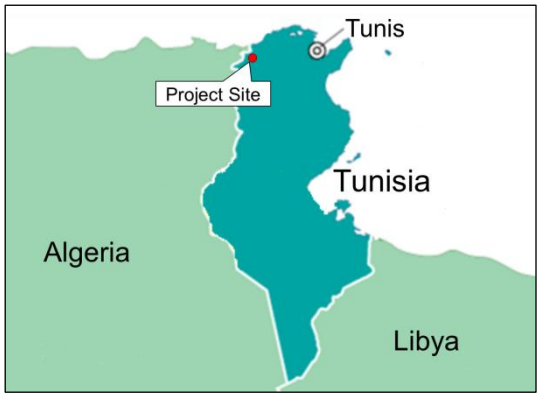
Ex-Post Monitoring of Japanese ODA Loan Project

Tunisia

Barbara Irrigation Project

External Monitoring Consultant: Eiko Nakamoto / Toyo Tanaka, Nakamoto&Associates Co., Ltd.

1. Project Description



Project Location

Irrigation Water Reservoir (Fernana)

1.1 Project Objective

The project's objective is to promote improvement in agricultural productivity and increase of agricultural production by irrigating 2,070 ha of farmland (cf. about one-third of the area inside Tokyo's Yamanote loop line (approx. 6,300 ha)) in Fernana and Hammam Bourguiba which are located in Barbara, Jendouba Governorate (population approx. 410,000), northwest of the capital city of Tunis, and thereby contribute to improvement of the farmers' livelihoods and standard of living.

1.2 Outline of Loan Agreement

Approved Amount / Disbursed Amount	1,913 million yen/1,518 million yen
Loan Agreement Signing Date / Final Disbursement Date	March 1998/ October 2004
Ex-post Evaluation	2006-2007
Executing Agency	Ministry of Agriculture (MOA)
Main Contractor	-
Main Consultant	-

1.3 Background of Ex-post Monitoring

Tunisia's agricultural sector employs approximately 33% of the working population and produces approximately 14% of the GDP, making it an important sector for the country. Because the northwestern region of the country, which is the center of agricultural activity, primarily conducted rain-fed agriculture that depended on wintertime rainfall, agricultural productivity was unstable since it was affected by the weather. In order to address this situation, this project constructed irrigation facilities in Fernana and Hammam Bourguiba in Jendouba governorate, located in the northwestern region of the country.

During the ex-post evaluation (2006), the number of beneficiaries and the benefitted area of the project exceeded the initial plan. However, the number of farmers using irrigation remained low due to the farmers' anxiety over the financing of the initial cost involved in irrigation, the lack of expertise in irrigation agriculture, and lack of knowledge in irrigational cropping. Cultivated area, price of produce, and crop yield were below the planned value.

Furthermore, concern was shown over the sustainability of the project since Regional Commissaries of Rural Development's (CRDA) training to the Agricultural Development Group (GDA) concerning operation and maintenance of facilities and cropping techniques were insufficient, and the GDA of Hammam Bourguiba had not started the collection of the water fee from the lack of staff and treasurer.

Under these circumstances, recommendation was made in the ex-post evaluation report to stimulate independent efforts by the Tunisian government itself (i.e., gratis provision of seeds and irrigation water, provision of subsidies for introduction of irrigation equipment, and assistance with loan applications at banks).

Therefore, this project was selected for ex-post monitoring and reviewed under each criterion with the findings from the field survey and other research activities with a final conclusion being drawn.

2. Outline of the Monitoring Study

2.1 External Monitoring Consultants

Eiko Nakamoto (Nakamoto & Associates Co., Ltd.)

Toyo Tanaka (Nakamoto & Associates Co., Ltd.)

2.2 Duration of Monitoring Study

Duration of the Study: September 2012 – June 2013

Duration of the Field Study: November 26, 2012 – December 14, 2012

2.3 Constraints of the Monitoring Study

Obtaining all of the detailed data for each region was impossible due to the limitation of the survey

period. The missing data were supplemented by national statistical data and by interviews to relevant authorities.

3. Monitoring Results

3.1 Effectiveness

3.1.1 Quantitative Effects

3.1.1.1 Results from Operation and Effect Indicators

3.1.1.1.1 Status of Irrigation Utilization

Area utilizing irrigation in Fernana has steadily increased from the time of ex-post evaluation (2006) to 2008. (Table 1) In Hammam Bourguiba, area utilizing irrigation is steadily increasing between 2007 and 2009; however, data after the Jasmine Revolution (January of 2011) could not be obtained. After the revolution, the GDA of Hammam Bourguiba was dissolved,[1] and a farmer in the region is currently serving as a contact for the region. However, the farmer declined to cooperate, and subsequent effect of the project could not be confirmed.

Table 1. Benefitted Area and Area Utilizing Irrigation

		Planned	2006*	2007	2008	2009	2010	2011
Fernana	Benefitted Area (ha)	1,170	1,094	1,094	1,094	1,094	1,141	1,141
	Irrigated Area (ha)	-	147	284	364	330	303	346
	Ratio of Irrigated Area (%)	-	13	26	33	30	27	30
Hammam Bourguiba	Benefitted Area (ha)	693	780	770	770	770	770	770
	Irrigated Area (ha)	-	44	40	56	78	N/A	N/A
	Ratio of Irrigated Area (%)	-	6	5	7	10	N/A	N/A
Total	Benefitted Area (ha)	1,863	1,874	1,864	1,864	1,864	1,911	1,911
	Irrigated Area (ha)	-	191	324	420	408	303	346
	Ratio of Irrigated Area (%)	-	10	17	23	22	16	18

Source: CRDA of Jendouba, GDA of Fernana *value from ex-post evaluation

[1] Significance of GDA organization: In order to understand the dissolution or dysfunction of the GDA, consideration of Tunisia's political background is essential. The GDA was created coercively by the former government for the purpose of "maintaining and spreading the use of irrigation" during the project implementation (1998-2005). The GDA intrinsically differs from Agriculture Cooperative Association of Japan. Current staff of the CRDA and the GDA state that "former GDA officials were farmers appointed by the former government or relatives of the former president's entourage. The system was corrupt, and the farmers were compelled to cooperate". With the collapse of the former regime by the Jasmine Revolution of 2011, officer of the GDA were ousted from their positions. In Fernana, new officials of the GDA were elected through an election by farmers, and currently, the GDA is actively engaging in the operation and maintenance of irrigation facilities. Relation between the CRDA and the GDA is favorable in Fernana, and the GDA is functioning smoothly. This is a model case of success. On the other hand, in Hammam Bourguiba, new GDA has not been established after the dissolution of the GDA at the time of the revolution. Farmers continue to utilize irrigation without the existence of the GDA. A farmer in charge of the region (former official of GDA) collects water fees from the farmers, but refuses to cooperate with the CRDA (submitting data, maintenance of irrigation facilities, water fee payment to the CRDA). The CRDA is conducting the maintenance of the irrigation facilities in place of the missing GDA, and is shouldering the cost of operation and maintenance of the irrigation facilities in the region. The CRDA states that "organizational responsibility and role of the GDA should be defined by law".

Table 2. Rainfall by Region

(Unit: mm)

		2007	2008	2009	2010	2011
Beja	Summer	15.2	3.6	63.0	8.4	7.8
	Winter	206.3	122.0	395.2	236.7	390.4
Jendouba (Fernana)	Summer	34.4	33.3	11.8	16.0	13.6
	Winter	113.6	44.6	256.6	99.4	235.2
Nabeul	Summer	24.8	1.0	48.0	2.2	5.9
	Winter	230.2	47.4	168.4	59.1	144.0
Monastir	Summer	39.6	23.4	10.0	2.0	36.6
	Winter	90.6	19.4	147.2	30.0	103.2
Djerba	Summer	5.0	0.0	0.6	2.2	3.0
	Winter	182.0	22.8	53.7	33.6	59.7
Medenine	Summer	1.8	0.7	0.0	1.8	0.0
	Winter	132.8	30.0	44.5	22.2	23.4

Source: National Institute of Meteorology

Barbara, situated in the region of Fernana, is part of the governorate of Jendouba which receives high amounts of rainfall in the winter compared to other regions (Table 2). In 2009 and 2012, heavy rainfall caused a flood in the region. The region's irrigation utilization rate is fluctuating inversely to the amount of rainfall.

Table 3. Status of Water Valve Utilization

(Unit: valves)

	2007	2008	2009	2010	2011
Irrigation Valves	250	250	250	250	250
Irrigation Valves being Used	132	156	172	182	182
Usage Rate (%)	53	62	69	73	73

Source: GDA of Fernana

The best indicator to verify the generalization rate of irrigation is the utilization rate of irrigation valves. During the implementation, water valves were evenly placed in each predetermined area. A total of 250 valves were installed. Irrigation valve utilization rate is the ratio of the number of irrigation water valves actually opened and used. A steady increase can be seen in the rate (Table 3). The number of irrigation valve utilization at December 2012 is 185 valves (74%).

The utilization rate of irrigation facilities (irrigation valve utilization rate) and area utilizing irrigation have both increased steadily since 2007 due to the following reasons. First, many farmers owning small parcels of land could not finance bank loans to purchase irrigation equipment necessary for the use of irrigation facilities. With the law enacted by the Ministry of Agriculture[2] to

[2] Ordinance for the enforcement of the Act on property rights of farmlands was enacted by the Ministry of Agriculture. A section in the Ministry of Agriculture is dedicated with a mission to group small and interspersed parcels of farmlands.

reorganize the farmlands, regrouping of scattered small farmlands were promoted. (1,141 farmlands existed in 2010. The farmlands were regrouped from 1,448 farmlands to 426 farmlands in 2010.) This regrouping of the farmlands created farmlands of greater area, enabling the farmers to apply for bank loans and purchase equipment for irrigation. This has made irrigation usage possible to the farmers. Second, apart from the bank loan, there is a low-interest loan and subsidy (FOSDAP) provided by the National Agricultural Bank (BNA). Bank guarantee is required in order to apply for the loan, but the aforementioned regrouping of farmlands has enabled the farmers to obtain a registration for a large parcel of land. This has promoted the use of FOSDAP. Concerning the subsidy of FOSDAP, the subsidy covers up to 60% of the irrigation-related cost. FOSDAP has led to the generalization of irrigation utilization. Third, because the farmers using irrigation are highly-profitable, temporary farmers (such as industrial farmers: speculators) are renting farmlands, which has led to the increased efficiency in land usage. Fourth, technical support of irrigation agriculture by the CRDA has produced effects in diversifying highly-profitable crops.

3.1.1.1.2 Number of Beneficiary Households, Irrigation Utilization

The number of beneficiaries and the irrigation utilization has increased since the ex-post evaluation (Table 4). The reasons for the increase are the rise in the profit of farmers utilizing irrigation, and the success of the CRDA's activity to generalize irrigation through demonstration of model farmlands utilizing irrigation.

Table 4. Change in the number of Beneficiary Households and Irrigation Utilization

(Unit: households)

		Planned	2006*	2007	2008	2009	2010	2011
Fernana	Benefitted Farm Households	320	327	327	327	327	430	430
	Farm Households Using Irrigation	-	72	136	172	204	249	249
	Irrigation Usage Rate(%)	-	22	42	53	62	58	58
Hammam Bourguiba	Benefitted Farm Households	219	228	228	228	228	N/A	N/A
	Farm Households Using Irrigation	-	25	73	91	110	N/A	N/A
	Irrigation Usage Rate(%)	-	11	32	40	48	N/A	N/A
Total	Benefitted Farm Households	539	555	555	555	555	430	430
	Farm Households Using Irrigation	-	97	209	263	314	249	249
	Irrigation Usage Rate(%)	-	17	38	47	57	58	58

Source: CRDA of Jendouba, GDA of Fernana *value from ex-post evaluation

Concerning the region of Hammam Bourguiba, data could not be obtained due to the same reason mentioned in 3.1.1.1.1. According to the interviews with the CRDA and the GDA of Fernana,

incomes of farmers in Fernana are higher than the neighboring regions due to the utilization of irrigation. Farmers from surrounding regions and corporate farmers are increasingly renting farmlands temporarily in Fernana. In 2010, irrigated area was expanded and new farmlands were created upon request from the farmers of surrounding regions.

These farmers from surrounding regions and speculators, renting the land for irrigation agriculture, are relatively small in scale, or temporary farmers. Since the data for beneficiary farm households after 2010 includes farmers of different scale and temporary farmers, the number of farmers utilizing irrigation and utilization rate cannot be compared to those before 2010. Therefore, irrigation valve utilization rate as indicated in Table 3 can be said to be the most effective indicator in representing the generalization rate of irrigation utilization.

3.1.1.1.3 Cultivated Area and Yield per Unit Area

Cultivated area was steadily increasing until 2008; however, due to heavy rainfall and flood in 2009 and 2011, the area has decreased (Table 5). There are no changes in the major crops since the time of ex-post evaluation, but tobacco production has decreased and highly-profitable crops such as potatoes, watermelons and green pepper have increased. Cultivated area for potatoes and watermelons exceed the initial planned value.

Table 5. Cultivated Area of Major Crops in Fernana

(Unit: ha)

	2007	2008	2009	2010	2011
Wheat	N/A	48.00	N/A	19.00	N/A
Oat (Fodder)	N/A	0.50	4.64	8.30	11.02
Barley	N/A	N/A	N/A	N/A	N/A
Sugar Beet	N/A	N/A	N/A	N/A	N/A
Tobacco	27.00	9.35	4.21	7.95	5.50
Potato	75.00	100.00	97.56	95.75	174.21
Watermelon	44.00	37.40	14.50	40.33	33.55
Other	86.00	192.20	138.39	90.55	98.17

Source: GDA of Fernana

In the ex-post evaluation, cultivated area was shown as a total of Fernana and Hammam Bourguiba. As mentioned before, data for Hammam Bourguiba after 2010 could not be obtained, and therefore, comparison and analysis could not be performed. Instead, analysis will be done on the data for 2007 obtained by this study. Hereafter, for other indicators, the same will be done in cases which the data was not obtained at the time of ex-post evaluation, or the reliability of the data presented in the ex-post evaluation is questionable. In Fernana, cultivated areas of highly-profitable crops such as

potatoes have increased compared to 2007. Green pepper constitutes most of the category "Others" in 2008 and 2009. Concerning tobacco, tobacco is produced upon the annual production plan decided by the Tobacco Monopoly Corporation. In Fernana, production of tobacco is decreasing from cancellation of the contract with the Tobacco Monopoly Corporation, which is the only buyer. This is due to the instability in the production of tobacco resulting from farmers increasing the cultivation of highly-profitable crops, or the speculators' tendency to cultivate only highly-profitable crops. If annual production plan cannot be met, Tobacco Monopoly Corporation cancels the annual purchase contract and switches the production to other regions.

Table 6. Cultivated Area of Major Crops in Hammam Bourguiba

(Unit: ha)

	2007	2008	2009	2010	2011
Wheat	65	70	100	N/A	N/A
Oat (Fodder)	5	8	5	N/A	N/A
Barley	N/A	N/A	N/A	N/A	N/A
Sugar Beet	0	0	0	N/A	N/A
Tobacco	30	35	45	N/A	N/A
Potato	5	3	10	N/A	N/A
Watermelon	0	0	5	N/A	N/A
Other	0	10	13	N/A	N/A

Source: CRDA of Jendouba

In Hammam Bourguiba, productions of major crops, tobacco and wheat, are steadily increasing from 2007 to 2009. Data after 2010 could not be obtained for the same reasons mentioned in 3.1.1.1.1, and an interview also could not be conducted.

Table 7. Change in the yield per unit area in Fernana

(Unit: tons/ha)

	2007	2008	2009	2010	2011
Tobacco	1	1	1	1	1
Potato	13	13	12	13	14
Watermelon	14	15	15	20	22

Source: GDA of Fernana

In ex-post evaluation, yield per unit area was presented as a sum of Fernana and Hammam Bourguiba. In this study, data for yield per unit area could be obtained only for Fernana, and so, comparison and analysis will be done with the data for 2007 obtained by this study. Yield per unit

area for watermelons, though lower than the initially planned value, is increasing compared to 2007 (Table 7).

From the above, although influence from external factors such as political instability and natural disasters (flood) can be seen, the indicators are maintained at the same level or have increased from the time of ex-post evaluation. Therefore, it was confirmed that the quantitative effect of the project continue to be produced.

3.1.1.2 Results of Calculations of Internal Rates of Return (IRR)

In the ex-post evaluation report, the economic internal rate of return (EIRR) was calculated as 7.0%. EIRR will not be calculated in this ex-post monitoring since the basis of the calculation used for the ex-post evaluation could not be obtained.

3.1.2 Qualitative Effects

The ex-post evaluation report did not indicate any qualitative effects. However, from interviews with the CRDA of Jendouba and the GDA of Fernana, agriculture production stabilized and double cropping of highly-profitable crops (such as potatoes) became possible through utilization of irrigation.

3.2 Impact

3.2.1 Intended Impacts

3.2.1.1 Social and Environmental Impact

In the ex-post evaluation, unemployment rate, school attendance rate, and literacy rate were compared between the time of ex-post evaluation and the time of project appraisal (1994) in order to measure the social impact of the project. However, direct relationship of those impacts could not be found. In this study, the latest figures could not be obtained, and comparison with the ex-post evaluation will not be done. According to the CRDA of Jendouba, data for the entire Jendouba governorate cannot be a logical indicator to represent the status of farmers utilizing irrigation particularly in the Fernana region.

3.2.1.2 Impact on Job Creation

Ex-post evaluation reported positive impacts by this project of increase in employment of women and women's advance into society. During this monitoring study, it was confirmed that this project continues to contribute to the increase in Women's employment. According to the interview to the CRDA of Jendouba and the GDA of Fernana, ten female workers were hired as seasonal workers for three months for harvesting potatoes, which is labor-intensive work. Increased employment of

women has led to rise in women's income. Younger women save their money for marriage and independence, and married women actively contribute to their household.

3.2.1.3 Annual Income from Farming

Ex-post evaluation mentioned increase in the annual agricultural income per household. In this study, statistical data concerning rural household income could not be obtained, however, according to the interviews with the CRDA and the GDA of Fernana, the income is increasing. According to interviews with the GDA of Fernana and farmers, agricultural production stabilized from irrigation as mentioned in 3.1.2, and double cropping of highly-profitable crops (such as potatoes) have led to an increase in income. More farmers are building extensions to their houses or purchasing automobiles. During the site visit to Fernana, relatively new houses and new cars could be seen. Also, increase in income enabled the farmers to send their children to school, and, further, to college. However, neither the CRDA nor the GDA possessed specific data on household income from farming, and so, the information could not be obtained.

3.2.1.4 Asset Ownership of Rural Households

Increase in the number of farmers possessing various assets, such as automobiles or mobile phones, was indicated in the ex-post evaluation. During this monitoring study, newly built houses and farmers owning automobiles were verified from the site visit.

3.2.2 Other Impacts

3.2.2.1 Organizational Impact

Improvement in the relations between the CRDA and the GDA is a new impact found by this monitoring study. Before the revolution, the GDA were managed by farmers appointed by the former government, and there were no substantial participation of other farmers to the GDA. After the revolution, the GDA is managed by officials elected by an election. All farmers are actively participating in the GDA activities, and communication with the CRDA has improved. By this increase in communication through irrigational activities and generalization efforts, relation between the CRDA and the GDA has been improved.

3.2.2.2 Resettlement and Land Acquisition

There continues to be no resettlement nor land acquisition from the time of ex-post evaluation.

3.2.2.3 Salt Damage

There continues to be no salt damage from the time of ex-post evaluation.

From the above, the impact of improvement in the lives of farmers in Fernana, reported in the ex-post evaluation, continues to take effect.

3.3 Sustainability

3.3.1 Structural Aspects of Operation and Maintenance

3.3.1.1 CRDA

There is no change in the organizational structure of operation and maintenance from the time of the ex-post evaluation. Staffs from Irrigation Development Section and the Irrigation Facilities Operation and Maintenance Section of the Water Supply Rural Facilities Department, in addition to irrigation support staff from the Irrigation Generalization Unit (CTV) perform the operation and maintenance.

10 staffs work for Irrigation Development Section and the Irrigation Facilities Operation and Maintenance Section of the CRDA, an increase of 4 staffs from the time of ex-post evaluation. The reason for the increase is the necessity to implement operation and maintenance by the CRDA in place of the GDA of Hammam Bourguiba, which was dissolved after the revolution. Out of the four staffs, three are responsible for operation and maintenance of pumping stations, and one is in charge of network maintenance. In Fernana, operation and maintenance of the pumping station is carried out by total of six staffs, three shifts with two staff in each shift. There is no problem with the organizational aspect of operation and maintenance.

The CRDA has hired another three staffs to further promote irrigation in the Fernana region. Currently, a total of 7 staffs (3 technicians, 3 workers, and 1 security guard) work for the CTV of Fernana. Main activities are assistance with applications for subsidies as financial support, and assistance with loan application, and drafting contracts.

In the ex-post evaluation, delay in the organization assistance of the GDA, resulting from insufficient staff of the CTV, was indicated. The CRDA was aiming to establish 10 GDAs. However, at the time of this monitoring study, the number of GDA has decreased from two GDAs to one. After the dissolution of the GDA of Hammam Bourguiba, the CTV for Hammam Bourguiba region has not been organized; the prospect of resumption of Hammam Bourguiba GDA is unclear.

3.3.1.2 GDA

At the time of the ex-post evaluation, the GDA of Fernana was composed of one president, one treasurer, four clerks, one engineer, and two security guards. The GDA of Hammam Bourguiba was expected to have the same structure, but treasurer, clerk, and technician had not yet been hired. Currently, there is only one GDA in Fernana. The GDA of Fernana consists of one president, one treasurer, three engineers, and four officials. The number of staff is the same as the time of ex-post evaluation, but the names of the positions have changed as have the substantial operation and

maintenance roles; the officials, for example, conduct tasks based on necessity. After the revolution, officials are elected by the farmers through an election. This has led to a strong conscience in the officials to undertake the operation and maintenance as a team for the interest of the members. The GDA is actively pursuing its activities, and, therefore, no problem can be seen in the structural aspect of operation and maintenance.

3.3.2 Technical Aspects of Operation and Maintenance

3.3.2.1 CRDA

The training for cropping techniques was insufficient at the time of ex-post evaluation. However, currently, training for cropping and training for repair and maintenance of irrigation facilities are constantly being given to the GDA. The GDA's cropping techniques have improved as the result. Further, orientation seminar for irrigation for the farmers is held by the CTV .

Techniques for operation and maintenance of irrigation facilities have continuously improved since the ex-post evaluation. 24 CRDAs in the country meet monthly to share and exchange necessary knowledge such as new irrigation techniques or new measures concerning irrigation agriculture.

3.3.2.2 GDA

Ex-post evaluation indicated the farmers' insufficient knowledge concerning cropping, and inadequate knowledge and technique concerning irrigation facilities. From the interviews with the GDA of Fernana, farmers have acquired the knowledge and skill for irrigation agriculture, and production through cropping has increased. Also, the GDA of Fernana has set an electric welding equipment in its premises in order to further its independence. Prompt repair by the GDA became possible in case of a malfunction in the irrigation equipment or machines. The GDA's aim is to become independent from the CRDA. The GDA have also received training directly from the contractor who prepared the irrigation equipment, and have acquired the knowledge to assemble irrigation valves and irrigation equipment.

3.3.2.3 External Support

3.3.2.3.1 CRDA

During the ex-post evaluation, the Japanese Agency for International Cooperation (JICA) has set in motion a technical assistance (SAPS) to the benefit of Jendouba CRDA with the cooperation of Tunisian consultants. Following SAPS, a new project, Northern Region Aqueduct and Barbara Irrigation Yen Loan Projects in Tunisia, was started in 2010. The CRDA has implemented the action plan for the installation of agricultural facilities to contribute to stable production and stockpiling of crops, and created a model farmland, utilizing the operation and maintenance manual for sprinklers

and drip irrigation facilities, at the GDA of Fernana. Since four parcels of model farmland were successful in improving productivity, the CRDA has increased the number of model farmland to seven parcels, and raising new crops on the farmland. Furthermore, the CRDA is considering the establishment of Mutual Society for Agricultural Services (SMSA) to market the produces and lower the cost through joint purchase. Collecting further details concerning the assistance programs through interviews with consultants were attempted; however, the interview could not be made due to the limited timeframe of the study.

3.3.2.3.2 GDA

At the time of ex-post evaluation, JICA was conducting technical assistance to the GDA of Fernana with the cooperation of Tunisian consultants. Assistance to Hammam Bourguiba was not conducted, but since the regions are geographically close, ripple effect through the interaction of farmers was expected. Currently, the GDA has not been organized in Hammam Bourguiba, and the degree of ripple effect, expected at the time of ex-post evaluation, is unknown. This ripple effect is expected in the Northern Region Aqueduct and Barbara Irrigation Yen Loan Projects in Tunisia, which is presently being implemented in the region.

3.3.3 Financial Aspects of Operation and Maintenance

3.3.3.1 CRDA

At the time of ex-post evaluation, the CRDA was making a profit from budget allocated by the Ministry of Agriculture, and the revenue from collected water fee. The income was showing a growing trend, and no problems were indicated. Currently, the CRDA's main source of income are the same, revenue from (irrigation) water fee collected from the GDA, and budget allocated from the Ministry of Agriculture. There is no change from the time of ex-post evaluation.

In Hammam Bourguiba, the GDA has not been reestablished after its dissolution during the revolution. Water fee is collected from the farmers in the region by the representative from pre-revolution time, but none is paid to the CRDA. The CRDA is currently paying the cost of operation and maintenance on behalf of the GDA. This cost is taken from the budget allocated from the Ministry of Agriculture. Application for the cost for large-scale repair is made on a case-by-case basis, and, according to the CRDA, there is no problem. The CRDA claims to have secured the budget for 2013 to repair a facility (crack in the threshold of rainwater pumping station in Fernana); however, this fact could not be confirmed at the Ministry of Agriculture. In addition, information on the operation and maintenance cost and the amount of allocated budget of the CRDA could not be obtained. According to the interview to the CRDA and the GDA of Fernana, there are enough funds for the operation and maintenance, and is continuously sufficient to maintain the irrigation facilities.

3.3.3.2 GDA

Water fee collection rate has decreased from 100% at the time of ex-post evaluation (Table 8). Collection rate from 2007 to 2011 is between 43% and 90%. According to the CRDA and the GDA of Fernana, there is no basis to the 100% presented in the ex-post evaluation report. Comparison cannot be made since there is no record of the collection rate. In addition, there is no one who can explain the data before the revolution. The GDA does not calculate the collection rate; the rate was calculated from the aggregate data provided by the GDA. Therefore, adequate explanation on the change in the collection rate could not be obtained. However, the reason for the decrease after 2010 is due to the bankruptcy of an agriculture corporation.

According to the interview with local residents, in Hammam Bourguiba, a farmer, which was the former GDA, seems to be collecting water fee from the farmers utilizing irrigation. However, none is paid to the CRDA. In an interview with the CRDA of Jendouba, the cooperative relationship between the CRDA and the GDA in management and maintenance of the facilities is lost. Request for site visit and questionnaire through the Ministry of Agriculture were denied; the facts of the situation could not be confirmed.

Although financial statements for analysis could not be obtained, according to an interview, collected water fee is sufficient in covering the costs of operation and maintenance.

Table 8 Water Fee Collection Rate

(Unit: %)

	Planned	2006*	2007	2008	2009	2010	2011
Water Fee Collection Rate	100	100	52	43	90	66	48

Source: GDA of Fernana *value from ex-post evaluation

Pumping Station (Fernana)

Crack in the threshold of rainwater pumping station (Fernana)

3.3.4 Current Status of Operation and Maintenance

At the time of ex-post evaluation, operation and maintenance of irrigation facilities were satisfactory. The following were found from the site visits. The current status of the facilities is well-maintained with the exception of those presented below.

One pump in the pumping station was non-operational, and a crack in the threshold of rainwater pumping station was found. (The threshold's concrete was lacking the proper thickness from the corruption at the time of construction. That portion of the threshold cracked from the devastating flood in 2009, and has partially collapsed.) According to the CRDA, budget to repair the threshold has been secured for 2013; however, in confirming the matter, the Ministry of Agriculture answered that they will investigate the situation in the near future and take the necessary measures. Concerning the pumps, since three of the four pumps are functional, the CRDA stated that there is no problem.

Thus, operation and maintenance in the Fernana region has been secured by the cooperation between the CRDA and the GDA, and there continues to be no problem from the time of ex-post evaluation. On the other hand, the GDA of Hammam Bourguiba, dissolved after ex-post evaluation, has not been organized, and though there is support from the CRDA, the future prospects continue to be uncertain and concerns remain.

3.4 Others

3.4.1 Follow-up of Lessons Learned

Ex-post evaluation report presented as a lesson, when implementing a new irrigation project in a region unaccustomed to irrigation, while installing infrastructure, it is also important to provide education concerning irrigation and to provide technical and financial assistance to stimulate actual implementation of irrigation. From the results of this monitoring study, it was found that the lesson

has been put into practice, and has contributed to the generalization of irrigation. According to the Ministry of Agriculture, the educational campaign and technical/financial assistance to encourage the use of irrigation is actively conducted through the CTV of the CRDA to the GDA and farmers. Financial assistance is provided through aid in application for subsidies or loan and assistance in drafting a contract. As a result, this has produced an effect in the generalization of irrigation.

3.4.2 Follow-up of Recommendations

In the ex-post evaluation, recommendation was made to stimulate independent efforts by the Tunisian government itself (i.e., gratis provision of seeds and irrigation water, provision of subsidies for introduction of irrigation equipment, and assistance with loan applications at banks). Currently, generalization of irrigation is carried out by irrigation education campaigns and creation of model farmlands. Low-interest loan and subsidy of FOSDAP provided by the BNA under the Tunisian government, and reorganization of farmlands by law have contributed to the promotion of irrigation agriculture. However, gratis provisions of seeds and irrigation water have not been implemented at the time of this study.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

Irrigation generalization rate is steadily increasing. Further, through the combination of increased agricultural productivity and income through improvement of cropping techniques and cultivation of highly-profitable crops, and the effort of Northern Region Aqueduct and Barbara Irrigation Yen Loan Project in Tunisia (2010-2013), the project effect in Fernana continues to be produced. Concerning Hammam Bourguiba region, information after the revolution in 2011 could not be obtained, and hence, the conclusion could not be drawn. The GDA of Fernana, organized for the operation and maintenance of the facilities installed by this project, was cooperating with the CRDA and actively engaging in the operation and maintenance activities. However, in Hammam Bourguiba, the GDA was dissolved and the CRDA was conducting the operation and maintenance in its place. In Fernana, cracks in the threshold of rainwater pumping station and non-operational pumps were observed. Although these problems do not impede the operation of the facilities, continuous monitoring of the executing agency is required.

4.2 Recommendations

4.2.1 Recommendations to the Ministry of Agriculture

In Fernana, the GDA was organized and was actively engaging in operation and maintenance of the irrigation facilities; Also, their communication with the CRDA was satisfactory. This has made possible the introduction of new agricultural techniques and superb maintenance of the irrigation

facilities possible. In order to sustain the irrigational equipment installed by this project and continue to produce the expected effects, establishment of a new organization to assume the responsibility of former GDA in Hammam Bourguiba is necessary. To do so, , careful consideration of cultural and political background is essential. In addition, monitoring and supervision should be continued to ensume the repair of the crack in the threshold of rainwater pumping station and the non-operational pump (one out of the four).

4.3 Lessons Learned

None

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1. Output	(1) Regulating reservoir, 1 site (Haman Bourguiba: 150 m^3) (2) Pump stations, 5 sites (3 pumps each at 3 sites in Fernana; 6 pumps and 3 pumps, respectively, at 2 sites in Haman Bourguiba) (3) Reservoir, 3 sites (2 sites of 7,000 m^3 and 4,000 m^3in Fernana; 1 site of 6,000 m^3 in Haman Bourguiba) (4) Water pipes（5.9km） (5) Tertiary canals (80.4km) (6) Consulting services 14MM	(1) Regulating reservoir, same as left (2) Pump stations, same as left(4 to 5 pumps each at 3 sites in Fernana; Haman Bourguiba, same as left) (3) Reservoir, same as left (4) Water pipes（6.6km） (5) Tertiary canals (78.0km) (6) Consulting services, same as left
2. Project Period	March 1998–December 2001 (46 months)	March 1998-August 2004 (78 months)
3. Project Cost Total ODA Loan Portion Exchange Rate	 2,823 million yen 1,913 million yen 1 dinar =110 yen (as of July 1997)	 1,750 million yen 1,518 million yen 1 dinar = 85.96 yen (weighted average during project period)