

The State of Eritrea

**Ex-Post Evaluation of Japanese Grant Aid Project
The Project for Urban Water Supply in Debub Region**

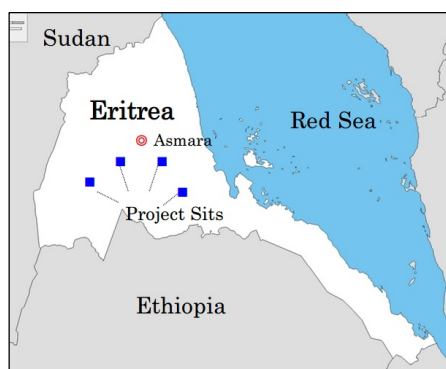
External Evaluator: Kenichi Inazawa, Miyuki Koga, Octavia Japan Co., Ltd.

0. Summary

The objective of this project was to increase water supply volume and to provide safe drinking water, by constructing water supply facilities (deep wells, pumping facilities, transmission pipes, reservoirs, distribution pipes and public fountains, etc) in four towns of Debub Region (Debarwa, Dekemhare, May-Dima and Adi Keyih). At the time of the ex-post evaluation, this project is consistent with the policy of Eritrea, such as the “National Water Supply Action Plan,” with the development needs for improving water supply facilities in rural towns, and with Japan’s ODA policy; thus relevance of the project is high. Due to problems, such as difficulty in procuring parts necessary for house connection work, staff shortage at the water supply service unit of each town and underutilization of well and pumping facilities, the actual average water supply volume per day, which indicates the quantitative effects, has shown limited achievement at the time of the ex-post evaluation; however, the number of people served with safe water and the percent of population with access to safe water have reached certain levels. Hence, the effectiveness and impact of the project is fair. Given that the project period and project cost were within the plan, efficiency of the project is high. On the other hand, major problems have been observed in that the target towns cannot neither assign sufficient number of staff nor conduct training programs due to budget shortage. Similarly, it is difficult to procure spare parts necessary for the connection work. In addition, the target towns have difficulties in addressing various problems that arise. Therefore, sustainability of the project effects is low.

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

1. Project Description



Project Location



Constructed Reservoir (May-Dima)

1.1 Background

In the State of Eritrea (hereinafter referred to as “Eritrea”), the country’s average water supply service rate¹ was very low at approximately 30% for the regions with regional urban centers and rural areas combined before the commencement of this project (2004). Roughly 80% of the country’s population lived in regional urban centers and rural areas, relying on unsanitary water from hand-dug shallow wells or rivers and springs. Droughts also occurred from time and time, and the country faced water shortage frequently. In addition, the border conflict with the neighboring country, Ethiopia (1998-2000), increased the number of internally displaced people who migrated from the border areas to the regional centers. This increased water demands dramatically, which led to the deterioration of the water supply service. It was an urgent issue to promote the development of water sources, the increase in water supply volume and the provision of safe water² in regional towns. In particular, in the four towns of Debeb Region (Debarwa, Dekemhare, May-Dima and Adi Keyih), the water supply service was poor due to the shortage of water sources (The water supply rates were 24.9%, 32.8%, 14.8%, and 14.2%, respectively³). Therefore, the government of Eritrea requested Japan to support this project.

1.2 Project Outline

The objective of this project was to increase water supply volume and to provide safe

¹ The main water source is groundwater from wells.

² At the time of the basic design study (2006), the level of water supply volume was extremely low at 4.9-13.5 liter per day per head in the four targeted towns. Additionally, as coli-forms and bacteria were detected from the groundwater in the studied area, there was a need for chlorination treatment.

³ According to JICA’ survey conducted in December 2005

drinking water by constructing water supply facilities (deep deep-wells, pumping facilities, transmission pipes, reservoirs, distribution pipes and public fountains, etc.) in four towns of Debub Region (Debarwa, Dekemhare, May-Dima and Adi Keyih).

Grant Limit / Actual Grant Amount	1,575 million yen / 1,500 million yen
Exchange of Notes Date (/Grant Agreement Date)	Detailed Design: September 2006 Construction Work: May 2007
Implementing Agency	The Water Resource Department (WRD) of the Ministry of Land, Water, and Environment (MoLWE)
Project Completion Date	February 2010
Main Contractor(s)	Dai Nippon Construction
Main Consultant(s)	Nippon Koei Co., Ltd.
Basic Design	July 2006
Related Projects (if any)	JICA: “Study on Groundwater Development and Water Supply for Seven Towns in Southern Region of Eritrea” (August 1997-March 1998)

2. Outline of the Evaluation Study

2.1 External Evaluator

Kenichi Inazawa and Miyuki Koga, Octavia Japan Co., Ltd.

2.2 Duration of Evaluation Study

Evaluation Study: January 2013-December 2013

Field Study: June 7-21, 2013, August 25-31, 2013

2.3 Constraints during the Evaluation Study

Because the monitoring by the concerned regional administrations and Water Supply Services of four towns, to which this project was handed over after project completion, has not been sufficient, only limited data could be obtained through this evaluation study; and the evaluator had no other alternative but to rely on the answers to the questionnaire and the interviews with the related agencies in many aspects.

3. Results of the Evaluation (Overall Rating: C⁴)

3.1 Relevance (Rating: ③⁵)

3.1.1 Relevance to the Development Plan of Eritrea

At the time of the project planning, the government of Eritrea developed the “National Water Policy (draft)” in 2004. While indicating the direction of utilizing the available water resources effectively, fairly and optimally for sustainable social and economic development, this policy proposed basic policies for water supply, sanitation and irrigation among others. In addition, the government of Eritrea formulated the “Urgent Action Plan for National Water Supply and Sanitation” (2004-2007) which focused particularly on water shortage in the regions, with the goal of “supplying safe water to 60% of the rural population by 2015” in line with the Millennium Development Goal.

At the time of the ex-post evaluation, the government of Eritrea developed the “Eritrea Water Resource Policy” in 2008, which advocates for the maximum utilization of the potential water resources and for the broad water distribution to the Eritrean citizens thereby contributing to the socio-economic development. In addition, the government has formulated the “Action Plan for Integrated Water Resource Management” since 2009. The plan aims to promote efficient water resource allocation and management in order to respond to the increase in water demand associated with the high population rate⁶, thereby contributing to the economic growth and poverty reduction. Building on this action plan, the government developed the “National Water Supply Action Plan” (2013-2017) in 2013. While the problem of water shortage is prevalent in the country, this new action plan aims to supply sufficient and safe water to the people by developing well and other water supply facilities (1,400 places in total) to address water shortage problems in the regions.

In view of the above, concerning the water sector in Eritrea, this project is consistent with the policy, such as national and sectoral plan, at the time of the project planning and also at the time of the ex-post evaluation.

3.1.2 Relevance to the Development Needs of Eritrea

Before the commencement of the project, the percent of population with access to safe water in regional urban centers was approximately 50% on average, while the national average, including the regional urban centers and rural areas, was very low at approximately 30%. This is

⁴ A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

⁵ ③: High, ② Fair, ① Low

⁶ It is 3.0% according to the World Bank’s 2010 data.

because the water source development technology and the water supply facilities were underdeveloped. According to JICA's Study on Groundwater Development and Water Supply for Seven Towns in Southern Region of Eritrea" (1997-98), it was confirmed that the average daily water supply volume was extremely low at 4.9-13.5 liters per person due to old facilities in three out of the four towns targeted by this project, except for May-Dima. Therefore, there was a great need for stable water supply through the development of water supply facilities. In addition, measures were also needed to address the issue of unaccounted for water and to improve the project planning capacities.

At the time of the ex-post evaluation, the understanding of the provincial government of Debub is that there is not enough number of water supply facilities, such as wells, relative to the population in the four towns targeted by this project. The government also mentioned that the water demand has been increasing year after year along with the increase in population in each town; thus there continues to be a need to promote the development of water sources and the construction of water supply facilities.

Based on above, the consistency is confirmed with the development needs before the commencement of the project and also with the development needs at the time of the ex-post evaluation.

3.1.3 Relevance to Japan's ODA Policy

Before the commencement of this project, infrastructures were destroyed in Eritrea due to the border conflict with its neighboring country, Ethiopia. In addition, droughts occurred repeatedly. Based on this situation, the government of Japan considered that supporting the reconstruction efforts of Eritrea through the Official Development Assistance (ODA) would be meaningful as it was in line with the ODA Charter which placed an emphasis on "poverty reduction" and "peace building." Because conflicts and natural disasters, such as droughts, are direct threats to people, providing assistance to fight against these threats was also viewed important from the perspective of "human security." In addition, following the peace agreement signed between Eritrea and Ethiopia in December 2000, the governments of Japan and Eritrea affirmed that Japan's assistance should focus on basic human needs, such as health/sanitation, water supply and education, as well as on the restoration and development of infrastructures at the economic cooperation policy meeting in May 2001. Considering such a background, it can be said that providing water supply assistance such as this project to Eritrea is consistent with the assistance policy of the government of Japan.

In view of the above, this project is relevant to Eritrea's development policy and needs as well as to Japan's ODA policy; therefore, its relevance is high.

3.2 Effectiveness⁷ (Rating: ②)

3.2.1 Quantitative Effects

Table 1 shows the baselines (2005), targets (2015) and assumed values at the time of the ex-post evaluation (2012) for average daily water supply volume, number of people served with safe water, percent of population with access to safe water and unaccounted for water rate, before the implementation of this project. Table 2 shows the actuals for the three consecutive years after the project completion.

At the time of the project design, average daily water supply volume in 2015 was set as a target. On the other hand, in this ex-post evaluation there was a need to calculate the targets as of 2012 for the sake of before and after comparison⁸. With respect to the average daily water supply volume, the assumption was made that the volume would have started to increase from the time of project completion (2010)⁹. Applying the rate of increase of the target from 2010 to 2015, what the target value should have been for 2012 was estimated, which was then compared with the actual for 2012. On the other hand, concerning the number of people served by safe water and the percent of population with access to safe water¹⁰, because the population inflow (including the influx of internally displaced people) is increasing in Debarwa and Dekemhare as it will be described later, we estimated the target value for 2012 by calculating the rate of increase from 2005 actual to 2015, which was then compared with the actual for 2012.

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

⁸ Target had not been set clearly through the soft component training, which will be described in "3.5.2 Technical Aspects of the Operation and Maintenance" under Sustainability.

⁹ The assumption was made that the water supply would increase starting from the completion of the project because the development of the reservoirs and the water distribution networks were planned to be completed in each town by April 2010.

¹⁰ The percent of population with access to safe water is (the number of people served by safe water divided by the total population of each town) x100.

Table 1: Data on Quantitative Indicators of this Project (Before Project Commencement)

Indicator	Target Area	Baseline (2005)	Target (2015)	Assumed Target at the Time of the Ex-Post Evaluation (2012)
1) Average daily water supply volume (m ³ /day)	4 towns (total)	N/A	8,389	N/A ¹¹
	Debarwa	155	1,942	1,072
	Dekemhare	467	2,743	1,366
	May-Dima	N/A	675	N/A
	Adi Keyih	193	3,029	1,702
2) Number of people served with safe water (person)	4 towns (total)	20,403	150,901	111,752
	Debarwa	4,311	30,497	22,641
	Dekemhare	9,319	47,983	36,384
	May-Dima	2,537	25,962	18,935
	Adi Keyih	4,236	46,459	33,792
3) Percent of population with access to safe water (%)	4 towns (average)	22.1	100.0	76.5
	Debarwa	24.9	100.0	77.5
	Dekemhare	32.8	100.0	79.8
	May-Dima	14.8	100.0	74.4
	Adi Keyih	14.2	100.0	74.3
4) Unaccounted for water (%)	4 towns (average)	N/A ¹²	15.0	N/A
	Debarwa	N/A	15.0	N/A
	Dekemhare	N/A	15.0	N/A
	May-Dima	N/A	15.0	N/A
	Adi Keyih	N/A	15.0	N/A

Source: Document provided by JICA

Table 2: Data on Quantitative Indicators of this Project (After Project Completion)

Indicator	Target Area	Actual after the Project Completion			
		2010	2011	2012	Achievement Rate*
1) Average daily	4 towns (total)	N/A	N/A	2,380	N/A

¹¹ In May-Dima, no baseline data was set in 2005; similarly no data was collected after 2005. Therefore, it was not possible to calculate the assumed target for 2012 in the case of May-Dima. In terms of average daily water supply volume in other three towns, it was calculated by applying the rate of increase of the target from 2010 to 2015, based on the assumption that the water supply would start to increase from the time of project completion (2010).

¹² With respect to unaccounted for water rate before the commencement of the project, it was not possible to calculate the rate because no concrete data was available.

water supply volume (m ³ /day)	Debarwa	279	347	370	34.5%
	Dekemhare	1,231	1,235	1,265	92.6%
	May-Dima	N/A	N/A	130	N/A
	Adi Keyih	465	558	615	36.1%
2) Number of people served with safe water (person)	4 towns (total)	75,924	81,668	87,886	58.2%
	Debarwa	9,900	11,006	13,216	58.4%
	Dekemhare	21,410	22,160	22,660	47.2%
	May-Dima	14,614	15,152	15,690	60.4%
	Adi Keyih	30,000	33,350	36,320	78.2%
3) Percent of population with access to safe water (%)	4 towns (average)	N/A	N/A	67.8	88.6%
	Debarwa	55.0	59.0	69.7	89.9%
	Dekemhare	N/A	N/A	58.4	73.2%
	May-Dima	80.0	73.0	65.0	87.4%
	Adi Keyih	65.0	72.0	78.0	104.9%
4) Unaccounted for water (%)	4 towns (average)	N/A	N/A	N/A	N/A
	Debarwa	N/A	N/A	N/A	N/A
	Dekemhare	N/A	N/A	N/A	N/A
	May-Dima	N/A	N/A	N/A	N/A
	Adi Keyih	N/A	N/A	N/A	N/A

Source: Answers on questionnaire and data provided by the Water Supply Service (WSS) of each town

*Note: Achievement rates were calculated by comparing the assumed target at the time of the ex-post evaluation in Table 1 (2012) with the actual (2012) shown in this table.

1) Average Daily Water Supply Volume¹³

The achievement rates of four towns for 2012, calculated based on the data shown in Table 1 and Table 2, are low at 49.4% on average for the four towns: 34.5% for Debarwa; 92.6% for Dekemhare; N/A for May-Dima; and 36.1% for Adi Keyih; thus the average achievement rate for the four towns is N/A. For reference, if the target for 2015 (675m³/day¹⁴) is used as an alternative for the 2012 assumed target at the time of the ex-post evaluation for May-Dima, the achievement rate would be 19.3%; hence the average achievement rate for the four towns would

¹³ The calculation method is slightly different from town to town. (e.g., for some towns per day data was available while for others weekly data was divided by seven days)

¹⁴ For the purpose of calculating the assumed target at the time of the ex-post evaluation (2012) for all four towns, target for 2015 (675 m³/day) was used of May-Dima (= 1,072+1,366+675+1,702 m³/day). As a supplementary note, unlike other three towns, piped water or water from tankers was not available in May-Dima; people relied on shallow wells and public fountains. While it can be presumed that average daily water supply volume of May-Dima was less than the other towns, the actual situation is not clear.

be 49.4%.

The situations of the towns except for Dekemhare are as follows¹⁵. In Debarwa, according to Debarwa's Water Supply Service (hereinafter referred to as "Debarwa WSS"), while there is a high demand of residents for water service, (1) there is a shortage of parts necessary for connecting each house to the water distributing pipe (mainly snap taps with saddles), as a result of which residents' water demand is not sufficiently met (it will be described in more details in the section of "Sustainability"), and (2) the volume of water intake from the wells is less than what was initially expected¹⁶. As for May-Dima, according to staff assigned to water supply of the town¹⁷, (1) the volume of water intake is less than what was initially expected because seven out of the ten wells and pumping facilities constructed by this project are not operational¹⁸, and (2) the groundwater availability is on the decrease around the well also for the three operational facilities¹⁹. In the case of Adi Keyih, according to the Water Supply Service (hereinafter referred to as "Adi Keyih WSS"), (1) the volume of water intake is less than what was initially expected because the groundwater level is on the decrease, and (2) sufficient volume of water is not provided to the residents because the water distribution network is old and causing high leakage and low water pressure while there are no major problems with the operational status of the facilities constructed by this project.

2) Number of People Served with Safe Water and 3) Percent of Population with Access to Safe Water

It can be observed from Table 2 that the achievements are relatively high for the number of people served with safe water and the percent of population with access to safe water, as compared to the performance in terms of average daily water supply volume. Evidently, as the number of residents increases year after year in the residential plots²⁰ for which the WSS of the three towns except for May-Dima is providing water connection, a situation is arising where certain amount of water is being shared by a large number of residents (i.e., a situation in which many people are sharing the small total). This explains why the rate of increase from the

¹⁵ No data was provided by the Eritrean side concerning water intake volumes and decreasing amount of underground water in each town.

¹⁶ Details will be explained in the Output section under Efficiency.

¹⁷ As it will be explained in the institutional aspects of the operation and maintenance under Sustainability, Water Supply Service (WSS) does not exist in May-Dima unlike the other towns. Staffs of other units are in charge of water supply concurrently; thus these staffs were interviewed for the purpose of collecting necessary information.

¹⁸ Details will be explained in the Output section under Efficiency.

¹⁹ Details will be explained in the Output section under Efficiency.

²⁰ Since the commencement of the project, the number of live births has been increasing throughout Eritrea. In particular, there is an increasing population inflow into towns closer to the capital, Asmara (especially Debarwa and Dekemhare).

baseline to target is higher for the number of people served with safe water and the percent of population with access to safe water than for the average daily water supply volume. As it will be described later as part of the beneficiary survey results (Figure 6: Answers on Water Supply Frequency Before and After Project Implementation), residents receive water supply less frequently after the project implementation than before the project implementation. This finding reaffirms the earlier presumption that a limited water supply is being shared by an increasing number of residents²¹. In May-Dima the number of residents with access to safe water has increased as a result of the construction of the public fountains by this project²².

4) Unaccounted for Water Rate

As shown in Table 2, unaccounted for water rate was not calculated in all four towns. The following reasons were provided for this: (1) The employees assigned to water supply in each town either do not measure or cannot measure²³; (2) In the case of Dekemhare mainly, a flowmeter (digital type, see Figure 2) installed inside the pumping facilities does not function because the embedded battery outlived its usefulness. While Dekemhare WSS does not have any spare, it is not possible to procure it domestically, either, due to budget shortage and others; thus it is not possible to measure accurate flow data.



Figure 1: Pumping Facilities (May-Dima)



Figure 2: Non-Operating Flowmeter (Dekemhare)

²¹ It should be noted that the respondents of the beneficiary survey are referring to all water supply facilities that are available in the target area, including the ones constructed by this project; thus the application of the survey results is not limited to this project.

²² As a side note, many residents in May-Dima used to fetch water from hand-dug shallow wells, rivers and springs before the project commencement.

²³ When these staffs were interviewed, they made comments, such as “We do not calculate the rate. We do not know any method to calculate the rate.”

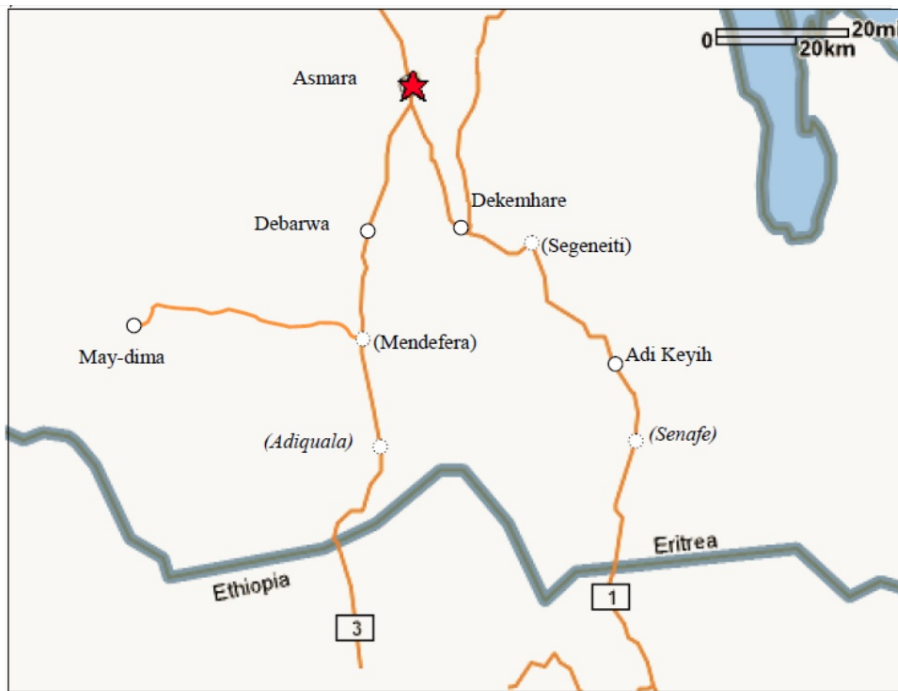


Figure 3: Locations of Project Sites²⁴

(Reference Data) Number of House/Yard Connections in Each Town

This section will review target and actual numbers of house/yard connections in each town except for May-Dima²⁵. As shown in Table 3 below, there are more connections in 2010 and onwards than in 2005 in the case of Debarwa although no data is available concerning targets. The number of connections is not increasing significantly because of the shortage of parts necessary for the connection work (mainly snap taps with saddles and flowmeters) as described earlier. In Dekemhare, although the number of connections is on the increase from 2010 to 2012 on an actual basis, the number of connections is less than the 2005 baseline. According to Dekemhare WSS, this is because of the following: (1) The 2005 baseline (737 connections) included the connections that had been completed but not yet in use, which suggests that the actual connections that were operational were less than what was stated as the baseline in reality; (2) After the commencement of the project a construction was carried out in the town to expand roads in the downtown area. The existing water distribution network was partly affected by this construction, as a result of which the number of house/yard connections decreased temporarily. While the work is being undertaken to establish new connections thereafter, the total number of connections has not yet reached the previous level; and (3) Dekemhare WSS is

²⁴ Source is document provided by JICA.

²⁵ The number of connection is zero in May-Dima because water distribution network does not exist there and water is only supplied with public fountains.

facing staff shortage as described earlier. As for Adi Keyih, it can be judged that the achievement is almost as per the target.

Table 3: Baseline, Target and Actual for Number of House/Yard Connections in Each Town

(Unit: Number of connections)

Target Area	2005	2010	2011	2012	2015
	(Baseline)	(Target)			
Debarwa	142	N/A	N/A	N/A	N/A
Dekemhare	737	1,200	1,400	1,600	2,000
Adi Keyih	919	1,578	1,728	1,888	N/A
Target Area		2010	2011	2012	
		(Actual)			
Debarwa		897	976	1,179	
Dekemhare		451	513	710	
Adi Keyih		1,543	1,709	1,876	

Source: Data for 2005 (baseline) is from documents provided by JICA, and data for 2010 and onward (baseline, target and actual) is from answers on questionnaire and the ex-post evaluation survey.

Note: The numbers are shown on a cumulative basis.

3.3 Impact

3.3.1 Intended Impacts

3.3.1.1 Contribution to Improving Living Conditions of Residents

A beneficiary survey was conducted targeting “residents who are already receiving water supply service (residents who are receiving water through house connections and public fountains)” in the four target towns concerning the level of satisfaction with this project as well as changes in their living and sanitary conditions²⁶. With regard to the level of satisfaction with this project shown in Figure 4, many of the residents are either “very satisfied” or “satisfied” in the target towns except for Adi Keyih. This is presumably because the water situation has improved through the development of water supply facilities by this project compared to before the project commencement when rural residents used to fetch water from hand-dug shallow wells, rivers and springs while urban residents were faced with unstable water pressure. In the case of Adi Keyih, while the water supply facilities have been developed by this project, it is thought that a part of the dissatisfaction comes from the leakage in the distribution pipe caused

²⁶ Samples were drawn with random sampling method, and it took the form of questionnaire. The sample size is 100 in total. The compositions of the respondents are as follows: (1) By town: 25 samples from each of Debarwa, Dekemhare, May-Dima and Adi Keyih town; (2) Sex: Debarwa had 4 male samples and 21 female samples, Dekemhare had 10 male samples and 15 female samples, May-Dima had 8 male samples and 17 female samples, Adi Keyih had 4 male samples and 17 female samples; (3) Age: 35 samples in 20-29 years old, 27 samples in 30-39 years old, 20 samples in 40-49 years old, 7 samples in 50-59 years old, and 11 samples in the 60s or above.

by the old water distribution network that exists in the town as described earlier. According to the interviews with the respondents of this town, comments such as “water volume is not stable” were given. With regard to the question related to the level of satisfaction with water supply volume shown in Figure 5, it is presumably for the same reason that relatively many respondents selected “no” in Adi Keyih. Figure 6 is a question concerning water supply frequency before the project commencement and after the project completion. In Debarwa, Dekemhare and Adi Keyih it can be observed that the water supply frequency is less after the project completion than before the commencement²⁷. This is due to the situation described earlier in which an increasing number of residents are sharing the limited volume of supplied water as a result of the population growth²⁸. In May-Dima where a higher proportion of residents used to go to the rivers and springs to fetch water than the other towns before the commencement of the project, the responses show the trend that residents are able to access water from the constructed public fountains after the project completion.

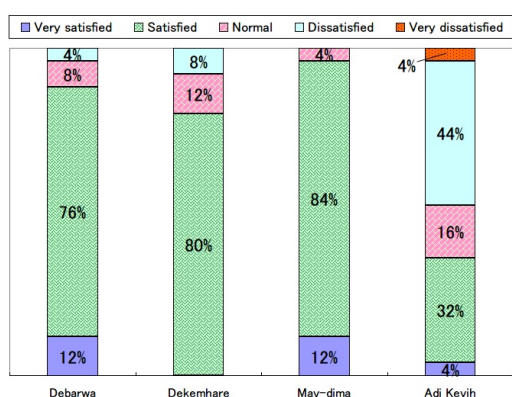


Figure 4: Are you satisfied with this project?

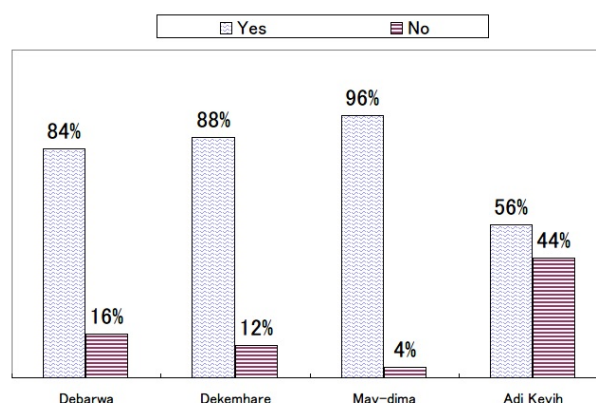


Figure 5: Do you think the volume of supplied water is sufficient?

²⁷ While the situation differs from town to town, there were some residents who used to receive water supply through the existing water distribution pipe, in addition to the residents who used to fetch water from shallow wells before the commencement of the project. It was thus judged relevant to do a before-and-after comparison and review the results. Although there may be external factors such as population growth caused by influx of internally displaced people in the case of Debarwa, Dekemhare and Adi Key, it is not taken into consideration in this analysis.

²⁸ In other words, although people have gained access to water supply facilities, they are not necessarily receiving sufficient amount of water.

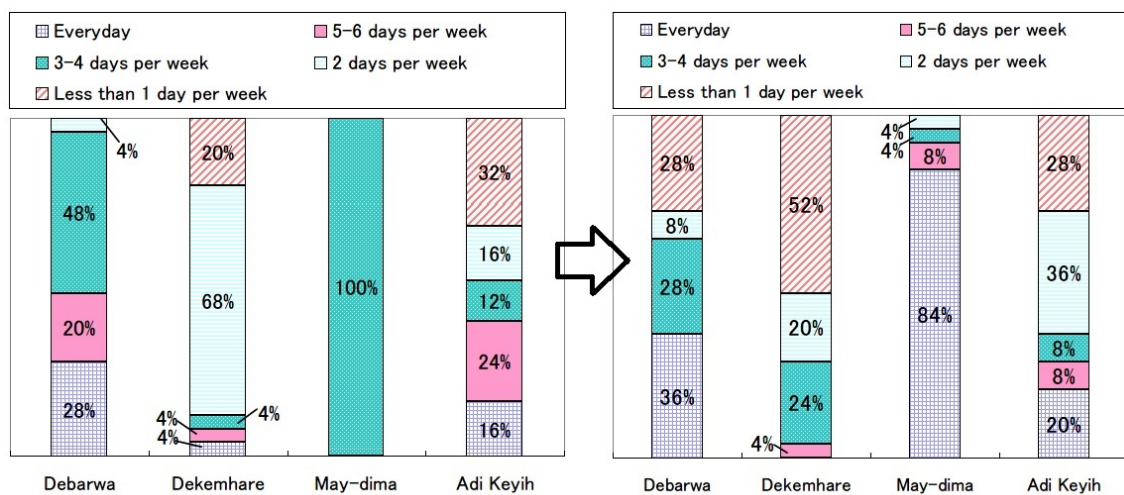


Figure 6: How frequent was/is water supplied before the commencement of the project and after the completion of the project? (Left: Before project commencement, Right: After project completion)

3.3.2 Other Impacts

3.3.2.1 Impacts on the Natural Environment

Before the commencement of the project it was presumed that the implementation of this project would have little negative impact on the social environment of the four target towns. However, it was cautioned that noise and vibration should be minimized while constructing the distribution pipes, giving consideration to residents in the neighborhood. Through the questionnaire and the interviews conducted during this ex-post evaluation, it has been confirmed that there was no negative impact on natural environment, noise or vibration associated with the construction of the facilities in the four target towns during the project implementation.

In Adi Keyih, on the other hand, a chlorine injector (see Figure 8), which has been installed at one of the transmission pumping facilities constructed by this project (1 site), is not in use at all. The original plan was that water would be chlorinated at the water transmission facilities after being collected from the wells²⁹. However, the actual practice was confirmed that Adi Keyih WSS staff members pour chlorine at a rough estimate (with buckets and others) at a reservoir located in the suburb. In other words, there is a possibility that appropriate quantity of chlorine is not being injected³⁰. When some residents were interviewed during the beneficiary survey, they commented, “The supplied water has a strong chlorine smell. It may be because the

²⁹ It was planned that accurate amount of chlorine would be injected automatically with the injector.

³⁰ No information or data was available for how long and why they have been pouring chlorine at a rough estimate. Data was also not available concerning the results of the water quality tests that are conducted periodically.

injected amount is too much. Some abnormal change is observed in the clothes after the laundry. We are afraid that there may be some health risk to our children.”

As for the other towns, it has been confirmed through site visits and interviews that there are no major problems on the natural environment attributed to the constructed well and pumping facilities and reservoirs.

Concerning the institutional aspects of environmental monitoring, water quality is checked at water sources such as wells in all of the four towns. The Water Resource Department (WRD) sends inspectors to conduct unannounced water quality monitoring and tests³¹. These inspectors take samples, examine the water quality and give admonitions the towns as needed. In Debarwa and Dekemhare sanitarians (one person each) conduct water quality tests and monitoring during water supply. According to Debarwa WSS, there are no major problems with the water quality. According to Dekemhare WSS, they cannot conduct water tests in a satisfactory manner because they do not have any water quality measuring instrument³². Similarly, in May-Dima and Adi Keyih water quality is not checked or analyzed during water supply as human and financial resources are limited; thus water quality test and analysis is thought to be an issue which needs to be addressed in the future. According to both towns, they would like to carry out water tests in the future with consideration for the health of the residents.

3.3.2.2 Land Acquisition and Resettlement

There was no resettlement in this project. On the other hand, land had to be acquired for the construction of reservoirs, well and pumping facilities and public fountains. According to the provincial government of Debu, the land which had to be acquired was owned by the provincial government from the beginning and that there were no problems with the procedure associated with the acquisition. It has been confirmed that approximately 800m² of land was acquired totally in Debarwa, approximately 4,110 m² in Dekemhare, approximately 580 m² in May-Dima, and approximately 2,570 m² in Adi Keyih.

³¹ WRD conducts water quality test at intervals. According to each town, it is carried out once every half-a-year on average although it is sometimes conducted irregularly.

³² According to them, it cannot be acquired easily because it is an imported product. No water quality data for Debarwa and Dekemhare was available although it was requested.



Figure 7: Adi Key Town



Figure 8: Chlorine Injector

【Conclusion on Effectiveness and Impact】

With regard to effectiveness, when assumed targets for 2012 were compared with the actuals at the time of the ex-post evaluation using indicators set at the time of the planning, such as (1) number of people served with safe water, (2) percent of population with access to safe water, and (3) average daily water supply volume, the average achievement rates for the four towns are 58.2%, 88.6% and N/A respectively. In addition, with respect to impact, the project had a certain level of contribution toward the improvement in the living conditions of the residents according to the results of the beneficiary survey which targeted those who are already receiving the water supply service. On the other hand, it is observed that the frequency of water supply is decreasing in the towns other than May-Dima.

In light of the above, this project has somewhat achieved its objectives; therefore, its effectiveness and impact is fair.

3.4 Efficiency (Rating: ③)

3.4.1 Project Outputs

Table 4 is the planned and actual outputs of this project.

Table 4: Planned and Actual Outputs of This Project

Plan (At Appraisal)	Actual (At Ex-Post Evaluation)
【Planned Outputs from the Japanese Side】	【Actual Outputs from the Japanese Side】
■ Construction and expansion of piping-system water supply facilities for four towns (e.g., deep well water intake facilities,	■ They are as follows:

<p>transmission pipes, distribution pipes and water fountains)</p> <p>1) Debarwa</p> <ol style="list-style-type: none"> Deep-well and pumping facilities: 14 Transmission pipe: 25km Reservoirs: 2 (500m³, 50 m³) Distribution pipe: 9km Public fountains: 9 <p>2) Dekemhare</p> <ol style="list-style-type: none"> Deep-well and pumping facilities (including replacement of the existing pumps): 8 Transmission pipe: 24km Reservoirs: 1 (1,100m³) Distribution pipe: 14km Public fountains: 16 <p>3) May-Dima</p> <ol style="list-style-type: none"> Deep-well and pumping facilities (including replacement of the existing pumps): 15 Transmission pipe: 15km Reservoirs: 1 (300m³) Distribution pipe: 4km Public fountains: 9 <p>4) Adi Keyih</p> <ol style="list-style-type: none"> Deep-well and pumping facilities : 11 Booster Pump: 1 Transmission pipe: 20km Reservoirs: 2 (700m³ and 50m³) Public fountains: 10 <p>■ Soft component (technical assistance) to strengthen the institutional aspects of the operation and maintenance by the Water Supply Service of each town for smooth operation and maintenance of the above outputs³³</p> <p><u>【Planned Inputs from the Eritrean Side】</u></p> <ol style="list-style-type: none"> Securing and providing land Facilitation for obtaining construction permits 	<p>1) Debarwa</p> <ol style="list-style-type: none"> Deep-well and pumping facilities: 16 Transmission pipe: 14.886km, 35 valve chamber elevations Reservoirs: 2 (500m³, 50 m³) Distribution pipe: 9.834km Public fountains: 4 <p>2) Dekemhare</p> <ol style="list-style-type: none"> Deep-well and pumping facilities: 8 Transmission pipe: 23.040km, 55 valve chamber elevations Reservoirs: 1 (1,100m³) Distribution pipe: 13.809km, 25 valve chamber elevations Public fountains: 8, 2 water towers, 1 pressure reducing valve <p>3) May-Dima</p> <ol style="list-style-type: none"> Deep-well and pumping facilities: 19 Transmission pipe: 12.412km, 16 valve chamber elevations Reservoirs: 1 (300m³) Distribution pipe: 5.681km, 4 valve chamber elevations Public fountains: 9 <p>4) Adi Keyih</p> <ol style="list-style-type: none"> Deep-well and pumping facilities : 15 Booster Pump: 2 Transmission pipe: 19.790km, 18 valve chamber elevations Reservoirs: 2 (700m³ and 50m³) Distribution pipe: 1.091km Public fountains: 6 <p>■ It was implemented as planned.</p> <p><u>【Actual Inputs from the Eritrean Side】</u></p> <p>a), b) and c) were implemented as planned except that the connection work (c)) is on-going at present as it will be explained in</p>
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³³ The details will be explained in “Technical Aspects of the Operation and Maintenance” under Sustainability.

c) Construction work for the house/yard connection ³⁴	the section of project period under Efficiency.
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With respect to the outputs by the Japanese side, there are some differences between the plan before project commencement and the actual at the time of the ex-post evaluation. According to the interviews with the main consultant who was in charge of construction management of this project, the provincial government of Debub and the four target towns, the main reasons are as follows: (1) Changes were made to the construction method during the detailed design and the construction based on the conditions of the project sites; (2) The expense was not allowed to exceed the planned financial input of the Japanese side (given the nature of Japan’s grant aid projects); thus outputs had to be delivered within the budget limit. What was done in practice is that design changes were made to the necessary outputs of high-priority that were within the planned budget, while outputs perceived to be of relatively low-priority were either downscaled or excluded as a result of the design change.

With regard to the soft component, there was a need before the commencement of the project to address the problem of the old water distributing pipe and water supply facilities caused by insufficient maintenance in each town. In response to such a situation, a technology transfer was implemented by this project with the aim of improving capabilities to manage leakage and operate based on business plans as soft component training for staff engaged in the water supply service. More specifically, the following topics were covered: examples and detection of leakage; how to renew old pipes and fix leakage as well as required equipment; establishing customer ledgers (identification of water supply systems and status of equipment use, such as pipe diameters and flowmeters); periodic patrol plans; record keeping (distributed water volume/supplied water volume, recording repairs of facilities, recording meter reading and recording leakage control, etc.); and on-the-job training.

(Outputs with Issues Observed at the Time of the Ex-Post Evaluation)

Through this ex-post evaluation, operational problems and risks were observed in some parts of the constructed outputs. The major ones are listed below:

- In Dekemhare well and pumping facilities (3 places in total) are not operational. More

³⁴ In May-Dima out of the four target towns, it was planned that water would be supplied with public fountains considering the availability of groundwater potential and the town size. Thus there is no water distribution network or house connection.

specifically, (1) one pumping facility is not being used, although it has no operational problem, because soil erosion, which occurred in one of the water transmission routes, has left a transmission pipe unfixed and interrupted (see Figure 9) (1 place); and (2) operation of one pumping facility is suspended due to an electric system failure (2 places)³⁵.

■ In Dekemhare a site of the constructed reservoir is at a risk for ground (terrace) collapse (see Figure 10). Generally this town has many places with sandy soil, and soil erosion is likely to occur when there is heavy rain. In particular, erosion has been expanding in the slopes since the completion of the project; some grounds are found to be fragile. Recently, erosion is progressing in the entire slope³⁶. No repair work has been done up to the point of this ex-post evaluation³⁷.

■ Seven out of the ten well and pumping facilities constructed in May-Dima are not operational³⁸. According to the provincial government of Debub and May-Dima town, this is because groundwater has been decreasing year after year (with the groundwater level becoming lower), as a result of which water intake has become impossible in some areas³⁹. At the time of the ex-post evaluation, water intake volume from these wells is found to be almost none obviously in the dry season and even in the rainy season. According to the provincial government and May-Dima town, they are aware that water intake volume is on the decrease even for the remaining three well and pumping facilities that are operational at the time of the ex-post evaluation⁴⁰. Therefore, a possibility cannot be denied that the remaining three facilities may also stop operating in the near future in May-Dima.

■ The foundation parts and doors of some well and pumping facilities were designed and constructed at low elevations in Debarwa, Dekemhare and Adi Keyih⁴¹, as a result of which these facilities get flooded in the case of heavy rain. Pumping equipment installed inside the facilities has to be stopped during the flood; and it cannot be operated for water intake until

³⁵ With regard to one of two places, although an exact reason remains unknown, the lightning arrester was not activated when the lightning hit according to the WSS staff. However, it could be the case that this happened because the arrester (embedded part, consumable) was not replaced, while it was pointed out during the inspection that arresters would need replacement.

³⁶ The focal point of the provincial government of Debub at the time commented in an interview, "Actually, we could observe that ground was fragile at the design stage of this project. Thus we requested the Japanese side to change the site for the reservoir construction. However, it was denied because budget and time were limited for the design study."

³⁷ According to the interview with the town and the provincial government of Debub, it is due to budget shortage.

³⁸ Concrete information was not available as to how long they have been non-operational.

³⁹ However each town targeted by this project is not measuring the data. Therefore, no accurate data is available.

⁴⁰ As discussed earlier, the target towns of this project are not currently measuring the data. Therefore, no accurate data is available.

⁴¹ Knowing the climate and situations during heavy rains around the sites where well and pumping facilities were constructed, the provincial government requested the Japanese side to elevate the foundations and the doors at the time of the design and also during the project implementation. However, such request was denied because the budget and time were limited for the design study.

floodwater recedes. According to the provincial government of Debub, from April 2010 up to the time of the ex-post evaluation, the facilities got flooded four times in Debarwa, five times in Dekemhare, and six times in Adi Keyih. They also commented that although there has not been any failure of pumping equipment thus far, equipment is apparently becoming worn fairly quickly because they had been under water.



Figure 9: Interrupted Water Transmission Pipe Due to Soil Erosion⁴² (Dekemhare)



Figure 10: Constructed Reservoir (Dekemhare)



Figure 11: Non-Operational Well and Pumping Facility Due to Electrical System Failure Caused by Lightning (Dekemhare)



Figure 12: Well and Pumping Facility in Debarwa (it gets flooded in the case of heavy rain as the foundation and the door are built at too low an elevation)

3.4.2 Project Inputs

3.4.2.1 Project Cost

The total project cost was initially planned to be approximately 1,581 million yen (the grant limit stated in the Exchange of Notes was 1,524 million yen for the construction and 51 million yen for the detailed design from the Japanese side, and approximately 6 million yen from the

⁴² The poles seen in the center of the photo had been installed to support the transmission main. As seen in the picture, no transmission main has been installed due to soil erosion.

Eritrean side), whereas the actual cost was approximately 1,509 million yen (regarding the actual cost of the Japanese side, the construction was 1,449 million yen and the detailed design was 51 million yen, while the Eritrean side was approximately 9 million yen), which was mostly as planned (approximately 95% of the plan).

3.4.2.2 Project Period

The project period was planned to be 3 years and 7 months (43 months) from September 2006 to April 2010. The procurement and installation work by the Japanese side took 3 years and 5 months (41 months) from September 2006 to February 2010, which is within the plan. On the other hand, concerning the work implemented by the Eritrean side, the house/yard connection work is on-going in the three towns except in May-Dima at the time of the ex-post evaluation. According to the document provided by JICA and interviews conducted during the fieldwork of this evaluation study, it was the initial plan of the Eritrean side that the connection work be continued up to 2015. Therefore, it is deemed inevitable that the work has not been completed at the time of the ex-post evaluation. Therefore, the completion of the construction and the procurement of equipment and materials by the Japanese side would be considered as the timing of the completion of this project. (Thus the actual project period is 95% of the plan.)

In view of the above, both project cost and project period were mostly as planned; therefore, efficiency of the project is high.

3.5 Sustainability (Rating: ①)

3.5.1 Institutional Aspects of Operation and Maintenance

The implementing agency of this project is the Water Resource Department (WRD), which is one of the departments of the Ministry of Land, Water, and Environment (MoLWE). However, WRD is responsible for the coordination and processing of new projects and planning of water supply programs; thus substantively they are not involved in this project at the time of the ex-post evaluation. The operation and maintenance of the facilities constructed by this project is the responsibility of the water supply units within the municipality offices of Debarwa, Dekemhare, May-Dima and Adi Keyih, which are under the provincial government of Debu. However, in the case of May-Dima, there is no unit specialized in water supply because the size of the population and the municipality office is small; the staff of the municipalities who also

have other duties carry out the operation and maintenance work⁴³. In the three towns except May-Dima, water supply units are called the Water Supply Services (WSS). The provincial government of Debut supervises and monitors this project by coordinating and liaising with each town.

Table 5 shows the number of staff assigned to the water supply service in the four target towns before project commencement and at the time of the ex-post evaluation. The number of staff increased in all towns compared to before the commencement of the project. This is mainly because the work requirement increased as the number of water connections increased compared to before project commencement. In Dekemhare, however, the number of staff is not necessarily sufficient given the increasing population and number of connections; thus the operation and maintenance structure is not sufficient. According to Dekemhare WSS, they cannot assign sufficient number of personnel for the operation and maintenance because their budget is limited and also because there is no prospect of receiving budget support from the provincial government of Debut. At present, they are faced with staff shortage and lack of training, and they cannot even carry out even the connection work in a satisfactory manner. Therefore, it can be said that there are some problems in the institutional aspects of the operation and maintenance of this project.

Table 5: Number of Staff Assigned to Water Supply Service in Four Target Towns

(Unit: person)

Position	Before Project Commencement				At the Time of Ex-Post Evaluation			
	Debar wa	Deke mhare	May-Dima	Adi Keyih	Debar wa	Dekem hare	May-Dima	Adi Keyih
Water Supply Head	1	1	-	1	1	1	(1)	1
Office/ Clerk Staff	1	2	-	6	13	3	(10)	15
Technical Staff	4	10	4	5	6	18	(6)	17
Support Staff	9	14	5	9	4	10	-	13
Total	15	27	9	21	24	32	(17)	46

Source: JICA document (before project commencement) and answers on questionnaire (at the time of the ex-post evaluation)

Note: Numbers in brackets are the numbers of staff who also have other duties.

3.5.2 Technical Aspects of Operation and Maintenance

⁴³ For example, a general administrative staff is checking the pumping facilities, while a driver is assigned to do the piping work. According to May-Dima town, they would like to establish a unit dedicated to water supply in the future, like WSS in other towns.

It has been confirmed through the interviews with WSS of three towns and municipality staff assigned to water supply in May-Dima that they have a certain level of technical standard just enough to carry out the needed operation and maintenance. This is thought to be owing to the soft-component training conducted during the implementation of the project as explained in the Output section under Efficiency. Some employees who had participated in the training were interviewed during the evaluation study; and they commented, “Although the training was short, I think it was the kind of training necessary for us. We are utilizing what we learned through the practical maintenance for our day-to-day tasks today.” Based on such a comment, it can be considered that the soft component training has produced results, fulfilling the technical standard necessary for the maintenance work.

While it has been confirmed that on-the-job training is provided for newly recruited staff in all target towns, no training (e.g., training on connecting suction pipes to distributing pipes, and leakage check and repair) has been offered to staff other than the newly recruited since the completion of this project; there is no plan or policy for such training, either. This is because each town does not have sufficient training budget. There is no budgetary support from the provincial government of Dehub or WRD. The towns commented, “While we feel that there is a need for training, we do not know what to do exactly. We do have some topics that we want to learn, but we do not know what to do.” In addition, there is not enough number of staff in Dekemhare for the increasing population and demand for the connection service as described earlier. Moreover, even if staff is newly recruited, they do not have the opportunity to receive the training needed to carry out the water connection work and others. Furthermore, Adi Keyih WSS staff is pouring chlorine at a rough estimate without using the chlorine injector as described earlier. Given that full-time staff at a transmission pumping facility did not know how to use the injector and that the injector was left unattended (1 site), it can be concluded that there are some problems in the technical aspects of the operation and maintenance.

3.5.3 Financial Aspects of Operation and Maintenance

Table 6 shows the income and expenditure in relation to the water supply service of four towns (last 3 years). The “income” shown in the table is mostly from water sales. On the other hand, the “expenditure” refers to a cost needed for operating the water service; it is the operation and maintenance cost, such as costs of fuel and electricity necessary for operating water pumps during water intake and staff salaries.

Table 6: Income and Expenditure of Water Supply Service in Four Target Towns

(Unit: 1000 nakfa)

【Debarwa】	2010	2011	2012
Income	1,226	1,553	1,533
Expenditure	326	328	326
(Income – Expenditure)	900	1,225	1,207
【Dekemhare】	2010	2011	2012
Income	2,234	1,712	2,133
Expenditure	2,561	3,034	2,879
(Income – Expenditure)	-327	-1,322	-746
【May-Dima】	2010	2011	2012
Income	129	452	449
Expenditure	113	493	562
(Income – Expenditure)	16	-41	-113
【Adi Keyih】	2010	2011	2012
Income	1,890	3,403	3,519
Expenditure	1,278	1,321	1,675
(Income – Expenditure)	612	2,082	1,844

Source: Answers on questionnaire

Note: The exchange rate is 6.73 yen for 1 nakfa⁴⁴ as of June 2013

In Dekemhare and May-Dima expenditure exceeds income, ending in the red. This is because WSS has not been able to increase water sales of residents as they have not been able to respond to the high water demand due to staff shortage as described earlier. In the case of May-Dima, expenditure exceeds income because the cost of fuel needed to operate pumps is substantial, while income from water sales has not increased as much due to the limited water intake volume at the well and pumping facilities as explained earlier. The deficit of WSS is covered by the respective municipality office. According to WSS of three towns and the municipality of May-Dima, a small amount of subsidy is also allocated by the provincial government of Debub to compensate for the loss⁴⁵.

In Debarwa and Adi Keyih income exceeds expenditure, generating profits. In the case of Debarwa, they have been able to secure income which is larger than expenditure because there are relatively more commercial-scale utility customers (e.g., companies and factories). In Adi Keyih, on the other hand, their water sales are increasing because in recent years the number of construction companies that are commercial-scale utility customers has increased in the town.

The main municipality office manages cash for water services in all towns; WSS of the three

⁴⁴ The official exchange rate is 15 nakfa for 1 USD as of June 2013.

⁴⁵ However, data on the exact amount of the subsidies could not be obtained.

towns do not have any authority to manage income or expenditure. In other words, even though WSS generates profits, like in the case of Debarwa and Adi Keyih, the surplus is not returned to WSS (other unit in the case of May-Dima) as WSS does not have any authority to deal with budget. The actual practice is that WSS prepares an operational plan for the following year including budget and submits it to the municipality office. However, budget is not necessarily approved as per the request. There are some cases where budget is increased based on the performance of the previous year in the case of running in the black; however, it is not to such an extent that WSS can recruit new staff or plan and organize training on its own.

The operation and maintenance cost of this project is incorporated in the expenditure shown in Table 6. According to the interviews with WSS staff of Debarwa, Dekemhare and Adi Keyih and May-Dima's staff in charge of water supply and others, they commented such as this: "Although we believe that the minimum level of budget is secured, we cannot say it is sufficient given the recent increase in the cost of fuel necessary for operating the pumping facilities. The budget is limited for purchasing parts necessary for the water connection work. There is little budget for training, either. The cost of transporting fuel and spare parts is high (although it is only in May-Dima) as the town is located in the mountainous area." Taking account of the above situation concerning the discretion of budget allocation and execution as well as the comments of staff members, it can be said that there is a problem in the financial aspects of the operation and maintenance of this project at the time of the ex-post evaluation⁴⁶. Therefore, it is thought necessary that the municipality office should make available sufficient operation and maintenance budget for the local units, such as WSS, including the review of budget allocation system⁴⁷.

3.5.4 Current Status of Operation and Maintenance

While no major maintenance works are carried out for the wells constructed by this project as they are in the ground, it is suggested that the common maintenance of boreholes to be carried out periodically. The pumping facilities established near the wells are periodically checked and cleaned. In case there is a problem with pumping equipment, specialized operators based in Asmara will be asked to do the repair because the maintenance staff of each town do not have the repairing skills. As for the transmission and distribution pipes, the maintenance staff of each

⁴⁶ According to WRD, water tariff will be reviewed soon, jointly by WRD and four WSSs.

⁴⁷ According to each town, there is no problem with the payment for electricity needed to operate the pumps; and there has not been any case of late payment. Additionally, as for the purchase of liquid chlorine necessary for chlorine injection, the Debub region purchase in bulk altogether and distribute it to each town. As far as chlorine is concerned, no major problems were observed in financing its purchasing cost and its procurement system.

town patrol in the town and do the repair as they find any breakage and leakage. Additionally, they visit the site to address any breakage or leakage as soon as it is reported by residents. As for the reservoirs, no major maintenance work is required; the maintenance staff eliminate weeds and clean the premises. With regard to the public fountains, the maintenance staff of each town clean a few times a week. They replace broken faucets if needed.

On the other hand, as it was discussed in the effectiveness section, problems were observed in some of the outputs at the time of the ex-post evaluation, three years after the completion of this project. More specifically, some of the well and pumping facilities are not operational in Dekemhare (transmission line is interrupted due to land erosion, and electric system failure at pumping facilities); the reservoir in Dekemhare is facing a risk of land slide; the well and pumping facilities are not operational in May-Dima (decreasing intake water volume); and some of the well and pumping facilities had been flooded in Debarwa, Dekemhare and Adi Keyih. The WSS of each town is not well-positioned to address these problems.

In addition, there is a serious concern about the procurement and securing of parts. According to Debarwa WSS, Dekemhare WSS and Adi Keyih WSS that are in need of the distribution pipe connection parts (e.g., snap taps with saddles), it is difficult for WSS to purchase from domestic suppliers. This is because suppliers are not willing to sell products to small organizations with little financial capacity and credit, such as WSS. In addition, although three towns are requesting support from the provincial government of Debub in this regard, the provincial government is also in such a financial difficulty chronically that they cannot respond to the matter sufficiently. Additionally, although the provincial government of Debub is requesting the central government (WRD) to smoothen the handling of the procurement of parts at the national level so that parts are distributed to each town, WRD does not have the authority or authorization right over internationally procured goods; thus WRD is not well-placed to resolve the issue. While WRD has consulted the Ministry of the National Development and the Ministry of Finance with the said authority about the matter a few times, it has not been solved up until the time of the ex-post evaluation. Therefore, it is deemed necessary that this matter should be addressed through dialogues among concerned parties in a prompt manner. As a side note, Eritrea has been imposed sanctions by the United Nations since December 2009. As a result, the national finances worsened and it has become difficult to obtain some industrial parts, which is thought to be related to this issue in no small part.

【Conclusion on Sustainability】

In view of the above, there are problems in the institutional, technical and financial aspects of the operation and maintenance of this project. Additionally, there is a serious problem in the current status of the operation and maintenance⁴⁸. Therefore, sustainability of the project effect is low.



Figure 13: Downtown of Dekemhare



Figure 14: May-Dima Town

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The objective of this project was to increase water supply volume and to provide safe drinking water, by constructing water supply facilities (deep wells, pumping facilities, transmission pipes, reservoirs, distribution pipes and public fountains, etc.) in four towns of Debub Region (Debarwa, Dekemhare, May-Dima and Adi Keyih). At the time of the ex-post evaluation, this project is consistent with the policy of Eritrea, such as the “National Water Supply Action Plan,” with the development needs for improving water supply facilities in rural towns, and with Japan’s ODA policy; thus relevance of the project is high. Due to problems, such as difficulty in procuring parts necessary for house connection work, staff shortage at the water supply service unit of each town and underutilization of well and pumping facilities, the actual average water supply volume per day, which indicates the quantitative effects, has shown limited achievement in some towns. However, the number of people served with safe water and the percent of population with access to safe water have reached certain levels. Hence, the effectiveness and impact of the project is fair. On the other hand, major problems have been observed in that the target towns cannot assign sufficient number of staff and conduct training

⁴⁸ However, it is not likely that any concrete measures can be taken at present.

programs due to budget shortage. In addition, the target towns are not well-positioned to address these problems; therefore, sustainability of the project effects is low.

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

4.2 Recommendations

4.2.1 Recommendations to the Implementing Agency

- No training has been offered to the staff members engaged in the water supply service in each town since the completion of the project. Especially in Dekemhare, a shortage of WSS staff is prominent, and the town is confronted with the challenge of not being able to carry out the water connection work in a satisfactory manner. As a result, the town is not sufficiently meeting the demand of residents for water supply service. Therefore, the municipality office of each town is recommended to secure budget necessary for the allocation and training of personnel and also for the operation and maintenance work by requesting support from the provincial government of Debub to the extent possible.

- There is a difficulty in obtaining and procuring connection parts (e.g., snap taps with saddles, etc.) that are necessary for supplying water. It is recommended that the central government, WRD, the provincial government of Debub and each municipality office should thoroughly discuss the procurement arrangement and establish a system whereby parts can be procured smoothly.

- In Dekemhare, a terrace on which a reservoir has been constructed has a risk of collapsing due to soil erosion. The municipality office is recommended to allocate budgets necessary for the slope repair work as quickly as possible and to proceed with the work, thereby making efforts toward eliminating the risk.

- In Adi Keyih, a chlorine injector installed at a transmission pumping station (1 site) is not in use. Adi Keyih WSS is advised to assign staff who can properly handle chlorine injector and chlorination, thereby making efforts for safe water supply.

4.2.2 Recommendations to JICA

- It is recommended that JICA should request and advise the government of Eritrea as needed to facilitate the smooth procurement of parts needed for the water supply service in each town.

4.3 Lessons Learned

- Verification of Expected Number of Water Connections at the Time of Planning and Effective

Utilization of Monitoring for Achieving Objectives

The direction or the plan for the house/yard connection, which was to be borne by the Eritrean side, was not necessarily clear at the design stage. It would have been necessary to verify the number of future connections expected after the completion of the project and monitor the progress with a view to achieving project objectives. In particular, while the average daily water supply volume expected to be achieved by 2015 was indicated, it would have been meaningful to monitor the progress of this project while tracking the actual average daily water supply volume, considering it as a water supply project up to the current year. Therefore, it is thought that future similar projects (groundwater/well construction projects) need to carry out surveys, and design works and monitoring by considering such aspect.