Republic of Madagascar

Ex-Post Evaluation of Japanese Grant Aid Project

The Project of Groundwater Development in South-Western Region of Madagascar (Phase II)

(Le Projet d'exploitation des eaux souterraines dans la région sud-ouest de Madagascar (Phase II)) External Evaluator: Satoshi NAGASHIMA, ICONS Inc.

0. Summary

This Project was conducted with the aim of improving the water supply rate in the target area and enhancing the targeted local residents' maintenance capacity of the water supply facilities by constructing deep well water supply facilities in the 61 villages of Menabe region located in southern part of Madagascar, by procuring the drilling equipment and by maintaining the existing drilling equipment.

This Project is consistent with the development policy of Madagascar, development needs, and Japan's ODA policy, and the relevance is high.

Not only are around 80% of water supply facilities constructed under this Project running, but the water supply rate in the target region has improved beyond the planned target in synergy with other donors' assistance, and water committees have been organized in each village. In addition, the effect of the equipment procured by the Project has spread to other regions, and this Project seems to contribute to reducing waterborne diseases. Therefore, the effectiveness and the impact are high.

On the efficiency, the number of public fountain type water supply facilities has decreased by two places. In addition, the extension of the Project period was because of the evacuation in line with worsening political situation and of one additional construction phase associated with it. However, the extension of the Project was also occurred apart from the suspension of the Project: it is regarded that the period of 4^{th} phase of the detail design was longer than planned because of the adjustment for change of exchange rate. Because of the overall reasons above, the efficiency is fair.

For the sustainability, even though about 80% of the water supply facilities are functioning, there is a problem on the supply system of spare parts, there is a limit to the monitoring system of the water supply facilities, and half of the water committees haven't collected the water utilization fees. In such circumstances, there are a lot of problems for the future. As for groundwater development equipment, the equipment is partially broken and not repaired. Therefore, the sustainability is low.

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

1. Project Description



Project Location



Public fountain type water supply facility

1.1 Background

In the water sector in Madagascar, the water supply rate in the rural area was only 12% at the end of 1999, and it was lagging significantly compared with 83% in urban areas and it was also the lowest level among neighbouring African countries. For this reason, the Ministry of Energy and Mines, which has jurisdiction over the water sector of the country, formulated the "Law concerning water" in 1999 with the help of the World Bank and the Poverty Reduction Strategy Paper (PRSP) in the following year (in 2000), and the goal was set to increase the water supply rate in the rural area up to 80% by 2015.

Japan has supported the water sector of the country from the early 1980s and in particular, the promotion of water supply equipment was carried out in the ex-southern Toliara province, which was one of the poorest areas. From 1992 to 1994, construction of water supply facilities was conducted in the 50 villages of the ex-provincial capital, Toliara city, as Phase I of this Project. Continuing this, a development study, "Onihira-Morondava area groundwater development plan" was implemented in the villages of Menabe region between 1994 and 1996, and it was verified the needs of the water supply facilities and the technical adequacy in the region.

Based on the results of the development study, Madagascar government requested a grant aid Project of which the main contents are construction of the water supply facilities of deep wells in 61 villages of Menabe region, former Toliara province, and procurement of equipment for excavation and maintenance of existing equipment.

1.2 Project Outline

The Project was conducted with the aim of improving the water supply rate in the target area and enhancing the targeted local residents' maintenance capacity of the water supply facilities by constructing deep well water supply facilities in the 61 villages of Menabe region located in southern part of Madagascar, by procuring the drilling equipment and maintaining the existing drilling equipment.

Grant Limit / Actual Grant Amount	347 million yen / 345 million yen (Phase 1)
	474 million yen / 197 million yen (Phase 2)
	475 million yen / 472 million yen (Phase 3)
	651 million yen / 593 million yen (Phase 4)
Exchange of Notes Date	April, 2001 (Phase 1), August, 2001 (Phase 2)
	June, 2003 (Phase 3), June, 2004 (Phase 4)
Implementing Agency	Department of Water and Sanitation,
	Ministry of Energy and Mine
	(Currently Ministry of Water)
Project Completion Date	February, 2006
Main Contractor(s)	ITOCHU Corporation (Phase 1)
	Urban Tone Corporation (Phase 2 and 3)
	KOKEN BORING MACHINE Co, Ltd. (Phase 4)
Main Consultant(s)	Japan Techno Co., Ltd
Basic Design	July, 2000 - September, 2000
Related Projects (if any)	Technical cooperation
	- The Project of Groundwater Development in
	South-Western Region of Madagascar
	(1989-91)
	- Onihira-Morondava area groundwater
	development plan (1994-96)
	- The Project for Improvement of Rural Water
	Supply and Hygiene Practice in Atsimo
	Andrefana Region (2008-2013)
	Grant aid Project
	- The Project of Groundwater Development in
	South-Western Region of Madagascar
	(1992-94)

2. Outline of the Evaluation Study

2.1 External Evaluator Satoshi NAGASHIMA, ICONS Inc.

2.2 Duration of Evaluation Study

Duration of the Study: November, 2012 - November, 2013

Duration of the Field Study: March 23rd, 2013 – April 6th, 2013

June 4th, 2013 – June 13th, 2013

3. Results of the Evaluation (Overall Rating: C^{1})

3.1 Relevance (Rating: 3^2)

3.1.1 Relevance to the Development Plan of Madagascar

Madagascar government developed the Poverty Reduction Strategy Paper (PRSP) (2000 - 2015) in January 2000. The need for promotion of the water supply facilities was pointed out as an important task of this policy, and the government set up a long-term water supply rate goal of 15 years from 2000 as shown in Table 1.

			Unit: %
	Rural area	Urban area	Total
1999 (Actual)	12	83	26
2000	13	83	27
2005	37	92	48
2010	56	95	64
2015	80	100	84

Table 1 Objective of the water supply rate in the PRSP in Madagascar

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Source: Basic Design Study Report

At the time of ex-post evaluation, the main principle of development policy of the Ministry of Water, in charge of the administration of the water sector in Madagascar, is Millennium Development Goals (hereinafter referred to as MDGs), and they don't follow-up the objective of PRSP. According to the Ministry of Water, the PRSP was recognized as the starting point of the development and Madagascar government hasn't regarded it as an important policy as of now.

Table 2 Indicator of MDGs "Proportion of the population using improved drinking water sources"

	2006	2007	2008	2009	2010
Total	43%	44%	45%	46%	46%
Urban area	75%	75%	75%	75%	74%
Rural area	30%	31%	32%	33%	34%

Source: Development Indicators unit, Statistics Division, UN

Even though the development goal was changed, improvement of the water supply rate still has been very important development goal as shown in Table 2, and there is no change in the fact that the assistance for the water supply is in a very important position.

¹ A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

² ③: High, ② Fair, ① Low

3.1.2 Relevance to the Development Needs of Madagascar

Water supply rate in whole Madagascar was 26% in 1999. Though the water supply rate of the urban areas was 83%, that in the rural areas was 12%, which was significantly low, and it was seen as a cause of the low water supply rate of whole Madagascar³. In the rural areas where improvement of the water supply rate was delayed, the Project site of former Toliara province was one of the poorest areas of the country, and the water supply rate was 10% and lower than the average of rural areas in Madagascar.⁴

According to the yearbook of the Ministry of Water issued in 2013, the water supply rate of former Toliara province in 2012 is about 42.4%. In particular, Menabe region which is the target area of the Project has attained a water supply rate of approximately 60% and has the highest rate out of the four regions of former Toliara province. According to the document prepared by the Regional Department of Water (hereinafter referred to as RDW) for Menabe region, though some donors such as UNICEF have also provided some assistance, implementation of the Project has contributed the most significantly to the improvement of the water supply rate. (Since 2000, about 71 % of public fountain type water supply facilities of Menabe region, and about 68% of foot pump type water supply facilities were constructed by the Project.)

	Population	Water supply	Water supply
		population	rate
Androy	621,947	192,110	30.9%
Anosy	668,970	278,960	41.7%
Atsimo-Andrefana	1,284,660	535,160	41.7%
Menabe	468,750	280,060	59.7%
Total in ex-province	3,044,327	1,286,290	42.4%
Total in Madagascar	21,757,964	10,013,520	46.0%

Table 3 Water supply population of 4 regions of former Toliara province in 2012

Source: Ministry of Water

On the other hand, in terms of "reducing by half the proportion of people without sustainable access to basic sanitation and safe drinking water by 2015," which is aimed in the MDGs, it is necessary to improve the rate of access to safe water in all Madagascar up to 64.5% by 2015, and there is still a need for improvement of the water supply rate in four regions of former Toliara province.

3.1.3 Relevance to Japan's ODA Policy

In the 2002 version of Official Development Assistance (ODA) national data book, there was an

³ Basic Design Study Report

⁴ Basic Design Study Report

indication that "in December, 1997, policy consultations on the technical cooperation and the grant aid were held, and it was agreed to support the basic human needs area, infrastructure area that contributes to the rural development, environment area and capacity building area;" and basic human needs area including the water supply aid was one of the important areas. Since Japan has selected the water supply assistance as one of the priority areas in Madagascar, the relevance of this Project was high.

In the consequence above, this Project has been highly relevant to the country's development plan, development needs, as well as Japan's ODA policy, therefore its relevance is high.

3.2 Effectiveness⁵ (Rating: ③)

3.2.1 Quantitative Effects (Operation and Effect Indicators)

1) Improvement of water supply rate in the target area (rural area in Menabe region)

In the Project, new and rehabilitated foot pump type water supply facilities were constructed at 129 units in 59 villages and new public fountain type water supply facilities were constructed at seven units in six villages. Among them, approximately 78.3% of foot pump type water supply facilities and about 75% of public fountain type water supply facilities are still running during the survey at the time of the ex-post evaluation.

For the water supply rate of rural area in Menabe region, the target indicator in 2005 set during the Basic Design Study was 28%, and the actual indicator in 2006 has improved to 48.9%, which was much beyond the target. There were some documents that UNICEF and other donors supported the construction of wells in 2002 apart from the Project⁶, and each activity was carried out as planned. That is the factor to achieve the target indicator higher than expected.

Number of facilities which has been constructed by this Project is about 70% of the number of the water supply facilities constructed in whole Menabe region since 2000. Though about 20% of the facilities aren't working, it seems that the Project contributes largely to the improvement of the water supply rate.

⁵ Sub-rating for Effectiveness is to be put with consideration of Impact.

⁶ According to the materials obtained from RDW, the percentage of the number of facilities in whole number of facilities in Menabe region since 2000 is about 71% for public fountain type water supply facilities (others from NGO assistance) and about 68% for foot-pump type water supply facilities (including hand pump type water supply facilities) (Others from UNICEF and NGO assistance).

Name of indicators	Plans	Actuals	Actuals
	(2005)		(2012)
(Unit)	(2005)	(2006)	(2012)
Water supply population in the target	86,917	147,700	201,420
area (Rural area in Menabe region)			
Water supply rate in the target area	28%	48.9%	56.3%
(Rural area in Menabe region)			

 Table 4 Indicators concerning the improvement of water supply rate in the target area (rural area in Menabe region)

Source: Ministry of Water

2) Organization and the activation of water committees in the villages Results for these indicators are as follows.

Table 5 Result of indicators concerning organizing and activation of the water committees in the villages

Name of indicators	Plans	Actuals	Actuals
(Unit)	(2005)	(2005)	(2013)
Number of water committee in the	61	64	52
target area			
Number of female members	More than 120^7	157	156
Number of members who received	More than 366 ⁸	323	265
maintenance training			

Source: Site survey result conducted in the ex-post evaluation and the survey entrusted to the local consultant

According to the survey in the target site⁹, because it was confirmed that the water committees were present at all sites when the water supply was started (in 2005), the number of the committees in the target area in 2005 was 64. Because it was aimed to organize the water committees in all villages in the soft component of the Project, the objective has been achieved. However, at the time of the ex-post evaluation, it was observed that there were some water committees which haven't used the water supply facility due to trouble of the pump and have become dormant. Therefore the value of the indicator in 2013 excludes these numbers. As shown in Table 5, at the time of the ex-post evaluation, the number of active water committees decreased slightly (from 64 villages to 52 villages, about 18.8% decrease). Even though 8-9 years have passed since organizing water committees, more than 80% of the water committees are still active and continue their activities.

⁷ In case of 6 members per water committee. In the ex-ante evaluation sheet, it was set at least one third (1/3) of the members.

⁸ In case of 6 members per water committee.

⁹ Interview survey with the water committees was carried out by the evaluator and the local consultant in 59 villages with foot-pump type water supply facilities and 6 villages with public fountain type water supply facilities: 64 villages in total (in Ambatolahy, there are the both kind of facilities and each are counted independently.)

For the number of women constituting the water committees, the achievement of the target value of the indicator was confirmed by the results of the survey at all villages. The main reason behind achievement of the indicators is that the villages where the surveys were conducted in the ex-post evaluation had a number of women who work for collecting the water utilization fee.

For the number of participants of the maintenance training of the soft component of the Project, achievement could not be confirmed in this survey. During the planning period, number of trainee was assumed as members of the water committees were six. That is because there are some villages where they did not have six members from the start, and the villagers who attended the maintenance training tend to decline by replacement by members re-election or by moving.

3.2.2 Qualitative Effects

1) Groundwater development ability of Ministry of Water (formerly Department of Water, Ministry of Energy and Mines) is improved.

Because the target value on the indicator wasn't set during the planning period, the number of excavation by Ministry of Water is used to measure the improvement of the capacity as alternative indicator for the ex-post evaluation¹⁰. As a result of the interviews at the Ministry of Water, the number of excavations by Ministry of Water from 2007 to 2012 was as shown in Table 6.

Until 2009, the actual number of excavations by the Ministry of Water had increased steadily. Since 2010, there was no excavation by the Ministry of Water because of a political crisis in Madagascar and there were no drilling works that the Ministry could participate (conducted with the assistance by the donors)¹¹ in. In this way, contribution to increasing the number of excavations is explained not only by the capacity improvement, but by presence or absence of excavating works. Therefore, it was difficult to measure the capacity of the underground water development works by increase or decrease of the number of excavations since 2010.

¹⁰ It was assumed that if the capacity was improved, the Ministry of Water can carry out more excavations.

¹¹ Comparing the number of excavations in whole Madagascar and the number of excavations by Ministry of Water, the number of excavations by Ministry of Water is significantly less (in 2010 and 2011 excavation by Ministry of Water was 0, but there were 1,546 excavations in 2010 and 1,949 excavations in 2011 in all Madagascar). This is because an agreement with the donor is required in case Ministry of Water wants to participate in the excavation works with supports by the donors. On the water supply works conducted by African Development Bank or the World Bank financed after 2010, bidding is taken for the selection procedure to ensure fairness, and Ministry of Water cannot participate in the bidding as it is the main organizer of implementation of the bidding.

	2007	2008	2009	2010	2011	2012
UNICEF	0	0	37	0	0	0
African Development Bank		150				
Budget of Ministry of Water	7	1	0			
Request from private company	0	0	2			

Table 6 Number of excavations by Ministry of Water

Source: Ministry of Water

On the other hand, according to interviews with Ministry of Water, there was information that retired technicians of the Ministry of Water have high demand of employment from private companies. From the interviews, there were comments from the Ministry that technical improvement of technicians was seen by the soft component of the Project. It seems that there might be an improvement of groundwater development capacity of technicians by the soft component of this Project as the background of high demand of the retired technicians from the private sector.

2) Maintenance capacity of Ministry of Water is strengthened.

In the soft component of the Project, it was aimed to improve the operation and maintenance capacity of the workshop in the Ministry through a) the inventory of existing equipment and preparation of equipment registration book, b) confirmation of current operation and maintenance methods, c) technical training for workshop personnel, and d) workshop maintenance.

At the time of the ex-post evaluation, it can be seen from the response of questionnaire that the Ministry grasps the current situation of the equipment. However, among the equipment that was provided to Ministry of Water, part of the equipment (such as pumps, trucks), except the major equipment such as excavation machine used in Ambovombe, has been broken and stored at the workshop of Antananarivo. As described above, at the time of the ex-post evaluation, the Ministry doesn't have a place to use the equipment even after the maintenance because there are no excavation works. Therefore there is no incentive to maintain the equipment, and the equipment isn't repaired¹². However, the issue isn't a matter of maintenance technique but the fact that Ministry doesn't have enough excavation works. Therefore, the cause of the problem isn't insufficient capacity strengthening of the operation and the maintenance by soft component of this Project.

¹² However, the Ministry's intention was confirmed that Ministry of Water will repair and use all equipment if the assistance from donors will be recovered and excavation works by Ministry of Water will be re-stared.

3.3 Impact

- 3.3.1 Intended Impacts
- 1) Excavators, support vehicles and other groundwater development equipment procured in the Project will be utilized in other areas and be beneficial to more population.

In the Basic Design Study Report, there was no description of how many numbers of excavation works where equipment procured in the Project will be used, but it seems that the equipment is basically planned for use in this Project.

The equipment procured in the Project, apart from utilization by the Project, was utilized for the groundwater development outside of the Project area such as Boeny, Vangaindrano and Ambovombe and Ambosary, and it contributed to digging new wells in 197 sites in 2008-2009 as shown in Table 7. Because a part of the equipment for groundwater development was utilized well for development of other areas, it is considered that the effect of the equipment also benefited other areas.

Equipment	Way of utilization		
Excavator	- Conduct five (5) excavation works in Boeny,		
Excavating tools	and three (3) excavation works in		
High pressure compressor	Vangaindrano.		
Equipment for trial pumping	- Conduct thirty seven (37) excavation works for		
Large size truck	UNICEF Project in Ambovombe and		
Medium size truck	Ambosary (part of the Project. The total was		
	100 wells)		
	- Conduct a hundred and fifty (150) excavation		
	works for part of African Development Bank		
	Project		

Source: Ministry of Water

2) Prevention of waterborne diseases has progressed by safe water supply, and the prevalence in the whole target area is reduced.

According to the results of interview surveys by the evaluator in target villages where the water supply facilities are still running (14 villages), people mentioned that waterborne diseases of villagers who use the water supply facility were reduced drastically.

Further, in the beneficiary survey¹³, looking at the infection rate of waterborne disease before and after installation of the water supply facilities in the villages where water supply facility is functioning and not functioning, the result (at the time of ex-post evaluation) of the infection rate

¹³ 24 villages out of 64 target villages were selected (all 6 villages of public fountain type water supply facilities and 18 villages of foot pump type water supply facilities which were randomly selected), and beneficiary survey entrusted to a local consultant was carried out. The survey method was questionnaire survey and 345 males and 608 females answered.



of diarrhoea (children (15 years and under) and adult (16 years or more)) was as follows.



Source: Beneficiary survey



Figure 2: Increase or decrease in the infection rate of diarrhoea for adults (over 16 years old) before and after the installation of water supply facilities

Source: Beneficiary survey

Upon comparing the villages where water supply facilities are functioning with the villages where water supply facilities aren't functioning, the proportion of villagers who feel that the infection rate of cholera and diarrhoea has remarkably decreased is high among both the children and adults, and it seems that the installation of water supply facilities has contributed to reducing

these diseases.

3.3.2 Other Impacts

(1) Impacts on the natural environment

According to the interviews on the sites, drying up of the underground water or land subsidence weren't observed at all though it was pointed out the possibility in the Basic Design Study, and penetration of sea water into the wells also wasn't seen.

(2) Land Acquisition and Resettlement

According to the interviews in the Ministry of Water, resettlement of houses was reported in two cases (Croisement BST, Ambohibary) for constructing the water supply facilities. One house each was transferred internally in each village, the compensation was made properly and the resettlement was completed successfully. Further, according to the Ministry of Water, this was only internal transferring in the village, and there was no effect on their living condition.

(3) Unintended Positive/Negative Impact

1) Reduction in the required time to go the water source and required time to take the water The change of required time to go the water source and required time to take the water are as follows in the villages where the water supply facilities are functioning and villages where the water supply facilities aren't functioning.

According to the results of the survey, required time to go the water source has decreased by about 53% in the villages where water supply facilities are functioning and required time to take the water has also declined about 72%. On the other hand, in the villages where water supply facilities aren't functioning, there was no change or it took longer than the required time to go the water source and required time to take the water.

Table 8 Average required time to go the water source and required time to take the water in the

villages where the water supply facilities are functioning and villages where the water supply

		Average required time	Average required
		to go the water	time to take the
		source (minute)	water (minute)
Villages where the water	After the Project	3.75	5.66
supply facilities are functioning	Before the Project	7.07	7.85
Village where the water supply	After the Project	2.85	9.24
facilities don't functioning	Before the Project	3.01	7.67

facilities aren't functioning

Source: Beneficiary survey

As described so far, the improvement of operation and maintenance capacity of the equipment by the Ministry of Water couldn't be confirmed at the time of ex-post evaluation since the Ministry hasn't had enough excavation works to be able to participate and there is no excavation record since 2010. On the other hand, not only are 80% of the water supply facilities constructed under this Project still running, but the water supply rate in the whole target area has improved beyond the target value in synergy with the assistance from other donors and about 80% of the water committees are also working at the time of the ex-post evaluation, so the effectiveness is high.

In addition, it can be seen that the effect of the equipment provided in the Project is spread to other areas, and the Project has contributed to reducing the waterborne diseases, while negative impact cannot be seen in terms of the social and the natural environment, and it is considered that the impact is also high.

Thus, this Project has largely achieved its objectives, therefore its effectiveness and impact is high.

3.4 Efficiency (Rating: 2)

3.4.1 Project Outputs

(1) Output from Japanese side

1) Construction of the facilities

Situation of the planned and actual facility construction in the Project is indicated as follows.

Items	Plan	Actual
New foot pump type water supply	54 villages	56 villages
facilities	121 units	121 units
Renovation of existing foot pump	8 villages	8 villages
type water supply facilities	8 units	8 units
Public fountain type water supply	7 villages	6 villages
facilities	9 units	7 units

Table 9 Situation of the planned and actual facility construction in the Project

Source: Documents provided by JICA



Photo 1: Public fountain type Water supply facility

Photo 2: Foot pump type Water supply facility

For foot pump type water supply facilities, even though the part of the excavation site was changed because of unsuccessful exploratory drilling and high salinity, etc, the planned number of the water supply facilities was eventually constructed. On public fountain type water supply facilities, the number of actual excavations was two below of the planned number. This was due to the unsuccessful exploratory drilling in Ankirizato and it was also found that the possibility of new underwater development there was extremely low; and the plan was changed through the proper procedures. According to the consultant who was in charge of designing the Project, even after conducting a detailed study and several exploratory drillings in advance at the cancelled site, it was difficult to find good water source. Therefore it was an unavoidable cancellation. For public fountain type water supply facilities, it seems that it was difficult to change the site to neighbouring villages because the scale of the facility was big and they couldn't find good water source; and it was hard to find an alternative site.

2) Procurement of equipment

Though the procurement period was delayed because of the political crisis from 2001 to 2002, excavators, transporting trucks and maintenance parts of existing equipment and vehicles, were procured as planned.

3) Soft component

Activities of soft component of the Project were implemented as planned.

(2) Matters borne by the Madagascar side

Matters born by the Madagascar side were as follows. These activities were carried out as planned.

- 1) Securing of land and levelling
- 2) Development, repair and expansion works of access roads
- 3) Dispatch of counterparts
- 4) Maintenance works of existing equipment and vehicle by procured spare parts

5) Follow-up and monitoring survey for the phase 3 target villages after March 2004 of the Project completion (Implemented by NGO)¹⁴

3.4.2 Project Inputs

3.4.2.1 Project Cost

For the Project cost, 1,516 million Japanese yen for three phases was estimated in the planning stage. However, because of the political crisis in Madagascar, one more phase had to be added and the actual input became 1,607 million Japanese yen for four phases, and the Project was completed within the limit of the E / N. However, since two public fountain type water supply facilities were decreased and the reduction in output was observed, the efficiency is slightly reduced from planning period.

From the above, the Project cost is higher than planned considering the decrease of the output

3.4.2.2 Project Period

The Project period was supposed to be 35 months in total for three phases during the planning period but the actual result was 58 months in total for four phases (166% of the plan). As this factor, since the political situation had deteriorated because of the results of the presidential election held in Madagascar in December 2001, the Project implementation has been suspended for five months from March to August 2002. This is because the members of soft component evacuated to outside of the country¹⁵ and it took long time to transport the equipment due to suspension of the custom procedure and blocking transporting means¹⁶; therefore it was unavoidable suspension. In consequence of this, one more phase had to be added due to the political crisis though the Project period was originally three phases in the plan.

However, though it was expected that the detail design of 4th phase took about 4.5 months in the original plan, it actually took about 8.5 months because re-calculation of the Project cost was necessary due to the effect of the slump of Madagascar currency and steep rise in commodity price and it was necessary to adjust about one hundred million Japanese yen difference from original Project cost¹⁷. Therefore the efficiency is reduced on the Project period, and it was slightly longer than planned.

As described above, the number of public fountain type water supply facilities was two less than planned. In addition, the extension of the Project period was because of the evacuation due to the worsening political situation and one additional construction phase associated with it. However, it is also regarded that the extension of the Project period also occurred because of factors apart from the suspension of the Project: the period of 4th phase of the detail design was longer than planned because

¹⁴ Survey on the situation of utilization of water supply facilities, survey on the situation of utilization by users and survey on the system of operation and maintenance

¹⁵ Material provided by JICA

¹⁶ Material provided by JICA

¹⁷ Interview result from the consultant who was in charge of designing the Project

of the necessity to respond to change of exchange rate.

In consequence of above, both Project cost and Project period slightly exceeded the plan, therefore efficiency of the Project is fair.

3.5 Sustainability (Rating: ①)

3.5.1 Institutional Aspects of Operation and Maintenance

(1) Operation and maintenance of water supply facilities

The new Water Act was enacted in 1999 and the management of water supply facilities in the villages was supposed to take place by the water committees approved by the Water Management Mechanism, which is incorporated in the law. Therefore, it was decided to let the water committee of each village conduct the operation and maintenance of water supply facilities of the Project.

According to the plan during the Basic Design Study of the Project, the water committees were supposed to be established at the village level, and the committees consisted of more than four members (one president, one treasurer and two or more technicians and members in charge of village activities) without payment. As the main roles of the water committee, collection of water fees, storage and management of the collected money, bookkeeping, and troubleshooting among residents at the time of taking water and support for pump trouble, etc. were planned. The current management system of water supply facilities by type during the ex-post evaluation is mentioned below.

1) Organization of the operation and maintenance for water supply facilities

In 48 villages out of 59 villages where foot pump type water supply facilities were installed (81.4%), the water committees have operated until the time of the ex-post evaluation. On the other hand, foot pump type water supply facilities have been broken and the activities of the water committees have stopped in 11 villages. Most of the water committees consist of a president, treasurer, technicians, secretary, assistant, etc., and the number of members is different for each water committee.

In the water committees where foot pump type water supply facilities were installed, the policy has been continued as originally planned that the facilities are managed by the users without payment. However, only Ambatolahy where public fountain type water supply facilities were installed is exception, and technicians are employed with payment to manage the facility. In addition, in Ambatolahy, even water fee collectors can get the 10% of an incentive from the collected money.

In all villages where public fountain type water supply facilities were installed (six villages), the water committees continue their operation. The committees consist of a president, vice president, treasurer, technician, secretary, assistant, water fee collector; the number of members varies from village to village. In most villages, water collectors are assigned at least one person for each water tap, and the number of water committee members is large.

In the water committee where public fountain type water supply facility was installed, there are some cases where the water committee pays to the technicians and they work in full-time. Three out of six villages have assigned full-time technicians and the facility utilization rate of these is higher than in the other villages. Furthermore, as described above, there is a mechanism where water fee collectors can receive 10% of revenue as an incentive in Ambatolahy.

2) Procurement management system of spare parts for water supply facilities

In the Project, spare parts were provided to the water committees of each village during handing over period to facilitate the operation by residents smoothly. In addition, it was planned that each water committee purchase the parts by their own effort after completion of the Project: in the plan, NGO organization¹⁸ managed the stock and water committee purchased it from the NGO when the spare parts were necessary.

However, according to the result of the site survey at the time of ex-post evaluation, purchasing and stock management of spare parts weren't done by the NGO and each water committee carried out by their own effort. Most of the water committee have already used all the spare parts granted at the time of the construction, and the other necessary spare parts were procured by their efforts. However, at the time of ex-post evaluation, in 30 villages out of 59 villages (50.8%), it wasn't possible to procure the genuine spare parts because of raising price of spare parts, lack of funds and high transportation costs to the large cities, and they have repaired by using materials which they can easily be procured in the neighbouring villages. Especially in the villages far from Morondava, which is the center of the province, a problem is seen that it is difficult to improve the situation to procure the spare parts only by the efforts of the village people.

An interview survey was carried out with the NGO that was entrusted the works from Ministry of Water, this NGO only conducted follow-up activities for one year from completion of the Project as specified in their contract¹⁹, and they didn't carry out any management of spare parts. In this way, it is regarded that the management system of spare parts of this Project wasn't planned sufficiently. It seems that it was necessary to plan to establish a system to procure the spare parts easily even in the remote areas as establishment of the management system of spare parts. In the technical cooperation Project implemented from 2008 to 2013 "The Project for Improvement of Rural Water Supply and Hygiene Practice in Atsimo Andrefana Region", a plan of collecting utilization fee, a system of procuring the spare parts and a system for technical back up, etc. were proposed and improvement was expected.

(2) Monitoring system of the water supply facilities

For monitoring activities of water supply facilities, it was described in the Basic Design Study

¹⁸ This was NGO Talatra who had worked for the enlightenment activities in the soft components of the Project.

¹⁹ Because this was only 1 year following up activities, it was considered that water committees can repair by the parts provided after completion of the Project and there was few order of spare parts during the period.

Report, etc. that an NGO would carry out the monitoring and the follow-up for one year after the completion of the Project, but there is no clear indication about follow-up system after the activities. At the time of ex-post evaluation, RDW in Morondava as the regional department of Ministry of Water continues the monitoring activities, but it is insufficient on the grasping the situation of the operation on the water supply facilities because of the lack of human resource and malfunction of vehicle, etc.

On the other hand, as a result of the support by RDW in Morondava for a part of the water committees on improvement of the utilization fee collection system and re-structuring of the members in Ambatolahy and Ankilivalo, weakened activities of the water committees were strengthened.

However, it is difficult to cover the vast Menabe province only by RDW in Morondava, and it is necessary to consider establishing a new monitoring system.

(3) Maintenance and management system of the groundwater development equipment

For maintenance system of groundwater development equipment, there is a workshop of Ministry of Water in Antananarivo, and five technicians are working. In whole Ministry of Water, there are 12 members such as two engineers and 10 technicians, but of the remaining seven members (two engineers, five technicians) are actually working at head office of the Ministry because there isn't enough work in the workshop. Therefore, at the time of ex-post evaluation, there is no sufficient volume of work at the workshop of Ministry of Water and lack of personnel hasn't been seen to carry out the minimum operation and maintenance.

3.5.2 Technical Aspects of Operation and Maintenance

(1) Technical aspect of operation and maintenance for water supply facilities

The technical level of the newly established water committee in each village at the time of the commencement of the Project seemed to be low, because there was no experience on the voluntary operation and maintenance. Therefore, in order to assist organizing the population for the management of water supply facilities, a soft component was carried out in the Project. Technical aspects of operation and maintenance by the type of the water supply facilities are as follows at the time of the ex-post evaluation.

1) Technical aspects of operation and maintenance for foot pump type water supply facilities

The number of villages where the technicians trained in the soft component of the Project are remaining was 46 villages out of 59 villages during the site visit in this ex-post evaluation. The reasons that there are no technicians who have received the training include moving. In addition, there were some cases where the predecessors didn't hand over to the successors. According to the interview surveys at the site, there were some opinions that some technicians forgot what they learned in the training since the period of the training was only two days and there was no frequent opportunity to use the techniques even though the contents of the training were sufficient.

In such cases, village people invite technicians from outside and ask them to repair the facilities. It seems that training of new members is required since 8-9 years have passed after establishment of the water committee and moving and aging of the members of the water committee are observed.

2) Technical aspect of operation and maintenance for public fountain type water supply facilities For public fountain type facilities, most of the technicians trained by the soft components of the Project continue the operation and maintenance activities, and half of the water committees have assigned them as full-time technicians. Therefore, for public fountain type water supply facilities, major problems haven't been seen for repair technology at the time of ex-post evaluation.

(2) Technical aspect of operation and maintenance for groundwater development equipment Among the equipment provided for Ministry of Water, a part of the equipment is broken and stored at the workshop in Antananarivo. This is because there isn't enough volume of works and lack of budget, and it isn't problem of lack of technique. Therefore, it is difficult to determine the repairing technique level at the time of ex-post evaluation. However, the maintenance was carried out smoothly until 2009 and equipment was also used effectively. In addition, according to the interviews with Ministry of Water, there was a comment that the level of technicians in the Ministry of Water was clearly improved by the soft component, and there is high demand for retired technicians of Ministry of Water from private companies because of their technique. Based on this information, it is considered that there is no technical problem.

3.5.3 Financial Aspects of Operation and Maintenance

(1) Financial aspects of operation and maintenance for water supply facilities

1) Maintenance costs for hand pump

In the Basic Design Study Report, it was planned that water committees at target villages of foot pump type water supply facilities reserve the amount as follows.

	Reserve for operation and	Test calculation of reserve
	maintenance	including the renewal of equipment
	(FMG^{20})	(FMG)
A village of 1 well	150,000	450,000
A village of 2 wells	300,000	900,000
A village of 3 wells	450,000	1,350,000
A village of 4 wells	600,000	1,800,000
A village of 5 wells	750,000	2,250,000

Table 10 Reserve of operation and maintenance for foot pump type water supply facilities

Source: Basic design study report

In addition, the system of water utilization fee and the rate of the water utilization fee were planned as follows.

Table 11 System of water utilization fee for foot pump type water supply facilities in plan

	System of utilization fee	Rate of utilization fee
Foot pump type	The operation and maintenance	Though number of household per one well
water supply	fee for one well, 25,000FMG /	is different in each village, the average will
facilities	month will be borne by each	be about 60 -70 households. Therefore, the
	household (minimum)	rate of utilization fee per one household will
		be more than $300 \sim 400 \text{FMG}$ / month
		(minimum)

Source: Basic Design Study Report

Actual situation of financial aspects for foot pump type water supply facilities is mentioned as follows.

1)-1 Current situation of the reserve of operation and maintenance costs

The reserve for operation and maintenance during the soft component in each village ran out in 22 villages out of 59 villages (no information for six villages because the treasurer was in agricultural activities). On the other hand, it was confirmed that there were 31 villages where the reserve still remained. 18 villages of these even increased the initial reserve.

1)-2 Utilization fee

For foot pump type water supply facilities, the water supply is stopped in 11 villages out of 59 villages (about 18.6%) at the time of ex-post evaluation. One of the reasons why foot pump type

²⁰ 1FMG=1/5MGA=0.008Yen (October, 2012)

In Madagascar, instead of the Madagascar Franc (FMG) used in parallel until 2004, Madagascar Ariary has been independently used since 2005. However, even the timing of ex-post evaluation, the price is frequently exchanged to Madagascar Franc in the rural areas. The exchange rate of FMG and MGA is fixed.

water supply facilities haven't worked in 11 villages is that there are not enough funds for purchasing the spare parts, and water committees cannot repair. The factors for why funds aren't enough are that users don't pay the utilization fee and the prices of the spare parts have risen²¹.

In the sites of foot pump type water supply facilities, the majority of population is farmers and don't have regular cash income. Therefore, there are a lot of cases where the population cannot even pay 200MGA / month (about 10 yen) regularly, and the water committee cannot buy spare parts because there isn't enough income. According to the site survey in 59 target villages, 29 villages out of 59 villages (about 49.2%) have collected the utilization fee on a regular basis at the time of ex-post evaluation. This is because the practice to pay for the water on a regular basis did not take root and village people who had regularly paid started not to pay after seeing other people who refuse to pay and continue to use the water. In addition, among some of the villages visited, there were two villages where the water committees cannot collect the water utilization fee sufficiently, they cannot repair the troubled pump, and people no longer use the well, and the activities of the water committee doesn't collect the utilization fee regularly, but they decided to collect the fund for spare parts when the pump is broken and there are some cases where the operation and maintenance is carried out in their own way even without collecting utilization fee.

In addition, during the interviews at the site, it was surveyed that the water committee needs about 400,000 MGA (about 20,000 yen) to replace just a filter of the water pump which is malfunctioning in many villages. Therefore, even as about 50 households continue to pay without fail, it needs the deposit for four years only to purchase this part and income is insufficient absolutely. On the other hand, increase in utilization fee hasn't been implemented even since establishment of the water committees. Therefore, it is necessary to transfer a technique for revising utilization fee to correspond to the rise of the spare parts price. Moreover, in the case that it is difficult to adjust the utilization fee depending on the circumstances, it is necessary to take measures considering future inflation and so forth when the rate is set.

In order to improve the sustainability, it is necessary to instil residents with the fact that the fund is necessary to maintain the pump by regular educational activities of regional direction of water, local government and the water committee.

2) Financial aspect of operation and maintenance for public fountain type water supply facilities In the Basic Design Study Report, the reserve in the target villages of public fountain type water supply facilities was planned as follows, and the reserve was deposited in every village as planned during the soft component period.

²¹ In the Basic Design Study, 300,000 FMG (60,000 MGA) was estimated for annual spare parts expense as 5% of the price of the pump. Therefore the annual operation and maintenance cost per household was planned as 300,000 FMG÷67 households=about 4,500 FMG (375 FMG/month/a household).

	Reserve for operation and maintenance	Test calculation of reserve including
	cost	the renewal of equipment
	(×1000FMG)	(×1000FMG)
Bemanonga	7,200	9,000
Analaiva	9,900	15,000
Betsipotika	7,400	9,900
Ankilivalo	9,700	15,000
Ankilizato	22,500	35,000
Tsimafana	7,500	12,000
Ambatolahy	20,000	34,300

Table 12 Reserve of operation and maintenance for public fountain type water supply facilities

Source: Basic Design Study Report

Moreover, in the Basic Design Study Report, the system of water utilization fee and the rate of the water utilization fee for public fountain type water supply facilities were planned as follows.

	System of utilization fee	Rate of utilization fee
Public fountain	The cost of the operation and	One public fountain will be used by
type water supply	maintenance is different by	50 - 70 households. The rate of the
facilities	facilities and is estimated	water utilization fee will be 2,500 -
	1,200,000 - 3,700,000 FMG /	4,000 FMG / month (Minimum).
	month (Minimum). The cost will	
	be divided into number of	
	households.	

Table 13 System of water utilization fee for public fountain type water supply facilities in plan

Source: Basic design study report

Actual situation of financial aspects for public fountain type water supply facilities is mentioned as follows.

2)-1 Current situation of the reserve of operation and maintenance costs

At the time of ex-post evaluation, in two villages out of six villages (Analaiva and Betsipotica) where public fountain type water supply facilities were installed, the amount of the reserve for operation and maintenance has become zero. The factor of this is that the water committee has spent on fuel and spare parts because the collected water utilization fee was small. For the four other villages, the balance of the reserve for operation and maintenance costs remains.

	Reserve for the operation and	
	maintenance cost (MGA)	
Bemanonga	59,000	
Analaiva	0	
Betsipotika	0	
Ankilivalo	300,000	
Tsimafana	1,500,000	
Ambatolahy	700,000	

Table 14 Reserve for the operation and maintenance cost of public fountain type water supply

facilities at the time of ex-post evaluation

2)-2 Utilization fee

Two systems have been adopted for collecting water utilization fee for public fountain type water supply facilities: monthly rate or measured rate. The villages where measured rate are employed are two villages (Ambatolahy, Analaiva). Three other villages have adopted monthly fee rates (except Tsimafana because the facilities haven't functioned), and the monthly rate is 1,500 - 2,200 MGA.

For utilization fee, the water committees have established the system to collect the fee according to the situation such as increasing price as needed and collection of money based on measured rate (per litter). This is because improvement was made in Ambatolahy, Bemanonga and Ankilivalo with the aid of the RDW in Morondava. On the other hand, in Analaiva and Betsipotika, there are a few problems such as stopping water supply partly as a response to unpaid water utilization fee.

As described above, appropriate support by RDW in Morondava is necessary to improve the system of collection of the utilization fee because the system hasn't worked very well in some villages.

In Ambatolahy, Ankilivalo and Bemanonga, the time of water supply is fixed for two hours each in the morning and the afternoon, and water utilization fee collectors are always arranged in each facility during the period. This enables to prevent the persons who don't pay the utilization fee to use the water, and to make sure to collect the fees. Therefore, it is considered that this method is very effective for collection of the utilization fee. However, as in the case of Betsipotika, it is sometime difficult to introduce the system of measured rates due to opposition of the village people. In addition, even if the measured rate system was introduced, such as the case in Analaiva where a treasurer reads just the value of the meter installed beside the facilities monthly (not sales record of water), and collects the money based on the value read from water utilization fee collectors, the money collectors have to bear the rates of water leakage too, and water taps are closed because the water utilization fee collectors cannot bear the expense. (2) Financial aspects of operation and maintenance for the groundwater development equipment Annual budget of the Ministry of Water since 2002 is shown in Figure 3 below. Though the budget was about \$200 million, including the funds to develop underwater between 2003 and 2004, the budget was drastically decreased up to \$50 million in 2005. Trend of recovery was observed in 2008 - 2009, but the budget was decreased again approximately \$4 million in 2010, and the budget is stagnant at around \$15 million to \$30 million²².





Unit: US\$

Source: Ministry of Water

At the time of ex-post evaluation, the budget of Ministry of Water has been greatly reduced, and the budget for repairing the procured equipment by the Project also hasn't been allocated. However, according to the Ministry of Water, if the political turmoil is settled and the assistance of the donors resumes, it will become possible to include the budget to repair these equipment provided by the Project in the budget of donor's assistance, and to repair the equipment.

3.5.4 Current Status of Operation and Maintenance

(1) Operation and maintenance of water supply facilities

1) Current status of the operation and maintenance for foot pump type water supply facilities

Among 115 units of the foot pump in 59 villages during the site survey, 25 units were unusable (the operation rate is 78.3%).

As the main factor of the villages where foot pump type water supply facility isn't running, the users don't want to pay the water utilization fee, or they are unable to collect the utilization fee because there is no money in the pre-harvest. As a result of continuing the water supply without payment, it can no longer repair because they cannot buy spare parts when the facilities are

²² However, there was a comment from the Ministry of Water that the loans for water supply development from the World Bank and African development bank (PAEPAR and PAEAR) are included in the budget and the budget isn't only for the operation of the Ministry.

broken.

Currently, there are a lot of villages that aren't able to collect the utilization fee, or have already spent their reserves, and there is a risk to stop more water supply facilities in the future. In addition, in some cases, technicians trained in the soft component of the Project have been replaced by moving, etc., and there is no one in the village that can carry out the maintenance and repair.

On the other hand, cases were observed during the site survey where, a) some water committees have decided not to collect regularly and but to collect the money and buy the spare parts when the facilities were broken, b) some water committees have tried to repair by inviting technicians from outside, and c) village volunteers continue the operation and maintenance even though the water committees have stopped working. As can be seen from these cases, village people understand the importance of water supply facilities and they continue the operation and maintenance in their own way even though the habit to maintain the facilities regularly hasn't taken root well in half of the villages.

2) Current status of operation and maintenance of public fountain type water supply facilities Even though there is no problem on generators and water towers, etc. for public fountain type water supply facilities, there are two villages where part of the public tap wasn't used because of the problem of the unpaid water utilization fee. 16 taps out of 64 taps are unusable (the operation rate is 75%)²³.

Since the maintenance is carried out on a regular basis, there was no site where the water pumps, generators are broken, but since the submerged pump is dropped into the well in Bemanonga and it was impossible to pull out, the water committee procured and installed new ground pump by its own effort. In addition, in Bemanonga, some cracks were seen on the water tower. On the cracks, interview survey was made with the consultants who were in charge of supervising the construction. According to them, the cracks weren't seen during the completion period and defect inspection period and it wasn't the problem during the construction period. They also mentioned that it is suspected due to internal shrinkage and external expansion in the water tower by internal and external temperature difference during the day. It was fixed by self-help efforts and there was no water leakage. Therefore, it isn't urgent problem. However it is desired to conduct follow-up by specialists in the future.

²³ However 8 taps are in Tsimafana where the water supply facilities aren't running because of the political problem in the village.

On the other hand, two villages out of six villages (Analaiva and Betsipotika) have already spent up the reserve, and it is difficult to renew the equipment by their own effort. In addition, the main reason for not using public fountain type water supply facilities in Tsimafana is a political issue between the chief of Village (Fukutan) and the mayor of commune²⁴.

(2) Current status of operation and maintenance for groundwater development equipment

Among the equipment provided, it was confirmed orally from the Ministry of Water that major excavating equipment listed in Table 7 are stored in South Water Agency (AES) in Ambovombe, Androy region and the status is good. However, parts of the equipment such as part of tracks, compressors and the pumps are stored in the workshop of Ministry of Water in Antananarivo and most of the equipment is broken. However, as described above, this is because the absence of donor assistance where Ministry of Water can enter the works, there is no excavation work, and the equipment will be usable if they replace the spare parts. Therefore, Ministry of Water doesn't expect to scrap the equipment that isn't currently available.

As mentioned above, in relation to foot pump type water supply facilities in particular, there is a problem about the supply of spare parts; there is a limit to the monitoring system of RDW in Morondava; more than half the villages don't collect the utilization fee; therefore, there are many challenges to be solved in the future.

For maintenance of the groundwater development equipment, the problem is not observed on the system and the technology. However, it was confirmed that part of the equipment has been malfunctioning even though major equipment such as excavation machines are working, and budget for repairs is also not allocated.

Major problems have been observed in terms of the institutional / financial aspects, therefore sustainability of the Project effect is low.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This Project was conducted with the aim of improving the water supply rate in the target area and enhancing the targeted local residents' maintenance capacity of the water supply facilities by constructing deep well water supply facilities in the 61 villages of Menabe region located in southern part of Madagascar, by procuring the drilling equipment and by maintaining the existing drilling equipment.

This Project is consistent with the development policy of Madagascar, development needs, and Japan's ODA policy, and the relevance is high.

²⁴ The water supply facility was used as a tool of political strife, and someone had destroyed the all taps up to now. In order to take advantage of the scheduled election campaign, the mayor of the commune might want to implement by himself to re-operate the facility, and it hasn't repaired until now. JICA Madagascar office has sent a letter to request a re-operation to the governor on 24th May 2013 for handling the issue.

Not only are around 80% of water supply facilities constructed under this Project running, but the water supply rate in the target region has improved beyond the planned target in synergy with other donors' assistance, and water committees have been organized in each village. In addition, the effect of the equipment procured by the Project has spread to other regions, and this Project seems to contribute to reducing waterborne diseases. Therefore, the effectiveness and the impact are high.

On the efficiency, the number of public fountain type water supply facilities has decreased by two places. In addition, the extension of the Project period was because of the evacuation in line with worsening political situation and of one additional construction phase associated with it. However, the extension of the Project was also occurred apart from the suspension of the Project: it is regarded that the period of 4^{th} phase of the detail design was longer than planned because of the adjustment for change of exchange rate. Because of the overall reasons above, the efficiency is fair.

For the sustainability, even though about 80% of the water supply facilities are functioning, there is a problem on the supply system of spare parts, there is a limit to the monitoring system of the water supply facilities, and half of the water committees haven't collected the water utilization fees. In such circumstances, there are a lot of problems for the future. As for groundwater development equipment, the equipment is partially broken and not repaired. Therefore, the sustainability 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

(1) Necessity of follow-up by RDW

The number of villages where water utilization fees aren't charged has increased among the villages of foot pump type water supply facilities. It is necessary that RDW visits each village and enlightens the necessity to collect the utilization fees for village people, and teaches the water committees that they should improve the system of water utilization fees, and makes the water committees deposit enough money to buy the spare parts in case the facilities are broken.

(2) Establishment of a new spare parts management system

In some water committees that are far from Morondava, the provincial capital, there is a problem of high transportation costs just to go to town and to buy the spare parts. Rather than managing the spare parts by the water committee of each village, it is necessary to establish a system such that the distance won't be the problem; for example, the establishment of a new spare parts management system by RDW and NGO as reflecting the result of the relevant technical cooperation project, etc.

(3) Establishment of a new monitoring system

In the new Water Act, which came into effect in 1999, it was decided that the owner of the water supply facilities will be transferred to the local government and it will be continued as a public service of the local government. However, capacity building for local governments, etc. wasn't

carried out in the framework of the Project, and the role of local government in the Project is weak. In addition, it is considered difficult for RDW to manage e all villages where the water supply facilities were installed because the area of Menabe province is vast, and it is necessary to establish a new monitoring system such as establishment of regular reporting system by RDW, NGO and the water committees as reflecting the results of the relevant technical cooperation project, etc.

(4) Solving the problem of Tsimafana

For Tsimafana, where the facility isn't running because of the political problems in the village, it seems necessary to solve the problem by the effort of the related parties. Therefore, it is necessary to seek their solutions through other routes such as coordination by the Ministry of Water and others.

4.2.2 Recommendations to JICA Nothing at all

4.3 Lessons Learned

(1) Establishment of a system of spare parts supply from the medium- and long-term perspective In the Project, for the supply of spare parts of water supply facilities, it was "the policy that NGO involved in educational activities manages it and village side purchases from NGO with payment if necessary". However, in the Project, the problem was seen in the plan because NGO did not continue the supply of spare parts after the contract was terminated and the supply of spare parts was difficult in remote villages. Therefore, when the supply system of spare parts is established, it is necessary to examine the establishment of the supply system of the spare parts utilizing an existing public organization, etc. standing on a medium- and long-term perspective.

(2) Project formulation, including capacity building of local government

In the Project, it was planned to establish a community-based system of management for the water supply facility in each village. However, there was a limit for capacity building of the village people who didn't have experience on the operation and maintenance and had capacity building opportunity only by soft component. Some problems are seen such as in particular, unpaid water utilization fee for the operation and maintenance of foot pump type water supply facilities. In addition, though the monitoring on the activities of the water committees is currently conducted by RDW, it is difficult to cover the vast Menabe region due to lack of human and financial resource. In order to provide a continuous water supply service, it is necessary to formulate the Project not only with the support of the water committees but also with the support of strengthening the function of the local governments, which can continuously support each village from closer place, including the operation and maintenance of the monitoring system.

(3) Set the water utilization fee considering the future inflation

In the Project, because the water utilization fee was set based on the spare parts prices at the time of Project planning, there are cases where the reserve will be insufficient in the future in countries where inflation is continuing as Madagascar. Because it is difficult to increase the rate of the water utilization fee once the rate has been set, it is desirable to set the rate taking into account the inflation rate, etc. in the future so that it becomes possible to cope with the rise in spare parts for future; and the sustainability will be improved.

(4) Employment of full-time technicians

For public fountain type water supply facilities that are larger scale and need regular operation and maintenance, there is a tendency that the possibility of functioning the operation and maintenance system will be increased if full-time technicians are employed using the collected funds of the water committees. Therefore, it is necessary to examine carefully whether to offer salary or no salary during the planning period from the view point of effectiveness of the water committees and the sustainability.