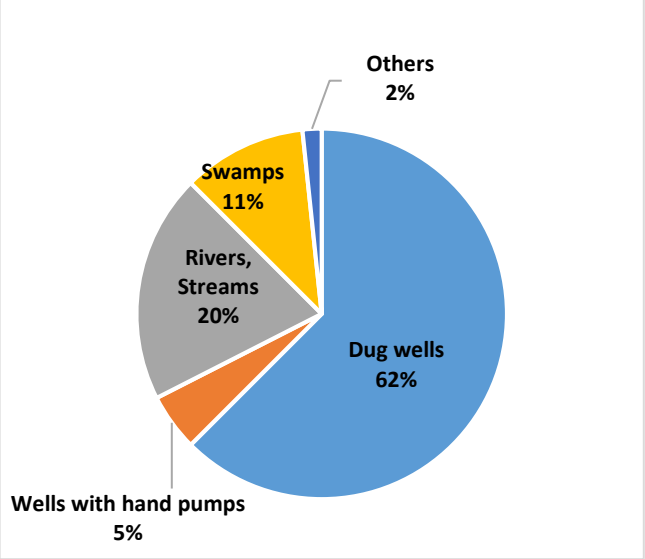
Source: Interview results with the Executing Agency

3.3.2 Qualitative Effects (Other effects)

3.3.2.1 Improvement of Water Quality

[36] The facilities of each private connection are classified according to the amount of water user fees collected (fixed price system). The class is not set for houses because it is a water user fee collection system with a meter.

The beneficiary survey[37] (public water tap users) on the quality of the public tap water showed that 100% of the respondents answered that the water quality improved compared to the previous water source. The water sources previously used by respondents are shown in Figure 3.



Source: Beneficially Survey

Figure 3 Water sources previously used by residents (public water tap users), who said that the water quality improved

Interviews with public water tap users in the field study showed that the water quality of public water taps installed by the project has not changed from the start of service to the time of ex-post evaluation. In addition, some respondents answered that water quality remained an improvement compared to the previous water source.

According to the field study at the time of ex-post evaluation and interviews with the executing agency, the water treatment facility was being sterilized by chlorine and "safe water compared with the previous water source" has been supplied, but regular water quality tests have not been carried out at the water treatment facility and public water taps.

Also, as of the ex-post evaluation, water was supplied every other day for each town. Therefore, in the beneficiary survey, 64% (77 people) answered that "they are also using other water sources ",

[37] The beneficiary survey was conducted from November 14 to 18, 2016 in Kambia Town taking into account the ratio of public water taps installed in each area by the project. A total of 120 people (49 people in Kambia 1, 71 people in Kambia 2) who came to fetch water from public water taps and 25 people with private connections were sampled and investigators carried out individual interviews with them. In regard to public water users, the number of valid response was 1-2 persons per site and 120 in total. In regard to private connection users, the number of valid response was one person per house and 25 in total. For public water tap users, the ages of respondents were as follows: 10.8% between the age of 10 and 19, 42.5% between the age of 20 and 29, 21.7% between the age of 30 and 39, 14.2% between the age of 40 and 49, 9.2% between the age of 50 and 59, 0.8% between age 60 and 69, and 0.8% at age 70 and older. Of the respondents, 36.7% were men and 63.3% were women. For private connection users (houses), the ages of respondents were as follows: 8.0% between the age of 10 and 19, 32.0% between the age of 20 and 29, 16.0% between the age of 30 and 39, 12.0% between the age of 40 and 49, 20.0% between the age of 50 and 59, 8.0% between age 60 and 69, and 4.0% at age 70 and older. Of the respondents, 36.0% were men and 64.0% were women.

which means that about two thirds were using other water sources as well. The most common reason for using other water sources was "to wash clothes," at 49% (38 people).

Residents who use a public water tap

Residents washing clothes at a stream

3.3.2.2 Supply Water Volume and Stable Supply Situation

Before the project implementation, the water supply facilities were limited to wells, rivers, swamps, etc. in Kambia Town, and they became dry during the dry season. As a result, their supply was unstable and the water supply volume was inconstant. In the project, intake sites were selected based on the amount of water and the turbidity[38] from two intake sites, and water supply can be provided throughout the year regardless of the season. With the exception of one respondent in the beneficiary survey (public faucet user), 99% answered that "the volume of water used is increasing compared to the previous water source used ". Although many residents use both the public water tap installed by the project and the previous water sources, the volume of water used by the residents has increased and the supply situation has improved as compared with the period before the project.

3.4 Impacts

3.4.1 Intended Impacts

3.4.1.1 Distance to Water Source

In the project, one public water tap was installed about every 200 meters. Even in the beneficiary survey (public water tap users), 79% of the respondents answered that the distance to the water source was less than 100m, as shown in Table 8. In addition, 93% (111 people) of all the respondents answered that "the distance has shrunk compared to the previous water source". We speculate that the project was effective in shortening the distance to the water source.

[38] The turbidity of the raw water being drawn must be low when adopting the slow sand filtration system. However, when the turbidity of the river used for water intake is high and cannot be used, we assumed that the water volume of the swamp is not sufficient and cannot be used. Therefore, a sedimentation basin, which has been shown to be effective in lowering the turbidity of the raw water to a turbidity suitable for the slow sand filtration system, was installed as a treatment facility for the slow sand filter so that it always had a low turbidity. (Source: *JICA Preparatory Survey Report* and interviews with the project consultant)

Table 8 Distance to public water taps

	less than 50m	50 to less than 100m	100 to less than 200m	More than 200m
No. of responses	57	37	15	11
%	48	31	13	9

Source: Beneficiary Survey
Note: The percentage (%) is rounded, so it is 101% in total. The respondents included nine respondents who answered that there was no change in the distance, and two respondents who answered that the distance had increased.

3.4.1.2 Water Fetching Time

In the beneficiary survey (public water tap users), all respondents answered that "the time has decreased" for water fetching. The time required to fetch water is shown in Table 9, with 75% answering that it takes less than 20 minutes. In the survey conducted at the time of project planning, 67% answered that the water fetching time was less than 20 minutes. Although we should be careful in interpreting the result because different areas and residents were targeted in this beneficiary survey, it is presumed that the project was effective in decreasing water fetching time.

Table 9 Water fetching time

	Less than 10min.	10 to less than 20min.	20 to less than 30min.	More than 30min.
No. of responses	37	53	24	6
%	31	44	20	5

Source: Beneficiary Survey
Note: Time to fetch water per day

3.4.1.3 Reduction of Water Fetching Labor and Utilization of Surplus Time

We were able to confirm that the distance to the water source and the time to fetch water had decreased, and interviews with residents in the field study also showed that water fetching labor had been reduced. Although the free time due to the shorter water fetching time is not very long, respondents who reported shorter water fetching time in the beneficiary survey answered (multiple answers) that the surplus time has been used for housework (84%), rest (84%), non-agricultural income activity[39] (63%), and agricultural work (27%).

3.4.1.4 Impact on Life of Children

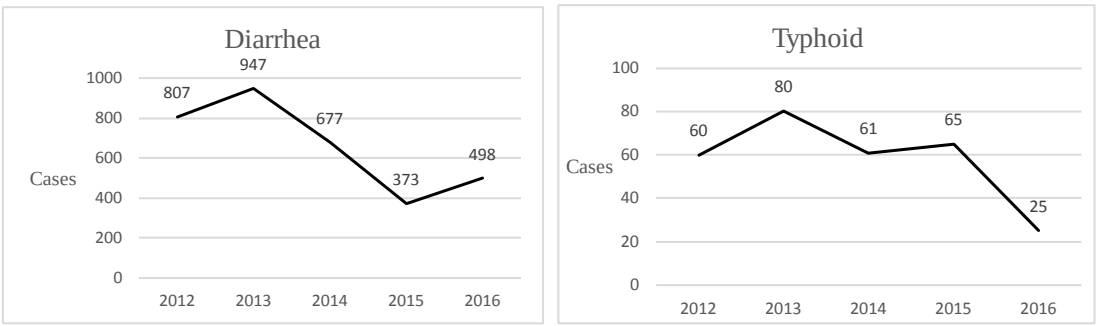
The most frequent answers (multiple answers) by respondents who answered that there was an impact on the lives of their children in the beneficiary survey (public water tap users) were "an increase in time spent at school" (97.5%) and "increase in study time" (95.8%). Even in interviews

[39] Some interviewees answered that they wanted to increase the time they spend selling in the market and time spent working in the store even a little.

at the time of the field study, residents answered that they make their children study as children did not need to help water fetching now that water fetching labor had been reduced with the installation of public water taps. However, it could not be confirmed how much surplus time children now had, and how much time was spent at school and how much study time had increased.

3.4.1.5 Reduction of Water-borne Diseases

According to the beneficiary survey and interviews to public water tap users, some residents were using the previous water source for laundry because use of the facility installed by the project requires payment of a water user fee, but water for drinking and cooking was mainly from public water taps (91%). In the beneficiary survey (public water tap users), 93% of respondents answered that waterborne diseases were "definitely reduced" after the project implementation. (7% answered "I do not know".) At the time of ex-post evaluation, the occurrence of water-borne diseases [40] in Kambia Town was confirmed with the District Health Management Team (hereinafter referred to as "DHMT"), shown in Figure 4. This confirmed that the occurrence of water-borne diseases was reduced in Kambia Town compared to before the project (2012).



Source: DHMT

Figure 4 Occurrence of water-borne diseases (Diarrhea, Typhoid)

3.4.2 Other Positive and Negative Impacts

3.4.2.1 Impacts on the National Environment

An environmental permit was issued for the project by the Sierra Leone Environment Protection Authority (SLEPA) in November 2011. There were no negative impacts on the environment, nor were there complaints from affected residents about "depletion of water sources" and "ground subsidence around the site" as a result of the project.[41]

[40] According to DHMT, cholera has not occurred in Kambia town since 2012, before the project started.

[41] Regarding the impact on the national environment, we were unable to confirm the environmental impact monitoring form for before and after construction. Instead, interviews were conducted with the project consultant and executing agency to confirm the impact between the period of the project plan and the completion of the project. For the period between the completion of the project and ex-post evaluation, impact was confirmed through interviews with the Kambia Water Supply and Sanitation Board, which is responsible for operation and maintenance, in addition to the field study.

3.4.2.2 Resettlement and Land Acquisition

No new land acquisition and resettlement occurred because the water treatment facility and elevated tank, the main facilities for the project, were constructed by removing existing facilities.

3.4.2.3 Consideration of Residents

When a water distribution pipe was constructed on an unpaved road in the target area, countermeasures were taken with the residents, such as preliminarily spraying water on the road and suppressing the generation of dust.

Regarding effectiveness, the population served at the time of ex-post evaluation, which was set at the time of planning, was slightly lower than the target population, but it can be said that the population served greatly improved as a result of the project implementation. The water supply per person per day was about 79% of the target value for users of public water taps. Of the 100 locations in which public water taps were installed by the project, 96 locations were in operation. Regarding access to safe water, the project has been supplying treated water that is safer than the previous water source, and it has been supplied throughout the year. However, the water was supplied every other day for each town at a limited time.

As for impact, although there are residents who are using the previous water sources in parallel because the water supply did not reach the target volume, there is an increase in the amount of water used compared to before the project. Reduction of water-borne diseases by improvement of water quality and improvement of awareness concerning hygiene, reduction of water fetching labor, and other factors have a positive impact on living standards. There were no reports of any negative impact due to the project such as harm to the natural environment, resettlement of residents or acquisition of land.

In light of the above, the implementation of the project has had effects to some degree. Therefore, the effectiveness and impact of the project are fair.

3.5 Sustainability (Rating: ②)

3.5.1 Institutional Aspects of Operation and Maintenance

The responsible ministry of the project is the Ministry of Water Resources. At the time of planning, it was the Ministry of Energy and Water Resources, but it had become the Ministry of Water Resources (since January 2013) by the time of ex-post evaluation. The Water Supply Division of the Ministry of Energy and Water Resources has become the Ministry of Water Resources, including the personnel involved in the project. This reorganization of the ministries had no influence on the project.[42]

[42] Based on an interview with the project consultant and Ministry of Water Resources.

Because of the decentralization[43], the responsibility for operating and maintaining the water supply services of Kambia Town related to the project was transferred from the central government to the Kambia District Council. Based on the bye-law, the Kambia District Council established the Kambia Water Supply and Sanitation Board[44] (hereinafter referred to as "KWSSB") in April 2012 as an operation and maintenance organization. At the time of ex-post evaluation, KWSSB had overall management responsibilities related to the project, and also devises the fee collecting method, collects fees, manages accounting and other similar tasks. In order to support the KWSSB both technically and financially, staff from the Sierra Leone Water Supply Company (SALWACO), a state-owned water company under the umbrella of the Ministry of Water Resources with a proven track record in local water supply services, are stationed at the water treatment plant of the project. Furthermore, there is an office of the Kambia District of the Ministry of Water Resources in Kambia Town, which manages water supply projects in the Kambia District (planning water supply projects, etc.).

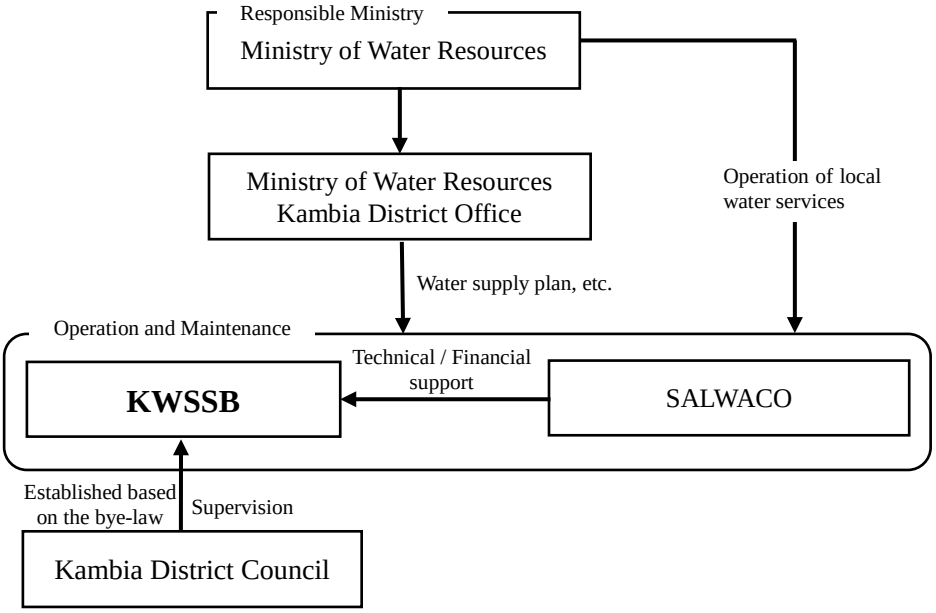
On May 23, 2017, a new law concerning water services, *The Sierra Leone Water Company Act, 2017* was passed[45] by the Parliament, giving SALWACO full management over municipal water service operations nationwide. Under this law, in the near future, the management of the water supply services of Kambia Town will be officially transferred[46] from the Kambia District Council to SALWACO.

[43] After the local autonomy law was established in 2004, local elections were carried out and the decentralization process began. Accordingly, the responsibility for the operation and maintenance of the water supply service in local cities over which the central government had previously had direct control was transferred to the local government.

[44] It was established in 2001. This was also meant to eliminate political interference in water supply services, and at the time of the project planning, SALWACO was responsible for the water supply services in six major regional cities, excluding the capital city Freetown. Although Kambia Town was not included in SALWACO's jurisdiction, it was able to support the operation and management of the water supply services owned by local governments. Also, amendment of laws and regulations concerning expansion of its jurisdiction (including Kambia Town) was underway.

[45] Available at <Parliament of Sierra Leone http://www.parliament.gov.sl/dnn5/Home.aspx> [Accessed at May 25, 2017]

[46] Formal transfer date is undecided. (As of June 2017)



Source: Created by the evaluator based on the study

Figure 5 KWSSB and related organizations responsible for operation and maintenance

Table 10 shows the staff of KWSSB at the time of planning and ex-post evaluation. Although procurement staff, residents service staff, electricians, and workers have not been added to meet the number set when the plan was devised, other staff complement the work. With regard to the staff structure of technical wing, technical support is also provided by SALWACO (staff dispatch) and no serious problems are seen. However, as of the ex-post evaluation, water quality inspections were not being carried out periodically, and the supervisory system and monitoring system related to safe water supply are weak.

Table 10 Staff list of KWSSB Unit: Number of people

	Staff	Plan	At the time of ex-post evaluation
Board	Chair	1	1（M）
	Board member	12 or less	12（M11, F1）
Administrative section	Accountant	1	1（M）
	Procurement	1	0
	Residents Service	0 to 1	0
	Water fee officer	1	3（M）
	Water fee collector[47]	15 to 22	Pump attendant 88（M26, F62）
Technical section	Pump operator	1	2（M）
	Plumber	1	1（M）
	Electrician	1	0
	Worker	2	0
	Assistant worker (for maintaining sand)	－	(Complemented by staff of Technical section） 0
	Security	－	4（M）

Source: Answers for the questionnaire from KWSSB

Although there are weaknesses in the monitoring system for operation and maintenance, there are no major problems in the staff structure of KWSSB, and the support system of SALWACO is also in place. In addition, according to new laws, the operation and maintenance will be officially transferred to SALWACO in the near future. Based on the above factors, it is determined that the institutional aspects of operation and maintenance are fair.

3.5.2 Technical Aspects of Operation and Maintenance

The technical staff at KWSSB were given instructions on operations by the main contractor, with training also provided by the JICA expert.[48] At the time of ex-post evaluation, technical support and maintenance as well as financial support were provided mainly by SALWACO[49] at the

[47] At the time of planning, the water user fee was a flat rate system and water fee collectors collected the fixed fee from water users. At the time of ex-post evaluation, the water user fee had become a usage-based rate system, and a pump attendant was placed at each public tap water. The pump attendant is selected at the recommendation of the community, and one person is placed at each public tap. They collect water user fees from water users and maintain the taps (cleaning, etc.). There is no salary from the KWSSB, but 20% of the water user fees collected from the responsible public tap are given as an incentive. 96 locations out of all the installed 100 locations were in operation at the time of ex-post evaluation, but a flat rate system (monthly fee) is used at eight locations, so a pump attendant is not assigned, resulting in a total of 88 pump attendants.

[48] Interviews with the project consultant

[49] There is a total of five staff assigned by SALWACO to KWSSB. They are a manager of the water treatment plant, an engineer (supervising and coaching two pump operators at the KWSSB), a technician, a marketing officer, and a

request of the Kambia District Council. In the KWSSB office, a manager who has a master's degree in development studies in addition to a bachelor's degree in geography, as well as an accountant who has a bachelor's degree in accounting, are primarily responsible for operations. On the technical side, an employee dispatched from SALWACO (with a bachelor's degree in civil engineering and a master's degree in development studies) manage the technical side of the water supply facility. At the water treatment plant, an engineer who has a bachelor's degree in civil engineering and was dispatched from SALWACO is operating and maintaining the water treatment facility with two pump operators, who are technical staff of KWSSB. The two pump operators have not acquired degrees in civil engineering, waterworks or similar fields. However, they have operated and maintained the water treatment facility without any problems under the supervision and coaching of the engineer dispatched from SALWACO. The project's operation and maintenance manual is also shared and utilized by KWSSB and SALWACO.

As mentioned above, technical staff at KWSSB are given the necessary training and coaching, in addition to management/supervision and technical transfer/support by appropriately qualified staff. There are no major problems in terms of the technical aspects of operation and maintenance.

3.5.3 Financial Aspects of Operation and Maintenance

The water service of KWSSB is based on independent financing as a principle, and the water supply operated and maintained by using the collected water user fee.

The water user fee for public water taps is set by KWSSB. Although a flat rate system was used for public water taps until April 2016, the usage-based rate system has been adopted since May 2016. This system was adopted because the number of water users who are stuck with payment has increased and there were cases in which users fetched water without limits due to the flat rate system. Thus, users of the public water taps have been paying water user fees on a usage-based rate system to the pump attendant assigned to each public water tap. Thereafter, as fuel costs rose[50] in November 2016, the water user fee also rose[51], but according to KWSSB, the mechanism of water fee collection by pump attendants has been functioning well and this usage-based rate system functions better than the flat rate system.[52] Water fees are collected

driver. However, there is no urgent demand for the marketing officer and the driver and they are not stationed in the Kambia District.

[50] Prices were raised 60%, increasing the fee from 3,750 SLL/liter to 6,000 SLL / liter. In Sierra Leone, gasoline, diesel fuel and kerosene are all the same price.

[51] It was 500 SLL for 0.066 m^3 in May-November 2016 (equivalent to three jelly cans [plastic containers]). It was 500 SLL for 0.050 m^3 (equivalent to 2 jelly cans [plastic containers]) from December 2016.

[52] A flat rate system (monthly) is applied for the eight public water taps. The eight locations include five locations at the military barracks (700,000SLL/month/five locations), one location at the jail (200,000SLL/month), one location at the secondary school (100,000SLL/month) and one location at the limited four households (There are no other households around there.) (40,000SLL/month).

for private connections using a metered system for housing, and a flat rate system[53] for private companies, offices, etc.

Table 11 shows the annual revenue (2013-2016) of the KWSSB after starting the project.

Table 11 Annual revenue and expenditure of KWSSB Unit: SLL[54]

	2013	2014	2015	2016
Revenue	41,479[55]	62,632,000	76,690,000	138,502,000
Expenditure	79,353,000	74,328,000	68,907,000	135,637,000

Source: Answers for the questionnaire from KWSSB

Note: Expenditure includes KWSSB staff salary, fuel costs for operating water treatment plant, office maintenance costs, and other. However, the fuel costs supported by SALWACO (September 2013-April 2014 and February-December 2016), disinfectant costs, salaries of SALWACO staff, as well as the cost of the international aid organization's fuel (June 2014-January 2016) associated with the Ebola outbreak are not included in the expenditures.

Although expenditures exceeded revenue until 2014 after starting the project, revenue slightly exceeded expenditures from 2015. However, KWSSB has been supported by SALWACO (personnel, fuel costs, disinfectant costs) since September 2013, and received funding for fuel costs from June 2014 to January 2016 as support related to the Ebola outbreak from international aid organizations, so its financial system is not completely independent.

At the time of ex-post evaluation, SALWACO was helping to cover the cost of the fuel (half of monthly fuel costs) and disinfectant needed to operate the water treatment facility, and the fuel subsidies alone amounts to approximately 8 million SLL/month.[56] According to interviews of officials at the Ministry of Water Resources and SALWACO, this same level of support is expected to continue until the transfer, although the timing and details of the official transfer of water service operation and maintenance in Kambia Town to SALWACO has not yet been decided.

The annual revenue of KWSSB is increasing due to the change in the water user fee collecting system. However, annual expenditures are also increasing due to the rise in fuel costs and other expenses. It is difficult to operate and maintain the water services using only the water user fees that are collected. Given these circumstances, KWSSB has been receiving financial support from SALWACO, and the management of the water supply services will be officially transferred to SALWACO in the near future. Given this situation, we have determined that the sustainability

[53] Class A (Drinking Water Distribution Company) 700,000 SLL/month, Class B (Hotel) 600,000 SLL/month, Class C (offices and guest houses, and including public facilities such as hospitals, Kambia District Council and resource centre)) 200,000 SLL/month, Class D (School) 100,000 SLL/month.

[54] Sierra Leonean Leone (SLL) is the currency of Sierra Leone. 1 SLL≒0.1 Japanese yen 7500SLL≒1US dollar (as of March 2017).

[55] After starting the project, in January 2013, the chairman of the Kambia District Council (Governor) declared on the local radio in March 2013 that water user fees would be eliminated, which made it impossible to collect the water fee from the water service users. As a result, the water supply was temporarily stopped. Later, from September 2013, SALWACO supported (from SALWACO's budget) the fuel and disinfectant necessary for operating and resumed the water supply. The water fee collection from water users resumed on February 1, 2014.

[56] Assuming that one month is 30 days. 6,000SLL (fuel/liter) x 88.9 liters/day x 15days = 8,000,000SLL.

of finances is fair.

3.5.4 Current Status of Operation and Maintenance

During the ex-post evaluation survey, field studies were conducted on the water intake facility, the water treatment facility, the elevated tank, all public water taps, and three private connections (Kambia Hospital, Kambia District Council, Resource Centre) supported by the project. The intake facility selectively takes in water from the river and the swamp, taking into account fluctuations in turbidity, and the area around the water source is being managed,[57] including cleaning of the intake port. Maintaining the sand for the slow sand filter is also carried out on a regular basis at the water treatment facility. However, at the time of ex-post evaluation, water quality inspections (control of residual chlorine concentration in supplied water) had not been done due to a missing analyzer, which SALWACO was planning to purchase. No leakage of the transmission pipe and the distribution pipe had been reported, but there was a water leak in the elevated tank, and leaked water was collected in the container. According to the project consultant for the project, there may have been problems with the assembly of the tank, which was assembled by a local agency that has a license to sell the elevated tank, and this may have been the cause of the water leakage.[58] SALWACO that manages the elevated tank, and KWSSB are studying ways of dealing with this leak. Also, water supply has been provided without problems at 96 out of 100 locations at which public water taps were installed by the project. At the time of ex-post evaluation, the pump attendant who is in charge of collecting water user fees was cleaning the public water taps and the facility was being kept clean, but regular water quality tests were not being carried out at the public water taps. As a result of the above, almost all of the constructed facilities have been operating properly, and serious problems such as water disruption due to facility failures have not occurred so far, but there is water leakage in the elevated tank and water quality inspections need to be carried out. As such, there are some problems with operation and maintenance at present.

[57] Based on the amount of water and the turbidity, intake from the swamp was carried out during the first field study (November 2016) and intake from the river was carried out during the second site field study (March 2017).

[58] The water leakage in the elevated tank had not occurred at the time of defect inspection (February 2014). Although visual confirmation at site is not made by the project consultant, the consultant assumed that it may be a problem in assembly especially bolt tightening, and mentioned that the water leakage may has occurred by the hasten aged deterioration of the rubber seal between the panels. According to the consultant, it will not cause problems with the operations and does not pose risks such as collapse as the tank is made of steel.

Maintaining sand in a slow sand filter basin

Cleaning public water taps by pump attendant

In light of the above, although there are no major technical issues concerning the operation and maintenance of the project, the structure and financial aspects are fair and there are some issues concerning the situation of operation and maintenance. Therefore, the sustainability of the project effect is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The project was implemented for the purpose of contributing to the improvement of the living environment and hygiene of the residents by providing a stable supply of safe drinking water by rehabilitating and improving water supply facilities in the target areas in Kambia Town.

The project was consistent with the development policies of Sierra Leone and the priority areas of the Japan's ODA policy for Sierra Leone. The development needs of Sierra Leone was high. Therefore, its relevance is high. Although the project cost was within the plan, the project period was slightly longer than planned. Therefore, the efficiency is judged as fair. Treated water, which was safer than the previous water source, was supplied throughout the year by the project, but the water supply for each area was provided during a limited timespan every other day. The population served at the time of ex-post evaluation was slightly lower than the target population, but it improved significantly with the project implementation. In addition, although it did not reach the target value for water supply per person per day, it was not much lower than the target value for water supply volume if it was limited to users of public water taps. The public water taps were operating in 96 out of all the installed 100 locations. Positive impacts such as the reduction of water-borne diseases and reduction of water fetching labor, among others, were realized due to improved hygiene conditions and better water quality. Although the project's implementation had an effect to a certain degree, the effectiveness and impact are fair because the water supply for each area was provided during a limited timespan every other day. There are no major problems concerning technical aspects of operation and maintenance, but the sustainability of the institutional and financial conditions is fair. The operation and maintenance status of facilities and equipment

has some problems. Accordingly, the sustainability of the project is fair.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

[Ministry of Water Resources and KWSSB]

・Implementation of water quality test

Although the water supply is provided after disinfectant is added at the water treatment facility, proper planning and implementation of appropriate and periodic water quality inspections at the water treatment facility and at the public water taps is required. The inspection was not being carried out at the time of ex-post evaluation. The Kambia District office of the Ministry of Water Resources needs to discuss this with KWSSB as soon as possible to formulate the inspection plan, implementation procedure and budget plan (reagent fee, etc.) for water quality inspections. If necessary, a budget must then be requested to the ministry and allocated, or a cost-sharing method set up with the KWSSB. Water quality inspections need to be carried out properly, and "safe water" meeting Sierra Leone's standards should be supplied to residents.

4.2.2 Recommendations to JICA

・Inspection by technical experts on water leakage of the elevated tank

At the time of ex-post evaluation, water was leaking from the elevated tank. Although SALWACO and KWSSB are examining ways to deal with this leakage, the dispatch of experts to provide guidance on determining the causes and appropriate measures as necessary should be considered.

4.3 Lessons Learned

Appropriate fee system and collection method, and its associated support

When it comes to collecting fees for services, there are advantages and disadvantages both for the flat rate system and the usage-based rate system. The flat rate system has advantages, especially for the collector, such as reduction of labor for fee collections, the ability to anticipate a certain amount of revenue, and attractiveness for users. On the other hand, users find that rates are low for those who use a lot of water, they don’t have to worry about rates when they use water, and it is easy to pay when using.

Initially, for the project, the flat rate system was adopted from the viewpoint of simplifying the system and reducing administrative costs, but it did not function well. The advantages for the side using the service were marked disadvantages for the collecting side, such as encouraging unrestricted water usage. Considering that facilities with limited funds are providing the water

supply, the usage-based rate system that charges according to the usage amount should be considered rather than the flat-rate system that has the potential to encourage unlimited use. The usage-based rate system has advantages such as suppressing usage of unrestricted water volume by users, appropriate fee collection according to the supply, and supply plans according to the volume of water used. Although a system that identifies the actual volume used and its inputs is needed, it was important to set limits on usage and time in the case of the flat rate system implemented in the project, and to consider measures for compliance. Also, prompt examination and response were required when problems occurred after implementation.

If the establishment of water fee collection system for public water taps is required, as in this project, from the stage of project formulation until after implementation, it is important to examine the capacity of the executing agency and consider providing the necessary technical assistance such as appropriate water usage fee setting, fee collecting system, personnel system, implementation procedure and monitoring system after implementation.

Establishment of water supply facilities suitable for actual conditions in target area

In the project, the water treatment facility of the slow sand filtration system was established in the targeted area of the local city. The slow sand filtration system cannot treat water in a short period of time as compared with the rapid sand filtration system, which uses a lot of chemicals and is complicated and expensive. However, it is a simple system and operation and maintenance can be done at a low cost if the conditions of the water source such as turbidity are suitable. Even in the project, there were limitations in terms of the budget and human resources, but there were no major technical problems with operation and maintenance and no serious problems such as water interruptions due to facility breakdowns. We believe that selecting an appropriate water facility with suitable filtration method based on the conditions in the target area and the capacity of the executing agency, such as human resources and finance, will contribute to the stable maintenance of the facility, as well as to the sustainable water supply.

End