

Ex-Post Monitoring of Japanese ODA Loan Projects in FY 2012  
Report

JUNE 2013

JAPAN INTERNATIONAL COOPERATION AGENCY

NAKAMOTO & ASSOCIATES CO.LTD.

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## Preface

Ex-post evaluation of ODA projects has been in place since 1975, and since then its coverage has gradually expanded. Japan's ODA charter revised in 2003 clearly states under the section "Enhancement of Evaluation" that in order to measure, analyze and objectively evaluate the outcome of ODA, third-party evaluations by experts shall be enhanced.

Ex-post monitoring is usually conducted seven years after the completion of ODA Loan projects and five years after Ex-post Evaluation if there is any concern in project effectiveness and sustainability based on the results of the ex-post evaluation. The aim of this exercise is to re-verify the project's effectiveness, impact, and sustainability, to monitor the extent to which recommendations drawn from the ex-post evaluation are being applied, and to obtain recommendations and lessons learned for the future projects to sustain their impact and to improve themselves as a whole. This time, 9 projects in different countries were monitored by external consultants, and this report is a compilation of all the results obtained. Now that this report is completed, we are determined to share the lessons and recommendations drawn with those who are concerned in and out of JICA, and utilize them to improve the management of ODA projects in the future.

Finally, I wish to express my sincere appreciation to all the people who kindly cooperated with us to implement this exercise.

June 2013

Masato Watanabe

Vice President

Japan International Cooperation Agency (JICA)



## Disclaimer

This report is an English translation of the original report in Japanese, which is a compilation of the results from Ex-post monitoring in Japanese fiscal year 2012. Monitoring was implemented by external consultants entrusted by JICA, in order to improve the neutrality of the results. The views and recommendations expressed in this report do not necessarily reflect the official view and opinion of JICA. Minor amendments to the original report may be added when it is posted on the official website of JICA. The Japanese version shall prevail in the event of any inconsistency with the English translation.

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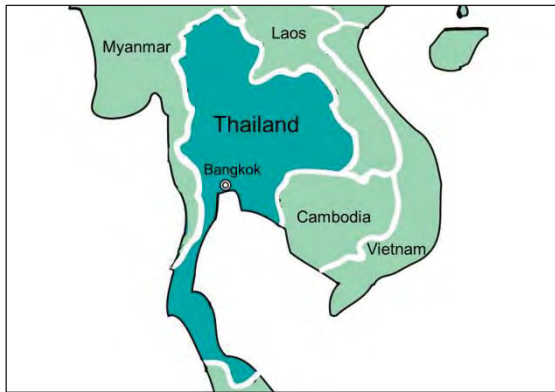
## Ex-Post Monitoring of Japanese ODA Loan Project

Thailand

### Regional Development Project (II)

External Monitoring Consultants: Kazunori Honda / Toyo Tanaka, Nakamoto&Associates Co., Ltd.

#### 1. Project Description



Project Location



City gate at the Entrance of the  
Tourist Spot of Pattaya

#### 1.1 Project Objective

The project's objective is to enhance the quality of tourism – an important part of Thai economy – by developing the basic infrastructure, conserving the environmental, cultural and historical resources of tourist spots, and constructing centers for developing human resources for environmental conservation, thereby contributing to the sustainability of tourism development.

#### 1.2 Outline of the Loan Agreement

Approved Amount / Disbursed Amount	3,602 million yen / 2,454 million yen
Loan Agreement Signing Date / Final Disbursement Date	September 1998 / January 2006
Ex-post Evaluation	2008
Executing Agency	Tourism Authority of Thailand (TAT)
Main Contractor	K. Engineering Consultants Co., Ltd. (Thailand), The Millennium Consultant Co., Ltd. (Thailand), Nippon Koei Co., Ltd. (Japan)
Main Consultant	-

### 1.3 Background of Ex-post Monitoring

With its currency crisis, Thailand had to try to find an economic base that could replace a rapid industrialization and the economic growth dependent on the financial market. In this context, it was quite a natural course for the country to implement this project related to tourism after Regional Development Project I (hereinafter "Project I").

As already known at the start of Project I, which was implemented from 1996 to 2002, the tourism sector was important for economic development, but there was a great possibility for the tourism promotion to destroy the environment or to have a negative influence on the conservation of culture. With Project I, while targeting to contribute to economic growth by promoting tourism, attention was also paid to the environmental destruction and the negative influence on culture. With Regional Development Project II (hereinafter "this Project"), this consideration was highlighted further. In addition to the harmony between tourism and the environment, the promotion of tourism by using traditional regional cultures was planned in an explicit form. Installation of basic infrastructure in the tourism sector; conservation of environment, culture, and history of tourist spots; and construction of centers for environmental personnel training were implemented.

At the time of ex-post evaluation, certain effects were observed as a result of the implementation of this project. However, the effects of this project could not be determined from the tourists' "average length of stay" and "average expenditure". On the other hand, since the effects of this project can be seen in certain projects such as industrial village, the effectiveness of this project was rated to be moderate. At the time of ex-post evaluation, comprehensive administrative body for the subprojects was nonexistent, and concern was shown over the sustainability of the project. In addition, ex-post evaluation indicated the existence of some poorly maintained facilities and non-operational facilities. Further, ex-post evaluation report made a recommendation to the Thai government to consider allocating the necessary budget to remove the equipment that was out of operation and transfer them to locations where they could be used effectively.

Therefore, this project was selected for ex-post monitoring, placing emphasis on confirming the effectiveness of the project pertaining to improving the quality of tourism based on indicators such as the "average length of stay" and the "average expenditure", and verifying the operation status of each sub-project, to be 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 Consultant

Kazunori Honda (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 17, 2012 – November 27, 2012

## 3. Monitoring Results

### 3.1 Effectiveness

#### 3.1.1 Quantitative Effects

##### 3.1.1.1 Results from Operation and Effect Indicators

###### (1) Domestic and Foreign Tourists

Although the economic downturn of the Lehman Crisis in 2008 had led to a decrease in the number of tourists in 2009, the number of domestic and foreign tourists has been increasing since 2010. Improvement in the quality of tourism can be seen through a steady increase in the “Average Length of Stay” and “Average Expenditure” since the time of ex-post evaluation. Therefore, the effect of this project seems to be continually produced.

The number of domestic tourists shows a steady increase since 2007. In 2010, the number of tourists increased by 24.52 million (25% increase compared to the previous year, Table 1).

Table 1. Quantity and Quality of Tourism by Domestic Tourists

Year	Number of tourists (million)	Average Length of stay (days)	Average Expenditure (baht/person/day)	Revenue (million baht)
2007	83.23	2.63	1,767.35	380,417
2008	84.28	N/A	N/A	388,200
2009	98.00	2.35	1,540.63	407,600
2010	122.52	2.59	1,736.38	402,574
2011	133.18	2.73	1,831.53	483,225

Source: TAT

Apart from this project, major factors in stimulating tourism in Thailand include the "Finance Ministry Ordinance No. 278" and "Notification of the Director-General of the Revenue Department on Income Tax No. 187" enacted in 2010. These regulations allowed domestic tourists to deduct the accommodation fee from the income when using the hotels that fulfill certain conditions. This led to

a considerable increase in domestic tourists. Until then, Thai tourists would usually stay at family or friend's house while on vacation. Only a limited number of people enjoyed staying at a hotel. However, the tourism style of Thai people has changed as a result of these measures.

Although Thailand experienced an economic recession in 2009 and a political uprising in Bangkok from 2009 to 2010, overall, the number of foreign tourists is showing a growing trend. In 2010, there number of tourists increased by 1.8million (growth of 13% from 2009) compared to the previous year, and a significant increase of 3.3 million in 2011(growth of 21% from 2010) compared to the previous year (Table 2). The main reason for this increase is Thailand's policy which focused on attracting tourists from neighboring countries. This led to the overall increase of foreign tourists, although the number of tourists from Japan, Europe, and United States has decreased. Thailand particularly focused on attracting tourists from China, campaigning to attract tourists with the sales copy "Amazing Thailand" has been effective.

Table 2. Quantity and Quality of Tourism by Foreign Tourists

Year	Number of tourists (million)	Average Length of stay (days)	Average Expenditure (baht/person/day)	Revenue (million baht)
2007	14.46	9.19	4,120.95	547,782
2008	14.58	9.51	4,142.30	574,521
2009	14.15	8.99	4,011.00	510,225
2010	15.94	9.12	4,079.00	592,794
2011	19.23	9.64	4,187.00	776,217

Source: TAT

Trends in the number of tourists throughout Thailand are not necessarily the direct results of this project. Many different policies to stimulate tourism have acted compositely, and have resulted in the increase of the number of tourists, their average length of stay, and average expenditure. Therefore, it is impossible to measure the direct effect of the influence of facilities such as, environmental protection facilities, environmental conservation, or nature study center, which were built by this project. However, city gates, monuments, and sidewalks constructed by this project at tourist spots such as Chiang Rai, Ayutthaya, and Pattaya are still being used. Furthermore, industrial village of Na Ton Chan has developed considerably through production of cotton products. It can be said that this project is definitely playing a part in promoting the tourism sector of Thailand.

## (2) Operation Status and Operation Rate of Sub-Projects

At the time of appraisal, the TAT was overseeing some sub-projects, and, at the same time, acted as a coordinator for all the sub-projects. However, jurisdictions of all of the sub-projects, with the

exception of A5 “human resource development for tourism”, have been transferred to other government agencies. In addition, decentralization law transferred the operation and management responsibility of A11 "industrial villages" to each village. Based on the information obtained from the TAT under these circumstances, the current status of the sub-projects can be seen in Table 3.

Table 3. Jurisdiction and Status of the Sub-Projects

No.	Project Name	Location	Jurisdiction	Status
A1	Improvement of Beach	Prachuap Khiri Khan	DPT *1	continue to be operational since the ex-post evaluation
A2	Improvement of Beach	Chonburi	DOLA *2	continue to be operational since the ex-post evaluation
A3	Improvement of Beach	Petchaburi	DOLA	Cancelled
A4	Improvement of tourist spots	Pattaya	DOLA	continue to be operational since the ex-post evaluation
A5	Human resources development for tourism	Nhakon Si Thammarat	TAT Nakhon Si Thammarat Office	continue to be operational since the ex-post evaluation
A6	Construction of a service area along expressway	Chumphon	DOA *3	closed after ex-post evaluation
A7	Construction of dock for Mekong River	Chiang Rai	DOLA	Information not obtained
A8	Restoration of temples	Chiang Rai	FAD *4	continue to be operational since the ex-post evaluation
	Construction of Ban Chian National Museum			
A9	Improvement of tourist spots	Ayutthaya	FAD	continue to be operational since the ex-post evaluation
A10	Tourism development in mountain regions	Chiang Rai	Mae Fah Luang Foundation Under Royal Patronage	continue to be operational since the ex-post evaluation
A11	Industrial village development	Thong Fai	DIP *5	Situation differs with each industrial village. Some have closed, while others have developed.
		Sathan		
		Pa Pu		
		San Pa Muang		
		Thung Luang		
		Na Ton Chan		
		Yang Thong		
		Na Ta Pho		
		Chiang		
		Nong Phue Noi		
		Pho Kong		
		Na Yang Klug		
		Kham Tai		
		Nong Khao		
		Huey Krieb		
		Hua Lane		
		Na Teen		
Ka Lai				
Khiriwong				
Na Tham				
B1	Waste treatment facilities at national marine parks	Had Noparat Tara	DNP *6	Information not obtained
		Had Wanakorn		
		Khao Laem Ya-Samet		
		Had Chao Mai		
		Ao Phangnga		
		Tarutao Mai		
		Similan Mai		
		Surin Mai		
		Ko Chang Mai		
		Ang Thong Mai		
C1	Natural environment learning facility	Khao Yai	DNP	continue to be operational since the ex-post evaluation
C2	Nature study center	Talay Noi	DNP	operational after ex-post evaluation
C3	Nature study center	Huay Ka Kaeng	DNP	operational after ex-post evaluation
C4	Nature study center	Hala-Bala	DOLA	operational after ex-post evaluation

Source: TAT

- \*1 DPT: Department of Public Works and Town & Country Planning (Ministry of Interior)
- \*2 DOLA: Department of Local Administration (Ministry of Interior)
- \*3 DOA: Department of Agriculture (Ministry of Agriculture and Cooperatives)
- \*4 FAD: Fine Arts Department (Ministry of Education)
- \*5 DIP: Department of Industry Promotion (Ministry of Industry)
- \*6 DNP: Department of National Park (Ministry of Natural Resources and Environment)

Details of the current status of each sub-project are only available at its overseeing government agency or at the region that the subproject is located. For this reason, the following sites were selected from the sub-projects, and detailed on-site survey was conducted to ascertain their actual situations.

A2 "Coastal development" Chonburi

A4 "Coastal development" Pattaya

A9 "Tourism area development" Ayutthaya

A11.13 "Industrial village development" Ban Kham Tai

C1 "Nature learning center" Khao Yai

Although the indicators have temporarily been influenced negatively by the economic downturn and political instability, generally, the numbers are the same or above those from the time of ex-post evaluation. It is impossible to measure the direct contribution of the project to these indicators, however, it can be said that the project has played a definite part in the development of tourism in Thailand.

#### 3.1.1.2 Internal Rates of Return (IRR)

Re-calculation of Internal rate of return (IRR) will not be performed since IRR had not been calculated at the time of ex-post evaluation.

#### 3.1.2 Qualitative Effects

Overall operation status and the effect of the sub-projects to the neighboring areas were examined through an interview with the TAT. Of the sub-projects, A2, A4, A5, A9, A11 (partial), C1-4 continue to contribute to the sustainability of the tourism sector. On the other hand, there are projects such as A6 & A11 (partial) which have shifted its role, and are being utilized for other purposes (Table 4).

Table 4 Current Status of the Sub-Projects According to the Interviews to TAT

No.	Current Status of the Sub-Projects
A1	The scenery is maintained, building upon the shore protection and sidewalk constructed by this project
A2(*1)	Shore protection and sidewalk constructed by this project are still being used.
A3	This sub-project was cancelled before appraisal due to the opposition from the residents.
A4(*1)	Shore protection, sidewalk, monuments, and fountains constructed by this project is still being used.
A5	Tourism guides are constantly trained at TAT Nakhon Si Thammarat Office.
A6	Service Area is closed due to popularity of new service area opened in the vicinity.
A7	Jurisdiction has moved to DOLA. No information was available at TAT
A8(*2*3)	Ban Chiang National Museum, Wat Chedi Luang, Wat Phra That Phu Khao Temple continues to operate.
A9(*1)	Utilized as part of Ayutthaya.
A10(*4)	Mae Fah Luang Foundation under Rotal Patronage has taken over and has continued the development through "Doitung Regional Development Project".
A11(*1)	There are industrial villages which were successful such as Na Ton Chan village. On the other hand, there are those which were closed such as Kham Tai.
B1.1-B1.10	Regulatory agency has changed to DNP. No information was available at TAT. Information could not be obtained.
C1(*1)	Visitors to Nature Study Center are mainly domestic tourists. The center is being utilized by many students and families.
C2	Construction has been completed, and the facility is being utilized.
C3	Construction has been completed, and the facility is being utilized.
C4	Construction has been completed, and the facility is being utilized.

Source: TAT

(\*1) Information collected during the site visit

(\*2) TAT website (Wat Chedi Luang / Wat Phra That Phu Khao)

(\*3) Fine Arts Department website (Ban Chiang National Museum)

(\*4) Mae Fah Luang Foundation under Royal Patronage website (Doitung Region Development)

At the visited sites, the following situations were verified:

A2, A4: City gates and sidewalks built by this project continued to be used, and were contributing to the improvement of scenery. They were well-maintained and kept in a satisfactory condition. The



sites were crowded with tourists, and were full of activity. The region is one of the major tourists spots in the country, and many tour buses were parked in the vicinity of these sites.

A9: Landscape improvement work implemented by this project could be seen within the premises of Ayutthaya Historical Park. However, Si Nakharin Park, implemented by this project, was being used as a park by local residents rather than as a tourist spot. Ayutthaya was devastated by flood in 2011. The restoration processes of the region, with emphasis on the historic sites, have since been undertaken, and the effects of the flood were barely noticeable. At the site visit, many tourists were visiting Ayutthaya. Tourism attraction in the region such as elephant rides had also resumed its activity. However, in the neighboring districts outside the historic site, unrepaired facilities could still be seen.

A11.13: The visited industrial village specialized in production of textile products. The village was closed due to insufficient funds to purchase the necessary raw material. The village was making a request to the local municipal office to provide funding to resume the textile business. However, the industrial village facility continues to be utilized by the villagers. On the weekdays, aerobics exercise is held on the premises. Exercise bike and weight training equipment were placed in one of the facilities, and the space was being utilized as a gym. The gym's usage fee is collected from the villagers to pay for the electricity bill of the air conditioner placed in the gym; no profit is made from this operation. Industrial village facilities were also used for events as a meeting place, a festival ground, and a venue for regional marathon competition. Maintenance of the facility is undertaken by the villagers themselves, and the facility was kept in satisfactory condition. According to the industrial village manager, the facility is ready to resume its operation and welcome the tourists at any time.



Lodges at Nature Study Center (Khao Yai)



Industrial Village Facility (Kham Tai)

C1: Nature Study Center is mainly used by domestic tourists. As shown in Table 5, 40,000 to 50,000 tourists visit the facility every year. At the time of the site visit, the Center was crowded with

groups of college students and families. The Center had amenities for lodging and camping. According to the Center manager, the operation and maintenance of the facilities are easily covered by the revenue from tourism. The Nature Study Center established by this project continues to attract many tourists; it can be said that this is a successful example of a sub-project.

Table 5. Number of Visitors to Nature Learning Center

(Unit: persons)

Year	Number of Visitors
2008	42,180
2009	47,698
2010	51,310
2011	39,834

Source: Nature Study Center

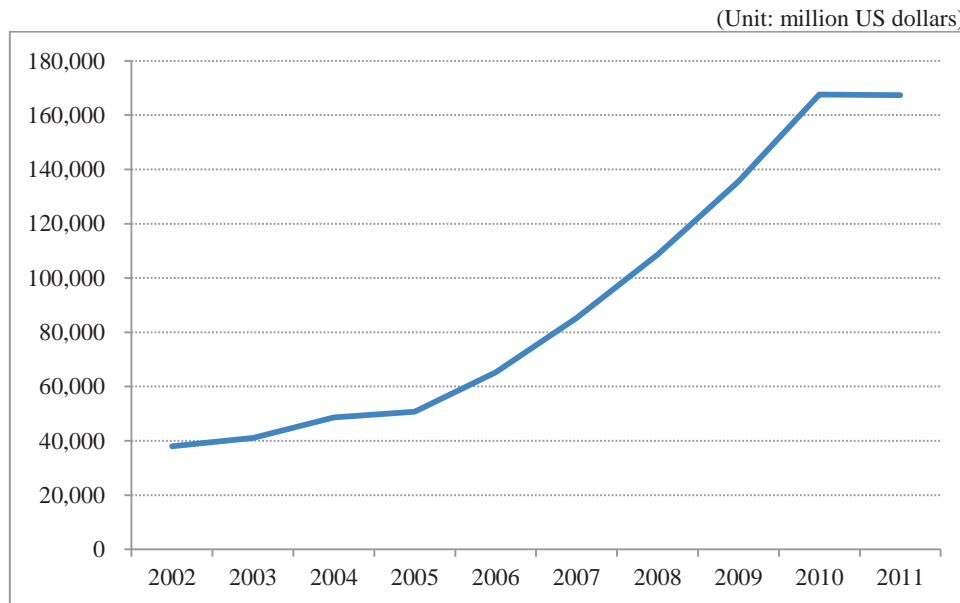
Restoration Projects have helped reduce the degradation of tourist facilities and contributed to the sustainable attraction of tourists. In addition, the development of village industries, management of the natural environment learning facilities, and the establishment of the Nature Research Center, were contributing to the cultural preservation, and coexistence of tourism business and protection of natural environment.

### 3.2 Impact

#### 3.2.1 Intended Impacts

##### 3.2.1.1 Foreign Currency Reserve

The foreign currency reserve had continued to increase until 2010 (Figure 1). It is clear that the increase in foreign tourists' expenditure is contributing to the increase in the foreign currency reserves. However, a clear linkage cannot be made between the fluctuation of tourism revenue and foreign exchange reserves.



Source: Created from "Country/Region Information" (J-Files), JETRO website

Figure 1. Foreign Currency Reserve

### 3.2.1.2 Reduction of Regional Disparities through Employment Creation in Rural Areas

In the ex-post evaluation, the coefficient of disparities of income between regions was calculated. In this ex-post monitoring, the coefficient of disparities was not calculated since the basis used for the calculation was not available.

### 3.2.1.3 Tourism Data of Chiang Rai

In this project, the most budget was expended for A7.1 (Construction of Chiang Kong Port, Mekong River), A8 (Renovation of Chedi Luang Temple and Phu Khao Temple in Chiang Saen district, construction of Ban Chiang National Museum), and A10 (Tourism Promotion for Integrated Rural Development), including A10.1 (Mae Fah Luang Garden Phase 3), A10.2 (Rai Mae Fah Luang Phase 2), and A10.3 Mae Khong Sub-regional Coordination Center), which are sub-projects in the Chiang Rai region. The ratio of tourists visiting the Chiang Rai region was decreasing at the time of time of the ex-post evaluation. The ratio has remained level and has not changed significantly since 2007s (Table 6). However, since 2007, the number of tourists visiting the Chiang Rai region has increased both among domestic and foreign tourists. Accordingly, Chiang Rai's tourism revenue has shown steady increase, and the region continues to play an important role as a popular tourist destination in Thailand. The reason for this increase in the number of tourists, as mentioned in the reason of increase in the number of tourists throughout Thailand, is the fact that the popularity of domestic tourism has taken root in Thailand. Also, the significant increase in 2010 can be accounted for by the tax deduction policies, "Finance Ministry Ordinance No. 278" and "Notification

of the Director-General of the Revenue Department on Income Tax No. 187".

Table 6. Tourism Data of Chiang Rai

		2007	2008	2009	2010	2011
Number of visitors to Chiang Rai (1,000 people)	Domestic	952	182	1,212	1,656	1,576
	Foreign	261	297	325	362	363
Tourism Revenue of Chiang Rai (million baht)	Domestic	3,870	4,153	4,912	5,679	5,357
	Foreign	1,653	2,349	3,243	3,478	3,446
Ratio to the entire country (%)	Domestic	1.14	1.40	1.24	1.35	1.18
	Foreign	1.81	2.04	2.30	2.27	1.89

Source: TAT

### 3.2.2. Other Impacts

#### 3.2.2.1 Improvement in the Lives of Farmers

There are industrial villages which are not operating; the industrial village chosen for on-site visit was also closed. However, the industrial villages have an important role of providing the farmers with an alternative source of income. In addition to the aforementioned reasons, closure of the visited industrial village is due to the rising price of rice. Currently, villagers can earn more through raising rice crops than the sale of textiles. Since the villagers have sufficient income, they are not engaging in the industrial village business. However, in the future, if the agricultural income is reduced due to depreciation in the price of rice or due to a lean year, the industrial village can be resumed, and can contribute to secure a source of income for the farmers. Although the visited industrial village was closed for its original purpose as a textile shop, the facility was being used by villagers as event venue and meeting room. It was well-maintained, and always ready to be resumed as an industrial village, should the need arise. By being used intermittently for multiple purposes, the industrial village facility is contributing to the improvement of the living standards of villagers.

#### 3.2.2.2. Contribution to the Development of the Region and the Tourism Industry

The TAT emphasized the contribution of this project to the tourism industry and to the development of the regions in Thailand. This project created a foundation for the tourism industry in each region, and the subsequent rapid development was made possible. TAT claimed that this was the primary effect of this project. Periods for developments that would have taken 20 or 30 years by Thailand's efforts alone, were greatly curtailed because of the existence of infrastructure and facilities installed by this project. Such effects of the project cannot be shown by statistical figures, but in the sense that this project laid the foundation to build the country's industry, it was meaningful.

It is difficult to confirm the direct impact of this project. Although the contribution of this project to the increase of foreign reserves and to the increase in the number of tourists visiting the Chiang Rai region seems unmistakable, it is impossible to accurately grasp and reveal the effects of this project.

### 3.3 Sustainability

#### 3.3.1 Structural Aspects of Operation and Maintenance

Sub-projects under the TAT jurisdiction were well maintained, and no problems could be detected. For the operation and management of each sub-project status, see Table 3 and Table 4. On the other hand, information regarding the operation and management of facilities under government agencies other than the TAT could not be obtained.

#### 3.3.2 Technical Aspects of Operation and Maintenance

Tourism human resource training center, under the jurisdiction of the TAT, holds tourism training sessions daily. At over 30 TAT regional offices located throughout the country, community-based tourism support is engaged to promote tourism for the region. Hence, the training program differs with each regional office. As for the tourist development program, training of regional tourism guides and regional tourism marketing and promotion are conducted. Regarding the wastewater treatment and garbage disposal systems at marine parks, information concerning the technical aspects of operation and maintenance were not available at the TAT.

#### 3.3.3 Financial Aspects of Operation and Maintenance

Regarding the wastewater treatment and garbage disposal systems at marine parks, information concerning the financial aspects of the operation and maintenance was not available at the TAT.

#### 3.3.4 Current Status of Operation and Maintenance

Some facilities, which were under construction at the time of ex-post evaluation, are well maintained after becoming operational. Some facilities have continually been properly maintained since the ex-post evaluation. On the other hand, there are sub-projects which are not operating. Through interview with the TAT and field visits, the following information was obtained: Within the sub-projects, there are those which were cancelled at the implementation such as A3, that which was terminated due to the opening of a convenient service area nearby (A6), and those which closed their industrial village such as Kham Thai (A11.13). On the other hand, at the visited sites of A2, A4, A9, A11.13, C1, it was confirmed that the maintenance and management were properly conducted. In addition, A10 “Tourism Promotion for Integrated Rural Development”, which is comprised of 3

sub-projects in Chiang Rai province, is being properly maintained under the supervision of Mae Fah Luang Foundation. According to TAT, there was no information available at the TAT that B1 (with 10 sub-projects B1.1 – B1.10), wastewater treatment and garbage disposal systems in 10 marine national parks, were operating after ex-post evaluation. Due to the time constraints, further information could not be obtained.

Because the facilities and equipment installed by this project are diverse and located throughout the country, investigation of the overall operation and maintenance was not possible. However, for sub-projects in which the site visits were conducted, the operation and maintenance were appropriately implemented. Also, according to the TAT, to their knowledge, the operation and maintenance of the facilities are being conducted appropriately in the sub-projects.

### 3.4 Others

#### Follow-up of the Recommendation in Ex-post Evaluation

Ex-post evaluation report made a recommendation to the Thai government to make the necessary budget available, in order to remove the equipment that was out of operation and to transfer them to locations where they can be used effectively. In the interview with the TAT, it was confirmed that there had been a transfer of some unused equipment to other parks since 2005. However, the relocation or the utilization of all the facility equipment for B1, wastewater treatment and garbage disposal systems in the marine parks, could not be traced.

## 4. Conclusion, Lessons Learned and Recommendations

### 4.1 Conclusion

The ex-post evaluation defined the quality of tourism by the fluctuations in the "average length of stay" and the "average expenditure". If this ex-post monitoring is to use the same indicators, both indicators are increasing overall in spite of the economic downturn and political instability, and hence, it can be concluded that the quality of tourism in Thailand is continually maintained. Though the improved quality of tourism cannot be explained by the result of this project alone, this project had a distinct role in the development of tourism in Thailand.

Regarding the operation status of each subproject, there are those which were cancelled (A3), those which became non-operational after ex-post evaluation (A6, parts of A11), and those which were non-operational at the time of ex-post evaluation and became operational (C2-4). Other sub-projects are unchanged from the time of the ex-post evaluation. The current status of each sub-project differs greatly.

The TAT, which was the coordinator for the sub-projects during the implementation of the project has ended its role, and the jurisdiction of the sub-projects, with the exception of one (A5), continues

to belong to those implementing agencies of each sub-project such as DOLA, DNP, DPT, and FAD. There are also a number of sub-projects, including industrial villages, of which the jurisdiction was transferred to their respective local municipalities due to the Decentralization Law.

In conclusion, effectiveness and impact of the project continue to be produced in general. Concerning the operation and maintenance structure, responsible agency for each subproject is clear, and no problem has been detected.

#### 4.2 Recommendations

None.

#### 4.3 Lessons Learned

None.

Comparison of the Original and Actual Scope of the Project

Item	Plan	Actual
1.Output	<p>A. Tourism improvement (11 projects)</p> <p>B. Environmental conservation (10 projects)</p> <p>C. Nature study center (4 projects)</p>	<p>A. Tourism improvement (10 projects)</p> <p>- One beach improvement project was cancelled due to residents' opposition campaign.</p> <p>- Two industrial village projects were cancelled due to land acquisition problem.</p> <p>- A project for museum construction had not been completed at the end of the project.</p> <p>B. Environmental conservation (10 projects)</p> <p>C. Nature study center (4 projects)-</p> <p>Two projects had not been completed at the end of the project.</p>
2.Project Period	September, 1998 - December, 2002 (52 months)	September, 1998 - January, 2006 (88 months)
3.Project Cost		
Foreign currency	2,342 million yen	N.A.
Domestic currency	2,462 million yen (Thai currency)	N.A.
Total	4,804 million yen	3,269 million yen (1,026 million baht)
ODA loan portion	3,602 million yen	2,454 million yen
Exchange rate	1 baht = 3.13 yen (as of April, 1998)	N.A.



Ex-Post Monitoring of Completed ODA Loan Project

Philippines

Special Economic Zones Environment Management Project

External Monitoring Consultants: Kazunori Honda / Toyo Tanaka Nakamoto&Associates Co., Ltd

1. Project Description



Project Location



Aerator (Mactan)

1.1 Project Objective

The project’s objectives are as follows: (a) to establish sewage treatment plants (STP) and treated wastewater reuse facilities in the Special Economic Zones (ECOZONES) of Mactan, Baguio City, Bataan and Cavite, and (b) to strengthen the PEZA’s capability in the planning, regulation, enforcement, and environmental monitoring of the ECOZONES to promote pollution control, to improve public wellbeing in the neighboring areas, and to promote investments in the Philippines.

1.2 Outline of the Loan Agreement

Approved Amount / Disbursed Amount	2,746 million yen / 534 million yen
Loan Agreement Signing Date / Final Disbursement Date	March 1997 / July 2005
Ex-post Evaluation	2007-2008
Executing Agency	PEZA (Guarantor: Government of the Philippines)
Main Contractor	-
Main Consultant	Pacific Consultants International (Japan), TCGI Engineers (Philippines) (JV)

### 1.3 Background of Ex-post Monitoring

In 1995, the Philippine government enacted into law Republic Act no. 7916 otherwise known as the Special Economic Zone Act of 1995 and developmentally restructured the Export Processing Zone Authority (EPZA) to establish the Philippine Economic Zone Authority (PEZA). The PEZA manages and operates four (4) public Special Economic Zone (ECOZONES) namely Mactan Economic Zone (MEZ), Cavite Economic Zone (CEZ), Baguio City Economic Zone (BCEZ) and Bataan Economic Zone (BEZ), now Freeport Area of Bataan (FAB). In the ECOZONES, preferential treatment for investments, and provision of improved infrastructure and services were offered to attract business enterprises. As a result MEZ, CEZ and BCEZ were filled to their capacity. As investments grew in the ECOZONES, the amount of wastewater and solid waste was expected to increase, and there was urgent need to prevent pollution in the ECOZONES. Therefore, the construction and rehabilitation of sewage treatment facilities were implemented in the four ECOZONES directly managed by the PEZA.

Although Sewage Treatment Plant (STP) and Wastewater Reuse Facility (WRF) were installed, the amount of treated water and their operation / utilization rate was low at the time of ex-post evaluation, and the effectiveness of the project was limited. Further, the ex-post evaluation report indicated that some areas within Mactan needed repair and/or rehabilitation of the existing sewage collection system. In Bataan, besides the low locator filling rate, the necessity for construction and/or renovation of the existing sewage collection system were indicated. In addition, environmental audit/monitoring, and management and maintenance of the STP and the WRF were outsourced to private entities. However, at the time of ex-post evaluation, the PEZA had not outsourced its operations in Bataan, and it continued hiring private engineers and supervising the operations by itself.

In this context, this project was selected for ex-post monitoring, while placing an emphasis on the analysis of the operation / utilization rate, number of locators and the situations of the investment in the ECOZONES, the external monitoring consultants reviewed the findings from the field survey and those of other research activities, and deducted a final conclusion.

## 2. Outline of the Monitoring Study

### 2.1 Duration of Monitoring Study

Duration of the Study: September 2012 – June 2013

Duration of the Field Study: November 27, 2012 – December 6, 2012

### 3. Monitoring Results

#### 3.1 Effectiveness

##### 3.1.1 Quantitative Effects

###### 3.1.1.1 Results from Operation and Effect Indicators

###### (1) Sewage Treatment Plant (STP) Operation

Since 2007, the volume of treated sewage and the operation rate of the STP have continued to increase (Table 1). However, considering the occupancy rate of ECOZONES in Mactan and Baguio City, which is near 100%, operation / utilization rate for the STP remains low. According to the PEZA, one of the reasons for low operation / utilization rate is due to the overly ambitious prediction of the sewage volume at the time of planning for the construction of the STP. The initial plan assumed the locating companies to be water-intensive manufacturing industries. However, due to the changes in the business environment in the recent years, ECOZONES saw an increase in locators of non-water-intensive industries such as telecommunications service. Further, many locators installed their own STPs in order to fulfill the requirement for the ISO14001 designation. These are believed to have led to the sustained low level of the STP's operation / utilization rate.

Furthermore, as indicated at the time of ex-post evaluation, insufficiency of the improvement in installation of sewage pipeline network is also a factor in the STP's low operation rate. Sewage pipelines in the ECOZONES require large-scale repairs, but due to budget restraints, the PEZA is implementing such repairs gradually. The PEZA has already started the procurement for Phase 1 (Repair and Rehabilitation of MEZ Drainage and Sewage Collection System Project). PHP 79 Million have been earmarked for Phase 1 and the PEZA plans to complete this project in 2014. Since these repairs are planned to span several years, their impact on the improvement in the STP's operation rate is not yet noticeable.

Table 1. Volume of Treated Sewage (Operation / Utilization Rate) in the ECOZONES  
(unit: m<sup>3</sup>/day)

		Mactan	Baguio	Bataan	Cavite*
Installed Capacity		4,700	1,500	15,500	-
Treated Volume (Operation Rate)	2009	1,400 (30%)	-	1,100 (7%)	-
	2011	1,713 (36.5%)	495 (33.0%)	1,112 (7.2%)	-

Source: PEZA/AFAB

\*Data for CEZ was not collected since it did not take part in the project.. The same applies to the rest of this report.

###### (2) Water Quality of Treated Sewage

The PEZA has made protection of environment one of its main objectives, and has implemented a strict effluent control. Each ECOZONE has its own standards for effluent wastewater in accordance

with Department of Environment and Natural Resources (DENR) classifications. The project's initial objective to improve environmental management has been attained and maintained, as the effluent's BOD, COD, and SS values, which are indicators for water quality, are below the standard value (Table 2).

In 2010, Bataan ECOZONE has changed from Special Economic Zone to a Freeport Area, and jurisdiction of Bataan Special Economic Zone has been transferred from the PEZA to the Authority of Freeport Area of Bataan (AFAB). At the FAB, the effluent water quality is monitored under a standard more stringent than the standard set by the DENR, and the monitored indicator values collected there are also maintained below the standard (Table 2).

Table 2. Water Quality of Treated Sewage

		(mg/l)							
		2008		2009		2010		2011	
		Actual	Standard	Actual	Standard	Actual	Standard	Actual	Standard
Mactan	BOD	19	100	3.7	100	4.7	100	7	100
	COD	79	200	46	200	50	200	54	200
	TSS	16	150	14	150	9.5	150	12	150
Baguio City	BOD	6.2	50	7.74	50	9.86	50	13.4	50
	COD	N/A	100	N/A	100	49.67	100	39.6	100
	TSS	4.81	70	7.79	70	6.76	70	14.4	70
Bataan	BOD	11.22	30	17	30	21.5	30	29.5	30
	COD	N/A	60	N/A	60	N/A	60	N/A	60
	TSS	4.18	50	4.5	50	8.25	50	10.5	50
Cavite	BOD	-	-	-	-	-	-	-	-
	COD	-	-	-	-	-	-	-	-
	TSS	-	-	-	-	-	-	-	-

Source: PEZA/AFAB, JICA

In FAB, BOD in 2011 was 29.5mg/l which is near the effluent standard which is 30mg/l. This was due to one locator company, which was not properly pre-treating the influent that was released to the STP. The AFAB instructed this company on sewage treatment after the incident, and the problem were resolved at the time of ex-post monitoring.

### (3) Water Supply and Consumption

Table 3 shows the amount of water supply and consumption of each Special Economic Zone. At the time of ex-post evaluation, there was a concern for the lack of water in Mactan. However, the data for the water supply in Mactan was not available, since the aggregate water supply data is not collected on a regular basis. According to an interview with the officials conducted at Mactan, it was revealed that Mactan is currently provided with ample water through three water pipelines from neighboring Cebu Island, and there is no longer any concern over the shortage of water. In Bataan, the water is transported from a dam located within the FAB, hence, there is no concern over water shortage, either.

Table 3. Potable Water Supply and Consumption

		(1,000 m <sup>3</sup> /year)			
		Mactan	Baguio City	Bataan	Cavite
2010	Water Supply	N/A	1,167	N/A	6,890
	Water Consumption	17,098	1,096	700	-
2011	Water Supply	N/A	1,111	N/A	6,890
	Water Consumption	N/A	916	2,561	-

Source: PEZA/AFAB

#### (4) Volume of Recycled Water

After reviewing the status of wastewater reuse in Mactan, it was found that, since 2009, the number of the companies using the recycled water had been slowly increasing. (Table 4) 13 out of 105 companies (12.4%) were using recycled water in 2009, and 17 out of 114 companies (14.9%) in 2011.

Use of recycled water is free of charge. However, in order for companies to use recycled water, additional investment is necessary to install an additional interior pipeline to connect to the recycled water pipeline. Also, the use of recycled water is restricted to limited use, such as watering the plants or flushing the toilet. In this context, most locator companies do not feel the incentive balances with the required investment. In addition, the fact that the problem of water shortage in Mactan has already been eliminated has also contributed to the low usage rate.

Table 4. Volume of Reused Water

	(m <sup>3</sup> /day)	
	Dec-09	2011 Average
Installed Capacity of WRF	1,269	1,269
Actual Usage	340	414

Source: PEZA

#### (5) Water Quality of Recycled Water

No problem was detected regarding the quality of recycled water. Since 2009, water quality of recycled water has always been maintained and its values stayed below the standard. In the project, the PEZA is paying particularly close attention to the maintenance of water quality. Problems of soil pollution or of odor due to the use of reused water have not been reported.

Table 5. Water Quality of Reused Water

	(mg/l)
	BOD
2009 Average	3.0
2010 Average	4.7
2011 Average	6.1
Standard	10.0

Source: PEZA

(6) Volume of Treated Solid Waste

There were no revisions to the “Republic Act No. 8749”, enacted in 1999, which prohibits the use of incinerator. Construction of a new incinerator for solid waste disposal has not been implemented. There is no change in the methods for treating solid waste in Mactan or Baguio since ex-post evaluation. Although Bataan's jurisdiction changed from the PEZA to the AFAB, there is no change concerning the method of solid waste disposal.

Table 6. Volume of Treated Solid Waste

	(tons/day)			
	Mactan	Baguio City	Bataan	Cavite
Disposed amount in disposal sites	34.4	0.36	N/A	N/A
Collection & Disposal	Private Contractor	Private Contractor	Private Contractor	Private Contractor

Source: PEZA/AFAB

In Mactan, solid waste is collected by approved contractors and disposed at waste disposal sites approved by the DENR. Baguio's solid waste is collected and sorted by approved contractors and disposed at the municipal disposal site. In Bataan, solid waste is collected by approved contractors and disposed at the ECOZONE's disposal site.

From the above indicators, concerning the water quality of treated sewage and recycled water, the process is properly managed to keep the water quality indicators below the pollution standard. Therefore it can be concluded that the effect of environmental protection continues to take effect since the time of ex-post evaluation. On the other hand, in considering the STP and the WRF, the amount of treated sewage is consistently low compared to the capacity of the facilities, though the increasing trend has been seen. However, there have been significant changes in the surrounding environment since the appraisal of this project. In this context, the selection of the operation / utilization rate of the STP as the only indicator to measure the effectiveness of this project is questionable. (See Lessons Learned (2))

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

Re-calculation of Internal rate of return (IRR) will not be performed due to the fact that IRR was not calculated at the time of ex-post evaluation.

### 3.1.2 Qualitative Effects

Awareness for environmental protection has continually been sustained since ex-post evaluation. According to the interview with the PEZA personnel, this project has contributed to pollution prevention and water preservation. No trouble with residents in surrounding areas has been reported. In addition, although the project is not the only factor, the occupancy rate of Mactan and Baguio is near 100%.



Sedimentation Tank (Bataan)



Faucet for Reused Water (Mactan)

## 3.2 Impact

### 3.2.1 Intended Impacts

#### 3.2.1.1 Number of Locators

##### (1) Mactan Economic Zone

Special Economic Zone is almost filled to its capacity, although fluctuation can be seen in the number of locators. There is a waiting list for companies wanting to locate in the ECOZONE. The number of locators is stable, but change can be seen in the locator's type of industry. At the time of the appraisal of the project, locators were expected to be mostly manufacturing industry. Recently, there are companies from different industries including call centers, warehouses, and real estate.

##### (2) Baguio City Economic Zone

There are no significant changes in the number of registered locator companies in real term since 2007, though, in the statistics, a significant increase in the number of locators can be seen in 2011. This is due to the fact that the number of permit locators, which are companies that perform support

services such as maintenance and cleaning for registered locators, were added to the number of registered locators in the Special Economic Zone. Therefore, there is no change in the number of companies registered in the ECOZONE.

(3) Freeport Area of Bataan

Number of companies has remained at a constant level. The number has not shown significant fluctuation since the time of the ex-post evaluation. Reasons include the location of Bataan, which is far from a port, and the development of numerous private ECOZONES which has contributed to this cause. Filling rate continues to be low compared to the capacity of the ECOZONE.

Decrease in the number of locators was seen between 2007 and 2010, during which this ECOZONE was under the PEZA jurisdiction. However, after the transfer from ECOZONE to FAB, the number of locators has increased from 39 to 54, which is the same level as at the time of ex-post evaluation.

Table 7. Number of Locators

	2007	2008	2009	2010	2011
Mactan	120	123	113	117	114
Baguio City	22	21	21	27	41
Bataan	53	42	43	39	54
Cavite	-	-	-	-	-
Total	195	186	177	183	209

Source: PEZA/AFAB

3.2.1.2 Investments from Locators

Investments by locator companies were also made continuously since 2007. Investments in Mactan and Baguio have increased since 2007. Investments in the ECOZONE are made through activities of locators such as moving, renovation of existing company facilities, and construction of new facilities. Increase in the investments in Baguio in 2010 and 2011 were due to construction of new manufacturing plants by Moog Controls Corporation.



Table 8. Investments by Locators

(1 billion pesos)

	2007	2008	2009	2010	2011
Mactan	0.78	1.37	2.87	0.97	4.47
Baguio City	3.60	0.41	0.18	18.21	16.50
Bataan	N/A	N/A	N/A	0.00	0.48
Cavite	-	-	-	-	-
Total	(4.38)	(1.78)	(3.05)	19.18	21.45

Source: PEZA/AFAB

\*() are reference values since Bataan is not included.

### 3.2.1.3 Employment in the ECOZONES

Number of employment in the City of Baguio and Mactan has been maintained at a high-level, and has increased from the time of the ex-post evaluation. On the other hand, in Bataan, the number continues to be low in accordance with the number of tenant companies. However, as a result of the transfer of Bataan ECOZONE to the AFAB in 2010, slight increase was seen in 2011.

Table 9. Employment in the ECOZONES

(1,000 persons)

	2007	2008	2009	2010	2011
Mactan	50.5	47.1	43.7	51.9	58.6
Baguio City	7.0	8.0	8.6	9.8	9.2
Bataan	15.5	12.3	13.4	12.6	12.8
Cavite	-	-	-	-	-
Total	73.0	67.4	65.7	74.3	80.6

Source: PEZA/AFAB

### 3.2.2. Other Impacts

#### 3.2.2.1 Social and Environmental Impact

There is no change from the time of ex-post evaluation in Baguio and Mactan. In Bataan, as the jurisdiction was changed from the PEZA to the AFAB, former PEZA engineers, under the supervision of the DENR and the AFAB, are implementing the operation and maintenance of the STP. An outsourced contractor engages in the daily management of the STP and the WRF and monthly activity reports are submitted to the PEZA / AFAB.

Environmental investigation/monitoring of the effluent from the STP is performed by outsourced contractors. In principle there is no change in the supervisory role of the DENR, PEZA/AFAB, and mandatory monitoring results are submitted to the DENR and the PEZA/AFAB. This environmental investigation/monitoring system are implemented not only in the public ECOZONES, but also in the

private ECOZONES under the supervision of the PEZA.

In conclusion, there are no negative environmental or social impacts in the ECOZONE/FAB areas.

#### 3.2.2.2 Land Acquisition, Relocation

There were no resettlement or land acquisitions.

In addition to the significant contribution by this project to the number of locators, investment from locators, and employment, especially in Mactan and Baguio, the impact of the rise in environmental awareness is evident not only in the four ECOZONES under PEZA jurisdiction, but also in the private ECOZONES.

### 3.3 Sustainability

#### 3.3.1 Structural Aspects of Operation and Maintenance

Management organizations in the Freeport Area of Bataan have changed, and the operation and maintenance of wastewater treatment facilities have been outsourced to private contractors. However, otherwise, there have been no major changes since ex-post evaluation. Operation and maintenance system is functioning appropriately. In Mactan and Baguio, operation and maintenance have been outsourced to private companies under the supervision of The PEZA's responsible departments. Bataan's managing organization changed from the PEZA to the AFAB in 2010. The AFAB engineers from the time of the Export Processing Zone Authority (EPZA, predecessor of the PEZA) are engaging in operation and maintenance as external contractors. Environmental monitoring results are required to be submitted to the PEZA/AFAB and DENR. All the data and monthly reports submitted by the contractor is stored and being utilized for maintaining and improving the water quality.

#### 3.3.2 Technical Aspects of Operation and Maintenance

Technical training for operation and maintenance has been carried out continuously from the time of ex-post evaluation, and no major problem has been recorded. For each ECOZONE, operation and maintenance of the facility have been entrusted to private contractors, and there have been no reports of technical problems or major breakdowns of the facilities. Environmental training (which covers the Clean Water Act, Water Standards and Monitoring, Environmental Laws) is being conducted on a regular basis to the staff of the PEZA/DENR. In Mactan and Baguio, staffs of Environmental Health and Safety Division (EHSD) receive two-day seminars on Clean Air Act, Clean Water Act, solid waste management, and hazardous waste management at least once a year. In FAB, internal training by engineers and operators is being held on a daily basis.

### 3.3.3 Financial Aspects of Operation and Maintenance

The PEZA has ensured sufficient profit in operating profit and profit after tax over the past 8 years. No problem can be found concerning the financial status. (Table 10) According to interview with the PEZA, there were no abnormal or extraordinary expenditure that would have impact on the financial situation. (Table 11)

Setting and collection of sewage treatment fees and wastewater reuse fee of Mactan, which was under deliberation in 2007, has not yet been implemented. (Table 15) The matter is still under deliberation. In BCEZ and FAB, sewage treatment fee has been levied continually from 2007.

Table 10. Financial Condition of the PEZA

	(1,000 pesos)				
	2007	2008	2009	2010	2011
Income	7,177,081	6,389,471	5,509,578	6,257,862	7,075,661
Expenses	6,256,809	5,658,067	5,182,953	5,660,664	6,169,785
Income from Operations	920,272	731,404	326,625	597,198	905,876
Other Income (Expenses)	72,521	-314,974	196,960	-3,720	127,810
Income Tax	304,350	117,015	151,042	172,556	293,571
Net Income	688,444	299,415	372,542	420,923	740,116

Source: PEZA

Table 11. Breakdown of Expenses

	(1,000 pesos)				
	2007	2008	2009	2010	2011
Personnel Expenses	367,566	367,327	495,775	567,138	561,047
Maintenance and Operation Expenses	5,889,243	5,290,740	4,687,178	5,093,526	5,608,738

Source: PEZA

On the contrary, the AFAB is in a state of deficit in its income and net income since its inception. (Table 12, Table 13) Under the new law (Republic Act No. 9728), the AFAB should receive a 500 million pesos budget annually for the five (5) years after its establishment, as subsidy from the Philippine government. However, no such budget was received in 2010 and only 100 million pesos was approved in 2011. The AFAB has requested for an allocation of five hundred million from the Philippine Government budget for fiscal years 2012 and 2013 but the government has only approved 100 million pesos for each year. These cases are not uncommon in the Philippines.

AFAB has drafted a master plan for the renovation of the FAB. Improvement of the operation / utilization rate of the STP is included in the plan. AFAB plans on continuing the request for additional budget. Should they receive the full requested budget, the AFAB plans to invest in the

installation of sewage pipe network in areas which are not yet connected to the STP and improve the utilization of the STP. Despite the AFAB's current budget constraints, they are properly operating and maintaining the STP.

Table 12. Financial Condition of the AFAB

	(1,000 pesos)	
	2010	2011
Income	342,503	775,577
Expenses	363,312	813,347
Income from Operations	-39,350	-37,770
Other Income (Expenses)	-16,142	-30,916
Income Tax	-	-
Net Income	-38,949	-68,686

Source: AFAB

Table 13. Breakdown of Expenses

	(1,000 pesos)	
	2010	2011
Personnel Expenses	28,803	60,164
Maintenance and Operation Expenses	353,071	753,184

Source: AFAB

Table 14. Operation and Maintenance Cost of the STP

	(1,000 pesos)			
	2008	2009	2010	2011
Mactan	5,640	5,888	5,888	5,989
Baguio City	1,816	1,653	1,772	1,687
Bataan	919	1,069	1,137	1,017
Cavite	-	-	-	-

Source: PEZA/AFAB

Table 15. Revenue from Sewage Treatment Services

	(1,000 pesos)			
	2008	2009	2010	2011
Mactan	-	-	-	-
Baguio City	1,491	1,416	1,558	1,663
Bataan	3,590	3,140	3,028	3,214
Cavite	-	-	-	-

Source: PEZA/AFAB

### 3.3.4 Current Status of Operation and Maintenance

There is no change in the status of operation and maintenance from the time of ex-post evaluation. Operation and maintenance is carried out properly based upon the manual. In Mactan, operation and maintenance is done by 3 shifts of 5 workers and 2 back-up workers, and the periodic inspection has also been carried out properly. Check-up of all equipment in the plant is carried out daily, and ampere voltage information of the device is recorded. Cleaning of the pump stations, manhole stations, strainer of final sedimentation tank is done on a daily basis. Removal of suspended solids in the tanks, such as plastic and paper, and cleaning of pipes for water reuse facility is being conducted on a regular basis several times a month. With respect to the management of the facility, there has not been an issue to date from the time of the ex-post evaluation. There is no problem obtaining spare parts. Their purchase is to be approved by the PEZA and executed on the needs basis.

From the above, the operation and maintenance conducted by the PEZA is satisfactory, and no major problem has been identified. On the other hand, although the AFAB is sufficiently implementing the operation and maintenance activities such as water quality monitoring within the limits of its budget, governmental budget has not been allocated and future prospects remain unclear. The AFAB has fallen into a deficit and is in a severe financial situation.

## 4. Conclusion, Lessons Learned and Recommendations

### 4.1 Conclusion

In Mactan, Baguio City, and Freeport Area of Bataan, the operating / utilization rate of the wastewater treatment facilities has increased, though slightly. However, the operation / utilization rate is constantly low compared to the projected / designed capacity of the facility, and its value remains below 50%. One of the major causes is the increase in the number of non-water-intensive, non-manufacturing locators resulting from the diversification of business environment. Also, locators are constructing their own STP facilities to obtain the ISO certification. In addition, as has been detected prior to this report, the upgrading/rehabilitation of the existing sewage collection system has been prolonged and not sufficient areas have been covered, which is also a contributing factor to the situation. Therefore, it can be speculated that the dramatic increase in the utilization rate in the future is unlikely.

On the other hand, in terms of prevention of pollution of the surrounding environment, which was one of the objectives of the project, the PEZA and the AFAB are particularly observant, and water quality survey has been carried out continually on a regular basis. The indicators for the water quality are maintained below the water quality standard, and the STP's effluent and Mactan's recycled water quality is maintained at a satisfactory level. There have been no reports of soil contamination or odor. In this regard, the role played by this project is particularly significant.

## 4.2 Recommendations

None.

## 4.3 Lessons Learned

### (1) PEZA

In planning of water use project in the ECOZONE, it is desirable to predict the potential industries of locators, as much as possible. At the time of appraisal, locators from water-intensive industries such as garment and steel industries were assumed to be potential locators. However, rapid growth of information and technology industries and other factors have led to a change in the locator industries. Predicting such changes is difficult. While taking into account the “future economic conditions”, consideration should be given to the possibility of changes in the industry of the locators at the time of appraisal; review, including the reconsideration of the project at a reasonable timing, is desirable.

Also, if the promotion of environmental protection by water conservation is conducted at government level and ample budget can be allocated for this cause, then raising the operation / utilization rate of the existing facilities through the completion of proposed sewage collection system projects in the ECOZONES and the strengthening of environmental awareness programs for locators will become possible. Because Mactan and Baguio are leading tourist destinations in the Philippines, linking such efforts to tourism projects may lead to further promotion of environment protection.

### (2) JICA

Operation / utilization rate has been adopted as the indicator to evaluate the effectiveness of this project. However, since the objective of the project is to prevent pollution and to improve public well-being in the neighboring areas through installation of the STP and the WRF, operation / utilization rate should not be the only indicator to measure the effectiveness of this project. As for the indicators used for the evaluation of such project, in order to assess the project from different viewpoints, it is desirable to use multiple indicators, or to leave a certain flexibility to revise the indicators when the situation evolves. In this project, for example, the proportion of locators using the STP (including the STPs installed by the locators themselves) may be an effective indicator.

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
(1) Output		
STP	Mactan (New construction)	As planned (ODA loan)
	Baguio City (New construction)	As planned (PEZA own fund)
	Bataan (Rehabilitation)	As planned (PEZA own fund)
Wastewater Reuse Facilities	Mactan (New construction)	As planned (ODA loan)
	Baguio City (New construction)	Postponed
	Cavite (New construction)	Postponed
Environment Management Equipment for the ECOZONES	Procurement	Cancelled
Consultant Services	International : 180M/M Local : 399M/M 1. D/D, construction supervision, and other tasks for STPs ( Mactan, Baguio City, Bataan ) 2. D/D, construction supervision and other tasks for wastewater reuse facilities 3. D/D, and other tasks for wastewater reuse facilities ( Mactan, Baguio City, Bataan, Cavite ) 4. Capacity building 5. Urgent planning of engineering services of ECOZONES	International : 49.2M/M Local : 603M/M 1. As planned 2. As planned in Mactan ( Postponed in Baguio City and Cavite ) 3. Cancelled - RA8749(Clean Air Act, 1999) prohibits incinerators. 4. As planned 5. Cancelled
(2) Project Period	March 1997 – February 2001 (4 years)	March 1997 – July 2005 (8 years and 5 months)
(3) Project Cost		
Foreign Currency	2,746 million yen	534 million yen
Local Currency	357 million yen (89 million pesos)	636 million yen (292.8 million pesos)
Total	3,103 million yen	1,170 million yen
ODA Loan Portion	2,746 million yen	534 million yen
Exchange Rate	1 peso = 4 yen (in 1997)	1 peso = 2.17 yen (average of 1997-2005 )





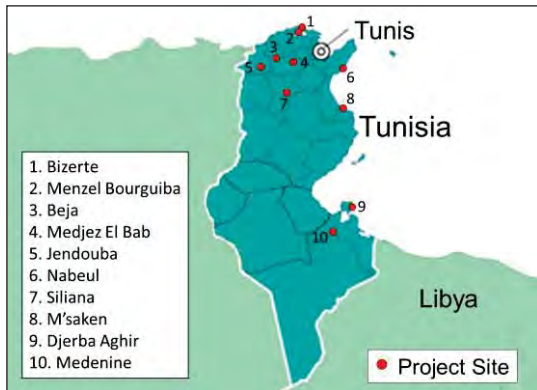
## Ex-Post Monitoring of Japanese ODA Loan Project

### Tunisia

#### Treated Sewage Irrigation Project

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

#### 1. Project Description



Location of the Project site



Distribution valve for irrigation

Inscription in red reads:

“Warning, non-potable water “

#### 1.1 Project Objective

In 10 areas – (1) Bizerte, (2) Menzel Bourguiba, (3) Béja, (4) Medjez El Bab, (5) Jendouba, (6) Nabuel, (7) Siliana, (8) Msaken, (9) Djerba Aghir and (10) Médenine – efforts will be made to ensure the stable supply of irrigation water and conserve groundwater through the development of Tunisia’s irrigation infrastructure (water reservoirs, pumping stations, etc.) using water treated at 12 sewage treatment facilities; thereby contributing to stable agricultural production and regional economic development.

#### 1.2 Outline of the Loan agreement

Approved Amount / Disbursed Amount	1,707 million yen / 1,331 million yen
Loan Agreement Signing Date / Final Disbursement Date	March 1998 / October 2005
Ex-post evaluation	2007-2008
Executing Agency	Ministry of Agriculture
Main contractor	-
Main Consultant	-

### 1.3 Background of the Ex-Post Monitoring

Rainfall is sparse in Tunisia, and most of the arable land is found in either arid or semi-arid areas. Agricultural regions that rely primarily on rainwater frequently suffer major damage from drought. To stabilize agricultural production and increase crop yields, development of irrigation facilities was indispensable. On the other hand, since surface and groundwater resources are limited, securing ample water for agricultural irrigation was a major challenge, especially in the dry season. Under these circumstances, treated sewage was an important source of relatively stable water supply regardless of rainy season or dry season, and so, effective utilization of this water resource was sought. Around 1965, Tunisia began implementing a series of irrigation projects based on the use of treated sewage water for agriculture, and, on the basis of that experience, promoted development plans (including the present project) related to sewage treatment facilities and irrigation facilities. In accordance with this situation, this project installed infrastructures for irrigation utilizing treated sewage from 12 sewage treatment plants in 10 regions.

However, at the time of ex-post evaluation (fiscal year 2007), the effects of the project were limited compared to the plan. Because infrastructure installation was cancelled in some regions (Menzel Bourguiba and Jendouba), number of beneficiary rural households was 61% of the plan; area irrigated by treated sewage remained at 26%. Among the obstacles in the promotion of using treated water was the strong reluctance to use treated water by older generations, who were insistent on traditional farming methods.

Ex-post evaluation made recommendations to conduct field studies in the regions already using treated sewage irrigation, to promote exchange of information within each generation, and to deepen the farmers' understanding of treated sewage irrigation through regularly held seminars on crops suitable to treated sewage irrigation and its cultivation method.

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: 26 November – 14 December 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. Results of the study

### 3.1 Effectiveness

#### 3.1.1 Quantitative effects

##### 3.1.1.1 Results from Operation and Effect Indicators

##### 3.1.1.1.1 Number of Beneficiary Rural Households

In M'saken, the number of beneficiary rural households is approximately the same or slightly higher compared to the time of ex-post evaluation (see Table 1). In Nabeul, sewage treatment station, SE3, has been omitted from the calculations, but no additional data could be obtained. It should be noted that these numbers refer to the number of rural households in the area covered by treated sewage irrigation, and do not represent the number of households actually using the irrigation. Consequently, these numbers cannot be an adequate indicator for determining the effectiveness of this project, and no further analysis will be made based on these numbers. Refer to Table 3 for the number of rural households actually using the irrigation. Also, at the time of ex-post evaluation, Agricultural Development Group (GDA) did not exist in Bizerte; GDA was to be organized in 2006, and treated sewage irrigation was planned to begin in 2008. However, GDA has not been founded to this day.

Table 1 Number of Beneficiary Rural Households

	(Unit: households)						
	Planned	2006**	2007	2008	2009	2010	2011
Bizerte*	2	16	13	13	13	13	13
Beja* (Medjez El Bab)	8	21	N/A	N/A	N/A	N/A	N/A
Nabeul (SE3/SE4)	1,044	610	324	421	443	443	443
Siliana	27	22	23	23	23	20	20
M'saken	100	70	120	120	125	132	132
Djerba Aghir*	55	36	36	36	37	38	38
Medenine*	40	39	39	39	39	39	39
<b>Total</b>	<b>1,276</b>	<b>814</b>	<b>555</b>	<b>652</b>	<b>680</b>	<b>685</b>	<b>685</b>

Source: Regional Commissariat of Agricultural Development (CRDA)

\* sites visited \*\*ex-post evaluation

Note: Years in which the data was unavailable is marked with « N/A » .

##### 3.1.1.1.2 Number of Rural Households Utilizing Irrigation

Regarding the number of rural households utilizing irrigation, comparison with ex-post evaluation

cannot be made since the data at the time does not exist. Considering the amount of yearly rainfall from 2007 obtained during this study (Table 2), number of households using irrigation is increasing in arid regions of Nabeul and M'saken where rainfall is insufficient; however, in the other regions, the irrigation is unused, or the usage is very few (Table 3).

According to the Ministry of Agriculture, treated sewage irrigation in Siliana was commenced in 2008, and there are currently no problems. However, this information was obtained after the completion of the field survey, and follow-up investigation is impossible. Therefore, no further analysis will be made concerning this information.

Table 2 Rainfall

(Unit: mm)

		2007	2008	2009	2010	2011
Bizerte	Summer	N/A	N/A	N/A	N/A	N/A
	Winter	N/A	N/A	N/A	N/A	N/A
Beja* Medjez El Bab	Summer	15.2	3.6	63.0	8.4	7.8
	Winter	206.3	122.0	395.2	236.7	390.4
Nabeul	Summer	24.8	1.0	48.0	2.2	5.9
	Winter	230.2	47.4	168.4	59.1	144.0
Siliana	Summer	N/A	N/A	N/A	N/A	N/A
	Winter	N/A	N/A	N/A	N/A	N/A
Monastir (M'saken)	Summer	39.6	23.4	10.0	2.0	36.6
	Winter	90.6	19.4	147.2	30.0	103.2
Djerba* (Djerba Aghir)	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 Weather Forecast \* sites visited

Table 3 Number of Rural Households Utilizing irrigation, and Rate of Utilization

(Unit: Households)

		2007	2008	2009	2010	2011
Bizerte*	Number of Farmers Utilizing Irrigation	N/A	N/A	1	2	N/A
	Irrigation Utilization Rate	N/A	N/A	8%	15%	N/A
Beja* (Medjez El Bab)	Number of Farmers Utilizing Irrigation	N/A	N/A	N/A	N/A	N/A
	Irrigation Utilization Rate	N/A	N/A	N/A	N/A	N/A
Nabeul (SE3/SE4)	Number of Farmers Utilizing Irrigation	307	333	344	340	324
	Irrigation Utilization Rate	95%	79%	78%	77%	73%
Siliana	Number of Farmers Utilizing Irrigation	0	0	0	0	0
	Irrigation Utilization Rate	0%	0%	0%	0%	0%
M'saken	Number of Farmers Utilizing Irrigation	90	95	92	100	105
	Irrigation Utilization Rate	75%	79%	74%	76%	80%
Djerba Aghir*	Number of Farmers Utilizing Irrigation	N/A	N/A	N/A	21	21
	Irrigation Utilization Rate	N/A	N/A	N/A	55%	55%
Medenine*	Number of Farmers Utilizing Irrigation	N/A	N/A	16	11	7
	Irrigation Utilization Rate	N/A	N/A	41%	28%	18%

Source: CRDA \*sites visited

The following are reasons for not utilizing treated sewage water obtained through interviews with each regional CRDA. Bizerte used the irrigation experimentally in 2008 and 2009, but there is no current usage of the irrigation. The reasons for this are the following: (1) there is sufficient rainfall; (2) Treated sewage is viewed as impure, and prayers cannot be held on land irrigated with treated sewage<sup>1</sup>; (3) cost of vaccination, compulsory to practice treated sewage irrigation, is expensive and borne by the individual; (4) the law restricts raising highly profitable crops using treated sewage irrigation (Eating fruits, such as olives, which have fallen from trees grown with treated sewage irrigation is also prohibited by law. The fruits must be picked from the tree.); (5) pipeline network have become antiquated, and seawater seeps into the system, preventing the use of treated water for irrigation due to salinity. Moreover, the low rate of utilization of irrigation can also be explained by

<sup>1</sup> Cultural considerations in reference to irrigated farming by retreated used waters: Consideration of religious background is essential in understanding the reluctance to resort to irrigation by treated sewage waters. During the site visits, farmers often asserted the impossibility to conduct prayer on the farmlands watered with impure water. In the Islamic religion, prayer is held five times a day. Hands, face, ear, and feet are cleansed with clean water before each prayer. The treated sewage waters are perceived to be “impure water”, and it is not possible to pray on the farmland watered by these waters. This explains their reticence to treated sewage water which is based on Islamic religious nature. On the other hand, treated sewage water in certain regions contains contaminants and salt. According to the Ministry of Environment, the treatment of waters has not reached the final ideal level. The National Sanitation Utility (ONAS) is ultimately aiming for “potable treated sewage water”. Along with this effort, the Ministry of Agriculture should meticulously engage in activities to reform the perception that treated sewage is “impure water”.

the dissolution of the GDA at the event of the revolution of 2011.<sup>2</sup> The low utilization rate in Béja and Medjez El Bab, in addition to the reasons shown for Bizerte, is as follows: (6) the revolution has caused bankruptcy or closing of industrial farmers who were primary users of the irrigation; (7) there is frequent system failure and water outage, since the quality of treated sewage is poor, and contaminants clog the irrigation pumps. In Medenine, additional reasons are as follows: (8) many of the farmers, which are small, part time farmers, are indifferent to treated sewage irrigation due to its cost; (9) many farmers prefer not to rely on irrigation because of occasional water outages due to pump failure or electric bill arrears; (10) Olives, which is the primary crop in Medenine, can be raised using rainwater, and there is no incentive in using the irrigation. In Djerba Aghir, irrigation is no longer utilized since February 2012, since the GDA is non-existent after the revolution, and operation and maintenance cost cannot be paid (See Footnote 2). At the visited sites, the utilization of irrigation were very few or none, and there were no new applications for utilization.

#### 3.1.1.1.3 Irrigated Areas

Since the ex-post evaluation, the irrigated areas remain the same or have slightly diminished (see Table 4). See 3.1.1.1.2 for the reasons for the low utilization rate. According to the Ministry of Agriculture and the CRDA, decrease in the irrigated area can be accounted to bankruptcy or discontinuation of large-scale industrial farmers which were seen throughout the country at the event of the revolution in 2011. Small-scale farmers constitute the majority of farmers currently utilizing the irrigation.

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<sup>2</sup> Significance of the GDA as a system: In order to understand the GDAs' dissolution or their functional deficiencies, it is necessary to take into account the Tunisian political context. During the implementation of the project, from 1998 to 2005, the GDAs had been created by the former government with the purpose of generalizing the utilization of the irrigation facilities and to ensure their maintenance. According to persons concerned within the CRDA and the GDA, "there was corruption, since the GDA was managed by the President's next of kin or by local rural households appointed by the former government; the farmers were compelled to participate". When the government collapsed at the event of the Jasmine Revolution in 2011, the supervisors of the GDA appointed by the former president were ousted with him. The farmers who were compelled by the government to use the facilities before the revolution were passive in the continuation of treated sewage irrigation, and the maintenance of the facilities (pumping stations etc.) was abandoned following the dissolution of the GDA. The Ministry of Agriculture is quite aware of the chaotic situation prevailing in the relations between the CRDA and the GDA. Financial responsibilities of inspection and maintenance are not clearly defined, and more facilities are being abandoned and have become dilapidated. (This is the case in Béja, Medjez El Bab, Medenine, and Djerba Aghir). Since the revolution, the rural households lost the sense of initiative, adopting a passive attitude of dependency to the government.

Table 4 Comparison of Irrigated Areas by Season

(Unit: ha)

		Planned	2006**	2007	2008	2009	2010	2011
Bizerte*	Summer	297	0	N/A	N/A	N/A	N/A	N/A
	Winter		0	N/A	N/A	N/A	N/A	N/A
Beja* (Medjez El Bab)	Summer	390	134	N/A	N/A	N/A	N/A	N/A
	Winter		75	N/A	N/A	N/A	N/A	N/A
Nabeul (SE3/SE4)	Summer	560	151	86	104	96	110	101
	Winter		0	45	51	41	41	46
Siliana	Summer	70	0	N/A	N/A	N/A	N/A	N/A
	Winter		0	N/A	N/A	N/A	N/A	N/A
M'saken	Summer	121	25	N/A	N/A	N/A	N/A	N/A
	Winter		0	N/A	N/A	N/A	N/A	N/A
Djerba Aghir*	Summer	128	44	N/A	44	38	37	37
	Winter		44	N/A	44	38	37	37
Medenine*	Summer	43	8.5	N/A	14	14	7	7
	Winter		9	N/A	14	14	7	7

Source: CRDA \* sites visited \*\*values from ex-post evaluation

On the visited sites in Djerba Aghir and Medenine, there is no necessity to further the utilization of facilities in the summer time, since the irrigated areas are the same as in winter time. From the responses to the questionnaire, in Siliana the conflict between rural households, at the time of ex-post evaluation, have ended, and agricultural production has resumed. The ex-post evaluation reported that one of the factors for the low usage is due to the fact that the GDA representative resided outside of the assigned region, and his supervision was inadequate. The report identified a possibility that this situation may improve by changing the GDA representative. The GDA representative was replaced in August of 2008. However, this did not lead to the increase in irrigation utilization. (See 3.1.1.1.2 for the reason for the lack of increase) According to the CRDA of Béja, the pumping station of Medjez El Bab (governorate of Béja), upon its startup service in 2008 was utilized by only two industrial farmers and no GDA had been created. Given the presence of a river nearby, water was sufficient and the irrigation had not been utilized.

The treated sewage water is utilized in Nabeul and M'saken, where rainfall is scarce and the lands are arid, but not in the other regions. (Please refer to the explanation under 3.1.1.1.2) In addition, according to the CRDA (interview and questionnaire), no new application for used waters supply has been filed by the farmers.

Table 5 shows the irrigated area based on the data provided by the Ministry of Agriculture.

Table 5 Comparison of Irrigated Areas by Season

(Unit: ha)

		Planned	2006**	2007	2008	2009	2010	2011
Bizerte*	Summer	297	0	N/A	N/A	5	N/A	N/A
	Winter		0	N/A	N/A	N/A		N/A
Beja*	Summer	310	134	324	354	299	413	N/A
	Winter		75	70		55		N/A
Medjez El Bab*	Summer	80	0	100	100	75	75	N/A
	Winter		0	6	75	8		N/A
Nabeul (SE3/SE4)	Summer	560	151	454	410	491	418	N/A
	Winter		0	10	30	30		N/A
Siliana	Summer	70	0	60.5	66.5	71	110	N/A
	Winter		0					N/A
M'saken	Summer	121	25	110	132	138	153	N/A
	Winter		0	108	108	113		N/A
Djerba Aghir*	Summer	128	44	51	75	41	41	N/A
	Winter		44	51		41.5		N/A
Medenine*	Summer	43	8.5	9	0	16	10	N/A
	Winter		9	10	10	16		N/A

Source: Ministry of Agriculture \*sites visited \*\*values from ex-post evaluation

From Table 5, the irrigated areas are increasing in almost all of the regions. However, follow-up investigation is impossible, since these data were obtained after the completion of the field survey. Therefore, no further analyses will be made based on these data.

#### 3.1.1.1.4 Crop Yields

Table 6 shows the volume of the crop yields. As with the ex-post evaluation, analysis of this project's contribution to the crop yield is difficult due to low irrigation utilization rate. The CRDA's responses during the site visits were the same.



Table 6 Crop Yields

(Unit: kg/ha)

Governorate	Crop	Planned	2006**	2007	2008	2009	2010	2011
Beja*	Sugar Beet	650	250	N/A	N/A	N/A	N/A	N/A
	Wheat	60	52	N/A	N/A	N/A	N/A	N/A
	Fodder	500	400	N/A	N/A	N/A	N/A	N/A
	Sunflower	20	N/A	N/A	N/A	N/A	N/A	N/A
Nabeul (SE3/SE4)	Citrus Fruits	200	150	N/A	N/A	N/A	N/A	N/A
	Tobacco	-	200	N/A	N/A	0.44	N/A	1.1
	Fodder	400	15	3,424	3,915	3,278	2,865	2,550
	Olives	25	11	12	15	15	15	20
	Fruit Tree	-	750	N/A	N/A	N/A	N/A	N/A
M'saken	Wheat	-	N/A	N/A	N/A	N/A	N/A	N/A
	Olives	28	N/A	100	100	150	130	180
	Fodder	600	N/A	650	800	800	900	1,200
Djerba Aghir*	Dates	16	N/A	N/A	N/A	N/A	N/A	N/A
	Olives	-	30	40	50	70	50	30
	Barley	-	16	30	30	60	60	15
	Fodder	600	300	300	400	480	150	N/A
Medenine*	Olives	7	85	72	84	84	42	48
	Fodder	600	70	80	80	160	80	80
	Barley	-	4	N/A	N/A	N/A	20	N/A
	Sorghum	-	N/A	N/A	N/A	N/A	N/A	N/A

Source: CRDA \* sites visited \*\*values from ex-post evaluation

### 3.1.1.1.5 Volume of Treated Used Waters

The volume of treated sewage has increased since the ex-post evaluation (Table 7). However, not all treated sewage is utilized for irrigation. As can be seen in Table 8, capacity of the treated sewage irrigation facility is fixed. Therefore, it is logical to analyze the facility utilization rate of facilities shown in table 8. Since corresponding data is not available from the ex-post evaluation report, analysis will be carried out on numbers obtained for 2007 in this study. From table 8, it can be seen that the volumes of utilization have increased in Beja, Nabeul, and M'saken. According to the CRDA of Béja, treated sewage was barely utilized until the revolution of 2011. However, since 2012, treated sewage ceased to be used due to pump shutdown from arrears of operation cost.

Table 7 Volume of Treated Sewage

(Unit: liters/sec)

	Planned	2006**	2007	2008	2009	2010	2011
Bizerte*	300	N/A	181	177	206	202	213
Beja* (Medjez El Bab)	163	95.57	82	83	75	74	66
Nabeul (SE3/SE4)	190	190.45	215	214	219	200	192
Siliana	30	N/A	34	28	24	28	27
M'saken	220	N/A	67	75	81	81	89
Djerba Aghir*	120	N/A	154	142	127	112	84
Medenine*	100	N/A	32	34	37	39	46

Source: ONAS \* visited sites \*\*values from ex-post evaluation

Table 8 Status of Sewage Treatment Facilities

(Unit: liters/sec)

		2007	2008	2009	2010	2011
Bizerte*	Capacity	25	25	25	25	25
	Treated Amount	0	0	0	0.09	0.32
	Usage Rate	0%	0%	0%	0%	1%
Beja* (Medjez El Bab)	Capacity	59	59	59	59	59
	Treated Amount	8.63	4.44	22.38	25.37	14.90
	Usage Rate	15%	8%	38%	43%	25%
Nabeul (SE3/SE4)	Capacity	121	121	121	121	121
	Treated Amount	86.57	80.86	102.60	109.40	85.62
	Usage Rate	72%	67%	85%	90%	71%
Siliana	Capacity	19	19	19	19	19
	Treated Amount	14.27	13.32	16.08	18.07	11.10
	Usage Rate	75%	70%	85%	95%	58%
M'saken	Capacity	27	27	27	27	27
	Treated Amount	15.60	13.95	22.20	22.20	22.20
	Usage Rate	58%	52%	82%	82%	82%
Djerba Aghir*	Capacity	12	12	12	12	12
	Treated Amount	6.79	6.34	7.93	8.56	6.34
	Usage Rate	57%	53%	66%	71%	53%
Medenine*	Capacity	7	7	7	7	7
	Treated Amount	2.73	2.22	5.03	4.76	5.71
	Usage Rate	39%	32%	72%	68%	82%

Source: ONAS \*visited sites

In the North, the utilization rate of treated sewage utilization varies from 0% to 25%. In the South, the utilization rates of treated sewage irrigation facilities are 70% to 95% of their capacity. These rates prove that the demand for treated sewage irrigation exist in the arid regions. According to ONAS, Bizerte and Siliana are supplied with treated sewage but the utilization is nil. A query was made to ONAS concerning the decline in the treated sewage utilization rate in M'saken, but clear answer could not be obtained. ONAS is merely supplying the treated sewage water, and is not

concerned with whether the water is utilized or not. At the time of the site visit, the reservoir was filled to the brim.

### 3.1.1.1.6 Water Quality Standard

Regarding the quality of treated sewage, average values have improved in comparison with the ex-post evaluation (Table 10), though there are regions which do not fulfill the national water quality standard (Table 9).

The ONAS undertakes the following analysis:

Daily: TSS (total suspended solids), Temperature, pH

Weekly: Physico-chemical test

Monthly: BOD<sub>5</sub> (biochemical oxygen demand in 5 days)

Semiannually: Toxicity, Bacteriological Test

There is no change since the Ex-post evaluation in that the supply of irrigation water is cut when the value from the test results or the monthly water quality tests exceed the standard's maximal value. However, data on the frequency of these cuts in water supplies could not be obtained. As a result of these water cuts, there is increasing number of farmers who do not rely on the irrigation because of frequent water outages (See 3.1.1.1.2(9)).

Table 9 Tunisian Standard on Water Quality

(Unit: mg/l)

	BOD5	COD	SS
2006**	30	90	30
2012	30	90	30

Source: ONAS \*\*values from ex-post evaluation

Table 10 Quality of Treated Sewage (average from 2007 to 2011)

(Unit: mg/l)

	Year	BOD5			COD			SS		
		Min	Avg	Max	Min	Avg	Max	Min	Avg	Max
Bizerte*	2004**	23			70			18		
	2012	18	20	24	70	75	81	18	21	24
Beja*	2004**	27			113			16		
	2012	17	26	36	82	103	141	8	23	30
Medjez El Bab	2004**	34			94			31		
	2012	22	27	35	69	76	91	22	25	31
Nabeul (SE3/SE4)	2004**	22			112			32		
	2012	15	23	31	76	102	142	21	27	34
Siliana	2004**	42			116			60		
	2012	22	36	51	79	108	137	19	42	66
M'saken	2004**	16			86			14		
	2012	11	22	33	70	89	106	13	23	31
Djerba Aghir*	2004**	10			51			17		
	2012	7	10	13	41	53	65	10	13	16
Medenine*	2004**	32			74			24		
	2012	19	22	26	53	57	64	20	24	29

Source: ONAS \*visited sites \*\*values from ex-post evaluation

ONAS understands the necessity for the improvement of water quality, and is continually taking measures to advance techniques on water quality improvement (filtering and sedimentation). Regarding the standards of water quality, the ONAS deplores the fact that there are still regions which do not meet the standards, and they affirm to pursue their initiatives to improve the quality of water, an issue they consider a high priority. The ONAS indicates, however, that the costs of utilization of water recovered from rural households are not sufficient enough to cover the irrigation facilities' maintenance costs. ONAS also states that there are other problems, other than water quality, that should be addressed as a combined effort of multiple ministries, in order to generalize irrigated agriculture, such as including the improvement of the relationship between the CRDA and the GDA and the implementation of vaccination.

The Ministry of Public Health indicated that "poor quality of water might be due to sewage treatment exceeding the capacity of the facility. Failure of irrigation machinery may be due to the poor quality of treated sewage water". Data provided by ONAS (Table 8), however, shows that even though the utilization rate of sewage treatment facilities are 70% to 95% in Nabeul, Siliana, and M'saken, the capacity is not exceeded.

This monitoring study has verified that the problems indicated during the Ex-post evaluation are not yet resolved. In addition, since treated sewage has not been generalized, the analysis is

impossible for a majority of indicators.

#### 3.1.1.2 Result of Calculations of Internal Rates of Return (IRR)

During the Ex-post evaluation, the IRR has been calculated as 7.0%. However, since the basis for the calculation could not be obtained, EIRR will not be calculated in this ex-post monitoring.

#### 3.1.2 Qualitative Effects

During the Ex-post evaluation, the qualitative effects as mentioned hereunder have been reported.

1. Conservation of the underground resources through water reuse
2. Expansion of irrigation area in the targeted regions, and ensuring/expanding the means of agricultural production
3. Increase in production through irrigated farming and improvement in living conditions by rise in income
4. Introduction of irrigated farming
5. Reinforcement of livestock industry by the introduction of summer fodder production
6. Improvement of production and economic activity

The presented effects in the ex-post evaluation seem, nevertheless, to have disappeared or never to have existed. Regarding the qualitative effects of the project, the Ministry of Agriculture replied that the reported qualitative effects could be expected if the use of treated sewage irrigation is widespread. However, at present, the usage is sparse and, therefore, has not led to any effects.

The Ministry of the Environment thinks that “irrigation utilizing treated sewage is significant considering that many regions of Tunisia is arid or semi-arid land”. The Ministry of Agriculture is of the opinion that “using treated sewage to complement the water shortages in the southern regions is significant”. From these opinions, it can be inferred that treated sewage irrigation is in accordance with the regions’ water demands. However, at this time, since there are many obstacles to the usage of treated water and the usage is sparse, it is impossible to find a correlation between this project and the above stated qualitative effects.

### 3.2 Impact

#### 3.2.1 Intended Impacts

##### 3.2.1.1 Economic Impact

Income of the rural households differs by a few digits compared to the values presented in the ex-post evaluation (Table 11). The obtained data for this study appear to be adequate, taking into account the fact that the average income (annual) in Tunisia are around 7,200 TND (about 400,000 yen).

Table 11 Rural Household Income

(Unit: 1,000TND)

	1996**	2007	2008	2009	2010	2011
Bizerte*	634.1	N/A	N/A	N/A	N/A	N/A
Beja* (Medjez El Bab)	379.0	N/A	N/A	N/A	N/A	N/A
Nabeul (SE3/SE4)	1,389.1	3.3	3.4	3.5	3.5	3.6
Siliana	145.9	3.0	3.5	4.0	5.0	5.0
M'saken	411.6	1.5	1.6	1.7	1.8	1.8
Djerba Aghir*	432.9	2.0	2.0	2.0	1.0	1.0
Medenine*	159.0					

Source: CRDA \* visited sites \*\*values from ex-post evaluation

According to the CRDAs of the visited regions, the treated sewage water were unused or used sparsely for irrigated farming, and, therefore, the CRDAs could not comment on the contribution of treated used waters concerning economic impacts such as, the positive effects on the development of agriculture, the diversification cultivated crops, the rise of productivity of crops, and livestock industry. Moreover, data on the volume of crop yields could not be obtained.

### 3.2.1.2 Social Impact

The ex-post evaluation mentioned the increase of work opportunities and the improvement of living environment as social impacts. From the questionnaire and interview to the CRDAs, there were no comments regarding the social impacts reported in the ex-post evaluation. The irrigation water is not being used, or even if it is used the ratio of land using treated sewage irrigation is much too miniscule to have any social impact. Ex-post evaluation also mentioned the negative effects of the conflicting views between the older generation, which is accustomed to agriculture using rainwater, and the younger generation, which is trying to convert to irrigation agriculture using treated sewage, on the diffusion of irrigation. In this study, clear answer regarding the differences between generations, and any change in the relationship of the generations could not be obtained.

### 3.2.2 Other Positive or Negative Impacts

#### 3.2.2.1 Awareness for Vaccination and Protective Clothing

Table 12 Vaccinated Farmers

(Unit: persons)

	2007	2008	2009	2010	2011
Bizerte*	0	0	0	0	0
Beja* (Medjez El Bab)	0	0	0	0	0
Nabeul (SE3/SE4)	0	0	0	0	0
Siliana	0	0	0	0	0
M'saken	0	0	0	0	0
Djerba Aghir*	0	0	0	0	0
Medenine*	0	0	0	0	0

Source: Ministry of Public Health \* visited sites

The Ministry of Public Health mandates vaccination and wearing of protective clothing to the users of treated sewage, in order to prevent infectious disease such as tetanus. The Ministry of Agriculture, the Ministry of Public Health, and the CRDA are conducting information seminars and door-to-door visits to inform the farmers. However, at the visited project site, vaccination recipient remains at zero, and protective clothing was not in use; no improvement could be seen from the time of ex-post evaluation.

This can be explained by the high cost of vaccination, 60 TND, which is wholly borne by the farmers. (According to table 11, the average monthly income in Medenine was 1,000 TND in 2011) The Ministry of Public Health, which is the ministry responsible for vaccination of farmers using treated sewage, insists that “the Ministry of Agriculture is responsible for this situation”, and the Ministry of Environment asserts that “the Ministry of Public Health should cover the cost for vaccination”. Role and responsibility of ministries regarding this issue have not yet been established.

#### 3.2.2.2 Impact on the Natural Environment

The problem of foul odor from treated sewage in the summertime at Medenine, which was referred in the ex-post evaluation, is still unresolved. At Medenine, only a part of the treated used waters is utilized, and the rest is discharged in the nearby creek. There are persistent complaints from residents as the drained treated sewage water causes infestation of insects and foul odor in the summertime. In the interview, the CRDA claims taking no particular action against this problem. It can be assumed that the CRDA is not in the state to solve this problem, as the structure of CRDA and GDA has been unstable since the revolution. In an interview, the CRDA of Medenine and the Ministry of the Environment stated that no serious impacts on health or pollution of the soil/crops have been reported by utilizing the treated water; but no scientific study has been conducted on this matter. According to the interview with the Ministry of Public Health, which undertakes health

examination twice a year for all rural households practicing treated sewage irrigation, the impact on health is slight; the only effects reported were of itching nature, no serious effect having been noticed. Besides, the Ministry of Environment states although they “have not undertaken a scientific study on the effects of treated used waters on the environment, a new proposition of a study on the effect on the underground waters in eight sites is being planned”.

### 3.2.2.3 Removal of Settlers and Land Acquisitions

There has been no removal of inhabitants or land acquisition since the ex-post evaluation.

In conclusion, most of the impacts indicated during the Ex-post evaluation could not be verified within the confines of this study. The treated sewage water having not been utilized, it is difficult to establish links between the impacts and the project. This study has, however, verified the persistence, since the Ex-post evaluation, of the negative impacts of lack of vaccination and foul odor generated by treated sewage.

## 3.3 Sustainability

### 3.3.1 Structural Aspect of Operation and Maintenance

Compared to the time of Ex-post evaluation, many regions are presently not able to carry out the maintenance of the pumping stations. The GDAs, which should be conducting its supervising and operating activities such as guarding the facility and pipelines, have dissolved or have become dysfunctional since the revolution in 2011.

Overall, the distribution of tasks remains the same, for operation and maintenance of the irrigation facilities, between the CRDAs and the GDAs ; the CRDA operate and maintain pumping stations and reservoirs, while the GDAs manage the facilities within the irrigated lands (guarding the facility, irrigation pipes, etc.) and conduct maintenance of small to medium scale. However, since the Jasmine Revolution of 2011, many GDAs organized coercively by the former government, have been dissolved<sup>3</sup> or are no longer operational, and consequently, the maintenance of pumping stations has become insufficient throughout the country. Specifically, the pumping stations are non-operational or dilapidated due to the following reasons: 1. during the revolution, the supervisors fled at the arrival of insurgents, and the copper wires of the electrical panel boards were stolen and destroyed; 2. in the absence of the GDA, electric power bills have fallen into arrears and the power supply was cut; 3. lack of personnel to conduct the necessary pump operations due to insufficient funds. According to the Ministry of Agriculture, in the zones where the GDAs were dissolved,

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<sup>3</sup> Treated sewage irrigation was decided by the former government and imposed on the farmers regardless of their preference. Since the officials of the GDA were appointed directly by the former government, the farmers could not express their opinion. (Today, the concerned individuals of the CRDA and the farmers describe these officials as “farmers affiliated with the former President”.) These GDAs, operated by the former government, were dissolved or became dysfunctional with the collapse of the former regime by the revolution in 2011.



farmers are depending on the CRDA for the operation and maintenance of the facilities. According to an interview with the CRDA, in the regions such as Bizerte, Medenine, and Beja, the CRDA is maintaining the facilities in place of the GDA. At present, even in the regions where there is still a GDA, cooperative relationships between the CRDAs and the GDAs in management and maintenance of the facilities are lost; the Ministry of Agriculture expects to restore the relationship of the CRDA and the GDA through a project financed by the German Bank of Development (KfW), French Development Agency, and African Development Bank (AfDB). At the time of this study, the items to be surveyed are being decided; this survey is expected to be implemented over a period of one year from January 2013. In addition, the Ministry of Agriculture has not implemented any sensitization project through the CRDA since 2011.

At the time of the ex-post evaluation, ONAS, under jurisdiction of the Ministry the Environment and Sustainable Development (current Ministry of Environment), was responsible for the sewage treatment and the treated water quality. According to ONAS, it is still responsible for these processes, and, at the same time, the CRDAs are also carrying out water quality inspection. This was confirmed by the CRDA during the site visit. In addition, according to the responses to our questionnaire, the CRDA of Béja and Siliana outsource water quality inspection to a private enterprise. The CRDA of Béja expended 6,700 TND in two years for water quality inspection. Also, according to the Ministry of the Environment, they are preparing, at national level, to analyze the effects of treated sewage water quality on the soil and the underground waters.



Empty reservoir  
(Béja)



Inundated pumping station  
(Medenine)

### 3.3.2 Technical Aspects of Operation and Maintenance

The CRDA's training program and the GDA's updating of instruction manuals and staff training, practiced at the time of ex-post evaluation, have been discontinued. The visited CRDA have affirmed that they continued the training and the technical assistance for the GDA and the rural households,

but with the revolution in 2011, the GDA in some regions were dissolved or became non-operational, hence making it impossible to pursue these activities. The manuals have not been renewed, and the CRDA staff individually use old manuals created at the launching of the project.

According to the responses to questionnaire, the CRDA of Siliana is organizing training sessions for the GDA on irrigation agriculture and treated sewage irrigation. In the irrigation field study to governorate of Sousse, the participants included CRDA engineers, GDA members, ONAS engineers, the Ministry of Public Health district office staff, and farmers from Siliana's Mediouna district. Also, In Siliana, the CRDA has also replied that it has organized training sessions for farmers on the irrigation system and the irrigation techniques, but since treated sewage irrigation is unused in Siliana, these training sessions is assumed to be pertaining to regular irrigation techniques. (Refer to Table 2)

### 3.3.3 Financial Aspects of Operation and Maintenance

The financial situation has worsened since the ex-post evaluation. The sustainability of the financing of treated sewage irrigation facilities maintenance is unclear: low water fee collection rate which has decreased further since the time of ex-post evaluation, operation and maintenance cost exceeds the collected water fee, and the GDA, responsible for expending the operation and maintenance cost, was dissolved by the revolution.

At the time of ex-post evaluation, Tunisian government was providing subsidies for installation of irrigation equipment, and encouraging the expansion of irrigation facilities. According to the Ministry of Agriculture and the CRDA of the sites visited, the government is providing low-interest loans and subsidies through a special fund, FOSDAP, managed by the National Agriculture Bank (BNA), and is actively engaging in promoting the usage of treated sewage irrigation. Other measures include the CRDA's financial assistance in operation and maintenance cost, although the exemption of the cost planned at the time of ex-post evaluation has been cancelled. Currently, the cost of maintenance of irrigation facilities such as pumping stations is assumed by the GDA, but in the regions such as Nabeul where the costs of utilization recovered do not suffice to cover its expenses, the CRDA pays the difference. In Djerba Aghir, where the GDA have been dissolved, the irrigation facilities have stopped since February 2012, for arrear of the costs of maintenance (electric power and personnel to guard the pumps).

In order to resolve the problem with the operation and maintenance, issues such as water quality, cultural perceptions, and absence of responsible organization need to be addressed other than the water fee; however, it is crucial to clarify the organizations' financial responsibility of the costs to ensure a sustainable facility maintenance. In the interviews with the ONAS, the Ministry of Agriculture and the CRDA, all have pointed out that "the water fee charged to the farmers for the water (20 mm, or 0, 02 TND/m<sup>3</sup>) are set too low in comparison with the costs of maintenance. The

water fee was set intentionally low by the former President as a public policy. Fundamentally, the fee should be raised to a level enough to be able to complement the cost of operation and maintenance”. Although the operation and maintenance cost exceeds the collected water fee, raising the water fee will result in adverse effects for the diffusion of irrigation usage. Therefore, water fee needs to be revised upon comprehensive analysis of government policy and demand for treated sewage irrigation. For the time being, CRDA takes charge of the deficits yielded by the maintenance of the irrigation facilities concerned.

Table 13 Costs of Irrigation Facility Maintenance Assumed by the CRDA  
(Unit: TND)

	2006**	2007	2008	2009	2010	2011
Bizerte*	440,000	N/A	N/A	N/A	N/A	N/A
Beja* (Medjez El Bab)	507,840	N/A	N/A	N/A	N/A	58,900
Nabeul (SE3/SE4)	346,000	72,000	74,000	76,000	78,000	80,000
Siliana	469,843	4,000	4,500	5,000	5,200	5,300
M'saken	245,000	21,250	23,020	19,840	19,220	18,450
Djerba Aghir*	N/A	N/A	N/A	N/A	N/A	N/A
Medenine*	77,000	N/A	N/A	N/A	20,000	7,000

Source: CRDA

According to the Ministry of Agriculture, the operation and maintenance cost of irrigation facilities in Nabeul and Siliana compared to those presented in the ex-post evaluation report may pertain to the cost of the whole governorate, and not the cost specific to the target regions of this project. Therefore, comparison with data from that of the ex-post evaluation was not performed. During the interviews on the visited sites, the CRDA has confided that “the facilities are getting old and the maintenance costs are increasing”. As to the regions other than Nabeul and M’saken, we were not able to collect data on the distribution of the costs of maintenance, which were collected in the ex-post evaluation.

Table 14 Distribution of the Costs of Operation and Maintenance

(Unit: TND)

		2006**	2007	2008	2009	2010	2011
Bizerte*	O&M Cost	N/A	N/A	N/A	N/A	N/A	N/A
	Collected Water Fee	N/A	N/A	N/A	N/A	N/A	N/A
	Government Budget	N/A	N/A	N/A	N/A	N/A	N/A
Beja* (Medjez El Bab)	O&M Cost	64,860	N/A	N/A	N/A	N/A	58,900
	Collected Water Fee	30,000	N/A	N/A	N/A	N/A	N/A
	Government Budget	34,860	N/A	N/A	N/A	N/A	N/A
Nabeul (SE3/SE4)	O&M Cost	12,000	72,000	74,000	76,000	78,000	80,000
	Collected Water Fee	1,200	36,000	37,000	38,000	37,000	35,000
	Government Budget	10,800	36,000	37,000	38,000	41,000	45,000
Siliana	O&M Cost	N/A	4,000	4,500	5,000	5,200	5,300
	Collected Water Fee	N/A	N/A	N/A	N/A	N/A	N/A
	Government Budget	N/A	N/A	N/A	N/A	N/A	N/A
M'saken	O&M Cost	N/A	21,250	23,020	19,840	19,220	18,450
	Collected Water Fee	N/A	4,450	6,220	4,500	5,400	4,600
	Government Budget	N/A	16,500	16,500	15,000	13,500	13,500
Djerba Aghir* Medenine*	O&M Cost	N/A	N/A	N/A	N/A	20,000	7,000
	Collected Water Fee	N/A	N/A	N/A	N/A	N/A	N/A
	Government Budget	N/A	5,884	2,808	4,159	2,358	3,916

Source: CRDA

### 3.3.4 Actual Status of Operation and Maintenance

Since the Ex-post evaluation, the status of the management of facilities has worsened. Overall, the conditions of operation and maintenance were unsatisfactory in the regions of visited sites. The facilities were in poor condition, and in some regions the resumption of operation was inconceivable. At the pumping station of Beja there supervisor was absent and we could not enter the area. The maintenance conditions were appalling. The premises were abandoned and there were traces of water leaks on the walls. In Medenine, the facilities are operational, but the pumping station could not be entered; the floor was inundated at a depth of 15 cm because of water leaks. According to the supervisor, this situation has not changed since his assignment four years ago. In other words, this condition is irrelevant with the Arab Spring; it appears that the state of maintenance was poor even before the revolution. Since these facts are not indicated in the ex-post evaluation report, it can be conjectured that the maintenance of the facility was abandoned after the ex-post evaluation. The state of maintenance is as bad in the Medjez El Bab pumping station. Not utilized for a long time, there was visible rust and meters were broken. In Djerba Aghir, the facilities have not been in use since February 2012 and the pumping station was abandoned. All the CRDAs stated that, “there is no problem regarding maintenance. The facilities can be put to use if we choose to use them”, or that “we have already secured the necessary funds for repair in the year 2013.” From observing the

facilities during the site visit, they were not in the condition to resume operation; however, further verifications could not be made. The pictures of the facilities were shown to the Ministry of Agriculture to determine the possibility of utilization upon resumption of operation, and if the budget necessary for repair were available. The Ministry declared that they were not aware of the status of the irrigation facilities of each CRDA, and they had no knowledge of the breakdowns and defects.

From the above, the conditions of the operation and maintenance have worsened since the ex-post evaluation. This is due to a great extent to the absence of an organization that is responsible for operating and maintenance, caused by the dissolution of many GDAs after the revolution. The absence or functional deficiency of the GDA has negative effects not only on the framework of operation and maintenance, but also on the irrigation technique and on financing. Further, there are abandoned facilities, whose abandonment is irrelevant with the revolution of 2011. It is desirable that the Ministry of Agriculture deploys radical efforts to improve the situation, but unfortunately, the situation remains for the moment obscure as to its future development.

### 3.4 Others

#### (1) Follow-up of the Lessons Learned

In the ex-post evaluation, the following points were indicated as lessons learned: public education campaign was insufficient regarding the convenience of treated sewage irrigation, and lack of understanding by older generation farmers is hindering the usage of treated sewage; cooperation between ONAS, competent authorities, and relevant agencies is necessary. Currently, it was found that public education campaign by the Ministry of Agriculture to the GDA and farmers is insufficient. ONAS and the Ministry of Agriculture have begun to cooperate with the Ministry of Public Health concerning the utilization of treated used waters (exchange of information and opinions), but this cooperation is also insufficient and further initiatives should be deployed.

As other efforts, Ministry of Agriculture and Ministry of Environment is cooperating to conduct a study of the attitudes and practices of farmers towards the use of treated sewage water. This will be followed by an intensive public education campaign in 2013 and 2014 in all areas irrigated by treated sewage water. Positive effects can be expected from this campaign.

#### (2) Follow-up of Recommendations

In the ex-post evaluation, the following recommendation was made: in order to further spread the irrigation of farmland using treated sewage water, it is important to reduce the sense of anxiety about using treated sewage water for irrigation – especially among the older generation of farmers who adhere to the traditional methods of farming – by promoting understanding of the benefits of using

treated sewage water as irrigation water. After the ex-post evaluation until 2010, the Ministry of Agriculture actively promoted the utilization of treated sewage water for irrigation through public education campaign, seminars on safety of treated sewage water, and, in some regions, undertaking of the facilities maintenance by the CRDA in place of the GDA. However, the GDAs of the project location which were organized in the name of “operating the treated sewage irrigation facilities” were dissolved or became non-operational during the revolution in 2011. Cooperative relationships between the CRDAs and the GDAs in management and maintenance of the facilities have been lost since the revolution in 2011. Consequently, the Ministry of Agriculture has ceased its public education programs.

#### 4. Conclusion, Lessons Learned and Recommendations

##### 4.1 Conclusion

The utilization of facilities developed within the scope of this project for irrigation by treated used waters has not been widely-used as expected initially. In many zones, these irrigation facilities are either underutilized or not utilized altogether. Consequently, the quantitative effects and the impacts that had been confirmed at the time of Ex-post evaluation could not be verified in this study. Majority of the arable lands in Tunisia are arid or semi-arid, and project's objective to stabilize agricultural production and promote regional economy through the use of recycled water is effective in conserving the water resources of the country. However, in reality, treated sewage irrigation is sparsely used and outlook for attaining of the project objective seems uncertain for the following reasons: reluctance to use treated sewage from lack of understanding; irrigation is not necessary in some areas due to adequate rainfall; aversion to treated sewage due to low quality of water; unreliability of treated sewage due to instable supply; high cost of using treated sewage. The Ministry of Agriculture had continued its public education programs after ex-post evaluation, but had been discontinued after the revolution in 2011. As a result, treated sewage irrigation has not spread, and its usage is declining. Moreover, after the revolution, no organization has replaced the GDA, which was in charge of the maintenance of the irrigations facilities, and the facilities have been damaged in certain regions. Sustainability of the project in certain areas has therefore become questionable.

##### 4.2 Recommendations

###### 4.2.1 Recommendations to the Ministry of Agriculture

(1) The Ministry of Agriculture should assist in improving the CRDA GDA relations, and act meticulously for the reestablishment of the GDA in the regions targeted by this project, which were dissolved or non-operational. In addition, a re-examination is imperative on the future utilization of irrigation facilities that are not utilized or where maintenance is inadequate. The Ministry of

Agriculture, with an objective of restoring the relationship between the GDAs and the CRDAs, is anticipating on implementing a research in a new project financed by KfW, French Development Agency, and AfDB for a period of one year as from January 2013 (the Ministry is actually at the stage of identifying the elements of the research). It is expected that the Ministry of Agriculture, will confer the highest priority to the follow-up on issues such as the dissolved GDAs that have not been reinstated, and the determination of the organizational responsibilities regarding the maintenance of the ill-maintained irrigation facilities.

(2) The cost of utilizing treated sewage waters being relatively low, the amounts paid to the GDAs by farmers utilizing irrigation do not cover the costs of the facility maintenance. The former president, from a political motive, intentionally set the utilization costs at a low level, without considering the maintenance costs of the facilities. In case of operation and maintenance fund shortages due to the aforementioned reasons, the CRDA bears the cost. However, in regions where the CRDA is unable to make the payment, necessary maintenance cannot be conducted and, therefore, the facilities are in dissatisfactory condition. Consequently, it is necessary to comprehensively review the country's (MOE, Ministry of Agriculture) inclination on the diffusion of treated sewage irrigation and the system of organizational responsibility, including the water cost and rules for bearing operation and maintenance costs. These questions should be studied at the occasion of the research project financed by the KfW, French Development Agency, and AfDB as referred in (1)

(3) In some regions, the treated sewage waters contain foreign matters and salt. According to the Ministry of Environment, quality of treated water has not reached its final ideal stage, which is potable water. ONAS' ultimate goal is "potable treated sewage water". In addition to the rehabilitation of sewage treatment facilities and improvement of operation and maintenance skills, the Ministry of Agriculture should cooperate with ONAS by monitoring the quality of water while conducting education campaigns to inform the public that treated sewage water is not "impure".

#### 4.3 Lessons Learned

From the cultural background, treated sewage water is perceived as impure. This aroused reluctance towards the usage and treated sewage water, and led to refusal of the usage by most farmers. Although the reason behind the low utilization rate of treated sewage water is versatile, cultural background is a factor that cannot be ignored. In the light of the above, a lesson was learned that it is necessary to take into consideration the cultural aspects of the region when planning a project. Also, since the regions differ in climate and agricultural produces, it is important to take these factors into consideration when choosing the sites for the project.

Comparison of the Original and Actual Scope of the Project

Item	Breakdown	Original	Actual
1. Output	<p>(1) Construction of treated sewage irrigation facilities in 10 areas in Tunisia</p> <p>(a) Facilities for storing treated sewage water</p> <p>(b) Pumping stations</p> <p>(c) Adjustment water storage facilities</p> <p>(d) Water supply and irrigation drainpipes</p> <p>(e) Irrigation sites development</p> <p>(2) Consulting services</p> <p>(a) Detailed design related to the above-mentioned irrigation facilities, tendering document preparation and detailed design/tendering document preparation (local) (5 subprojects: Bizerte, Menzel Bourguiba, Djerba Aghir, Siliana, Médenine)</p> <p>(b) Survey related to groundwater increment for using treated sewage water in Nabeul and Djerba Aghir</p>	<p>10 sites</p> <p>13 sites</p> <p>12 sites</p> <p>187 km</p> <p>1,853 ha</p> <p>52.5 MM</p> <p>4 MM</p>	<p>8 sites</p> <p>10 sites</p> <p>10 sites</p> <p>179 km</p> <p>Djerba Aghir; implemented only in the first stage of construction.</p> <p>Nearly as planned</p> <p>As planned</p> <p>4MM</p> <p>Survey of Djerba Aghir was implemented as planned. Survey of Nabeul was cancelled because it was included in a project funded by the World Bank.</p>
2. Period	March 1998 – Sept 2003 (5 years and 7 months) 67 months	March 1998 – Oct 2005 (7 years and 8 months) 92 months	
3. Project cost		*19	
Foreign Currency	215 million yen		
Local Currency	2,062 million yen (Foreign currency: 18.749 million DT)		
Total	2,277 million yen	1,588 million yen	
ODA Loan Portion	1,707 million yen	1,332 million yen	
Exchange Rate	1 DT = 110 yen (As of March 1998)	1 DT = 92.95 yen (Average March 1998 – October 2005)	

<sup>19</sup> There are no data on the breakdown



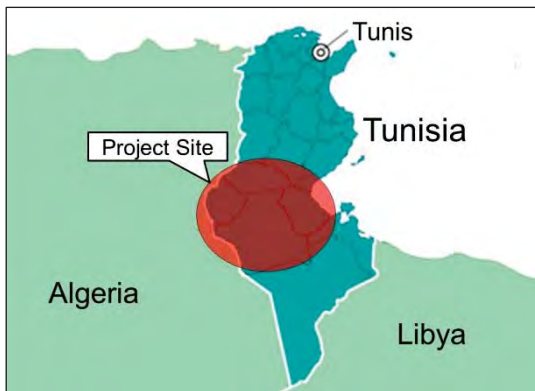
## Ex-Post Monitoring of Japanese ODA Loan Project

Tunisia

### Irrigation Perimeters Improvement Project in Oasis

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

#### 1. Project Description



Project Location



Concrete canal and old canal (Gabes)

#### 1.1 Project Objective

The objective of this project is to provide stable supply of irrigation water and conserve groundwater through the renovation of terminal earth canals and development of drainage systems in the oases of Tunisia's four southern governorates – Gabes, Gafsa, Kébili and Tozeur – thereby contributing to the stability of agricultural productivity and development of the local economy.

#### 1.2 Outline of the Loan Agreement

Approved Amount / Disbursed Amount	8,106 million yen / 6,417million yen
Loan Agreement Signing Date / Final Disbursement Date	December 1996 / December 2005
Ex-post Evaluation	2007-2008
Executing Agency	Ministry of Agriculture (MOA)
Main Contractor	-
Main Consultant	-

### 1.3 Background of Ex-Post Monitoring

In Tunisia, the agricultural sector is extremely important, as 35% of the population live in rural areas; agriculture accounts for 11% of its GDP; and agricultural products comprise 9.3% of all exports. Date palms, an important export product, are a major agricultural product in the southern oases. The southern oases are, however, in an arid region that receives only 100–200 mm of rainfall per year; consequently, groundwater has been used to irrigate the land in this area since ancient times. However, in the oases, due to a lack of adequate terminal channels, the irrigation systems are often beset with water leakage, resulting in a low usability level. From the fact of lowering of the groundwater level, and since the development of new water resources is not dependable, improvement in the effective use of irrigation systems through water conservation was urgently needed. In order to address this situation, this project has implemented the renovation of terminal earth canals and development of drainage systems in the oases of Tunisia's four southern governorates – Gabes, Gafsa, Kebili and Tozeur.

At the time of ex-post evaluation report (2007), the number of beneficiary rural households of this project were 18% less compared to the initial plan due to insufficient funds. In addition, the areas under cultivation in three regions covered by the project were 40% to 60% less than the areas that were originally planned in the project. From the financial aspect, some Agricultural Development Groups (GDA) in Tozeur and Kebili were in deficit in 2006. Due to the government proposal to reduce the budget, the ratio of maintenance cost (CRDA3:GDA7) borne by the GDA was rising. Since 2005, the ratio of GDA's funds to the operation and maintenance cost was exceeding 100%. Also, in the ex-post evaluation report, deterioration of concrete canals was indicated. The cause for the deterioration was under research at the time. From these situations, concern was shown over the sustainability of the project.

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.)

Toyoy 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 Beneficiary Rural Households

Compared to the time of ex-post evaluation, the number of beneficiary rural households has leveled after a slight increase; the efficacy of the project continues to take effect (Table 1). Numbers in Tozeur and Gabes are lower than the planned value; however, this is due to the fact that the planned value includes the regions excluded from this project. The increase in the number of beneficiary rural households in 2008 is from the homecoming of rural households, and not from new entry of outside farmers. Because of the cultural background of the Southern Oasis Region to think it is a shame to sell the land inherited from ancestors, sale of agricultural land is uncommon, resulting in limited new entrants. Land within the oasis is inherited from generation to generation, and therefore, acceptance of new entrants from outside farmers is rare.

At the time of ex-post evaluation, due to the increase in the number of land-owners interested in participating in the project, the CRDA had partially expanded the project components. However, the fact that the CRDA expanded the project's concrete canals could not be verified in this study.

Table 1: Number of Beneficiary Rural Households

(Unit: households)

	Planned	2006*	2007	2008	2009	2010	2011
Gafsa	5,620	6,212	7,055	7,055	7,070	7,070	7,080
Tozeur	7,060	5,855	4,652	4,652	4,652	4,652	4,652
Kebili	9,020	10,122	10,886	10,886	10,886	10,886	10,886
Gabes	17,900	10,171	10,171	10,618	10,626	10,626	10,676
Total	39,600	32,360	32,764	33,211	33,234	33,234	33,294

Source: CRDA \*value from ex-post evaluation report

###### 3.1.1.1.2 Beneficiary Area

In comparison to the time of ex-post evaluation, beneficiary area by this project shows a slight increase in all regions (Table 2). In regards to the beneficiary area of the oases in which the project was implemented, Gafsa exceeds the initial plan; beneficiary areas of Gabes and Kebili are below the planned area, but have stabilized. The project continues to produce positive effects.

Table 2 Beneficiary Area

(Unit: ha)

		Planned	2006*	2007	2008	2009	2010	2011
Gafsa	Number of Oases	8	8	9	9	9	9	9
	Benefitted Area	3,467	3,467	3,584	3,584	3,584	3,584	3,584
Tozeur	Number of Oases	30	20	18	18	18	18	18
	Benefitted Area	5,622	3,143	3,285	3,285	3,285	3,285	3,285
Kebili	Number of Oases	67	30	30	30	30	30	30
	Benefitted Area	7,213	3,700	3,735	3,735	3,735	3,735	3,735
Gabes	Number of Oases	48	30	30	34	34	34	34
	Benefitted Area	7,133	4,115	4,424	4,435	4,443	4,443	4,443
Total	Number of Oases	153	88	87	91	91	91	91
	Benefitted Area	23,435	14,425	15,028	15,039	15,047	15,047	15,047

Source: CRDA \*value from ex-post evaluation

According to the interview with the CRDA of Gabes, 4 oases in Gabes were divided because of inheritance and, as a result, the number of oases increased. The increase in area is due to the change in the calculation method; there was no substantial increase. In Tozeur, number of oases decreased by two. However, according to the Ministry of Agriculture, this decrease can be explained by the possibility that several oases or GDAs were merged.

Furthermore, with the following ODA loan project, "Water Saving Agriculture Project in Southern Oasis Area", irrigation facilities will be installed in the 19 oasis which were excluded from this project. The new project had not initiated its implementation at the time of this study.

#### 3.1.1.1.3 Cultivated Area and Cropping Ratio

Cultivated areas in Gafsa, Kebili and Gabes have increased compared to the time of ex-post evaluation (Table 3). According to the interview with Ministry of Agriculture, this is due to the increased efficiency of land usage resulting from three-layer polyculture. The farmers generally plant palm trees on the upper level, olive trees on the lower level and cultivate vegetables on the ground level in order to optimize land usage. Increased volume of distributed water from the rise in water efficiency by this project has enabled the farmers to actively engage in three-layer polyculture. The CRDA calculates cultivated area by multiplying benefitted area with cropping ratio resulting in cropping ratio exceeding 100%.

Table 3 Cultivated Area and Cropping Ratio

(Unit: ha)

		Planned	2007*	2008	2009	2010	2011
Gafsa	Cultivated Area	5,359	3,046	3,154	3,226	3,226	3,226
	Cropping Ratio	155%	85%	88%	90%	90%	90%
Tozeur	Cultivated Area	6,501	3,700	3,722	3,708	3,580	3,548
	Cropping Ratio	116%	113%	113%	113%	109%	108%
Kebili	Cultivated Area	12,130	5,528	5,602	5,789	5,976	6,125
	Cropping Ratio	168%	148%	150%	155%	160%	164%
Gabes	Cultivated Area	10,690	6,575	7,220	7,238	7,323	7,330
	Cropping Ratio	150%	149%	163%	163%	165%	165%
Total	Cultivated Area	34,680	10,275	10,942	10,946	10,903	10,878

Source: CRDA \*value from ex-post evaluation

On the other hand, abandoned plots of farmland also exist within the oasis. Ex-post evaluation reported the problem of abandoned farmlands due to property rights disputes resulting from inheritance. This problem is caused by a tradition to divide the land into the number of male heirs upon inheritance. This leads to fragmentation of land after a few generations and complication of land boundary and property rights, and ultimately, dispute over land ownership. At present, more than 60% of farmland in Gabés is fragmented land, under 0.5 hectare. Concerning this problem, the Ministry of Agriculture issued a law in 2011 (decree No.4115.5) which prohibits land division and endowment. As a result, land fragmentation deterred and cases of dispute over land ownership have tranquilized. During the field study in Gabés, abandoned lots of farmland were identified; however, according to the CRDA, the situation is improving.

#### 3.1.1.1.4 Crop Yields

Data for 2007 obtained during this study and those reported in the ex-post evaluation (2007) differ significantly. In the inquiry made to the CRDA of Gabes, the source of the data in the ex-post evaluation report could not be verified. Therefore, this analysis was done with the available annual data since 2007, which were newly obtained by this study. Based upon these premises, crop yield has shown a steady increase since 2007. For example, crop yields of summer and winter vegetables of Gafsa have continually risen, as seen in Table 4. In addition, crop yield of fodder has shown substantial increase since 2007. This is due to the government's policy to raise the self-sufficiency of milk to 100%, which led to the increased demand and rise in price of dairy cows, resulting in enhancement of breeding of dairy cows. Consequently, the rising demand for fodder led to the increase in price; fodder has become a highly attractive crop to the farmers.

Table 4 Crop Yield

(Unit: tons/ha)

		Planned	2007	2008	2009	2010	2011
Gafsa	Fruit Trees	11.7	10.6	10.6	10.7	10.6	10.7
	Summer Vegetables	18	4.3	4.4	4.5	4.6	4.6
	Winter Vegetables	23.6	6.5	6.6	6.8	6.8	6.8
	Fodder	59.3	65.8	65.7	65.9	66.0	66.1
Tozeur	Fruit Trees	2.5	525.0	533.0	582.0	582.0	611.0
	Summer Vegetables	9.6	1,350.0	1,724.0	1,596.0	1,336.0	1,269.0
	Winter Vegetables	12.5					
	Fodder	79.9	5,612.0	6,543.0	7,764.0	11,832.0	10,420.0
Kebili	Fruit Trees	2.8	539.6	541.0	566.0	576.0	576.0
	Summer Vegetables	10.1	50.0	58.0	59.0	48.0	6.0
	Winter Vegetables	12.8	165.0	240.0	230.0	253.0	157.0
	Fodder	20.1	1353.0	1443.0	1402.0	1370.0	1085.0
Gabes	Fruit Trees	11.8	32.3	34.6	34.6	31.6	35.1
	Summer Vegetables	15.2	11.1	11.7	12.3	13.4	13.4
	Winter Vegetables	28.1	27.0	27.3	27.3	28.7	28.7
	Fodder	59.4	59.0	71.3	75.4	77.6	81.7

Source: CRDA

According to the CRDA of Gabés, as described above, stable production as a result of increased irrigation water supply has enabled the farmers to engage in three-layer polyculture. In addition, irrigation water enabled the farmers to cultivate in the dry season, and the resulting increase in the cultivation period has led to the rise in the crop yield. Crop yields of olives and pomegranates have particularly increased. In addition, the drop in crop yields of fruit trees seen in 2010 is due to heavy rainfall.

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

In the ex-post evaluation report, Internal Rate of Return (IRR) was calculated to be 9.0%. However, since the basis of this calculation used in the ex-post evaluation report could not be obtained, IRR will not be calculated in this report.

### 3.1.2 Qualitative Effects

From the interview with the CRDA of Gabés, and from the responses to the questionnaires sent to the CRDAs, positive quantitative effects of the project reported in the ex-post evaluation report were

confirmed. The installation of concrete irrigation canals has reduced water leakages and increased water efficiency. The effects produced from this effect are as follows: First, salt damage has decreased. Since irrigation water is periodically drawn into the farmland, salinity in the soil is washed away, and salt damage was decreased from depressed salt concentration in the soil. However, scientific research has not been performed on the salinity or the conservation of ground water resources. Second, since the irrigation canals used before the projects were simple ditches dug in the ground, there was substantial water loss. Concrete canals enabled efficient water use, and water distribution to farmers farther downstream became possible. Third, with the stable volume of water supply, accurate calculation of water distribution became possible, and as a result, water outages decreased and led to the increase in crop yields. The distribution of water to farmers is done according to a rotation system between users. The rotation system consists of deciding on the order in which irrigation water is used by each farmer as well as the allocated time which is counted by hours per user, in order to optimize the efficient use of irrigation water. The installation of concrete water pipes has allowed for improved precision in terms of time and volume of water distributed to each parcel. This has helped reduce water outages and led to increased production. Furthermore, the improvement in water efficiency increased the volume of water distributed per hour, and reduced the time for water distribution to each parcel. Fourth, diversification of crops resulting from more farmers engaging in three-layer polyculture has led to a reduction in the fallow periods. The fallow periods, in which the farmlands were unused, were between 20 to 50 days before the implementation of the project. After the project, periods were reduced to 17 to 35 days. In addition, the qualities of harvested products have improved compared to those before the project.

The above mentioned items confirm that the positive effects at the time of ex-post evaluation continue to be produced. Although the problem of aforementioned abandoned farmlands resulting from dispute over land ownership has not been solved, the problem is showing signs of steady improvement from the efforts made by the Ministry of Agriculture.

## 3.2 Impact

### 3.2.1 Intended Impacts

Ex-post evaluation report indicated this project's impact of younger generations' return to agriculture. According to the interview to the CRDA, the recent years have witnessed a growing tendency for younger generation, between 39 and 50 years old, to return to agricultural activities. This is due to the fact that increased irrigation efficiency has made irrigated agriculture more accessible than before, and part-time agriculture, undertaking agricultural tasks as secondary activities, became possible. There are also an increasing number of people returning to farming after early retirement. It can be assured that the contribution of this project to the returning of those

aforementioned to agricultural activities is continually significant, since the ex-post evaluation.

Ex-post evaluation reported the increase in employment opportunities of seasonal workers during harvesting season, resulting from the increase in agricultural production brought about by this project. Currently, the increase in agricultural production continues to produce employment opportunities for seasonal workers during the harvest season. However, the increase of agricultural production in the oasis gave a rise to a new problem of insufficient seasonal labor. The olive harvest season in the southern region requires a seasonal workforce of 120,000 workers, while in reality, there only 20,000 workers are available. Seasonal workers receive low wages and do not have any social insurance; such conditions are not attractive to young people. The majority of seasonal workers (more than 80%) are women. In recent years, women's advance into society have accelerated in Tunisia, and women have better chances of finding work that offer better working conditions compared to seasonal workers. This is also a factor in the shortage of seasonal workers. In addition, political instability in neighboring country of Libya resulted in refugees flowing into Tunisia. This has created a demand for vast quantities of food. While the farmers are increasing their productions, the seasonal workers immigrate to countries paying higher wages such as the Gulf and Libya creating a shortage of seasonal workers in Tunisia. In case of serious shortage, the government assists the harvest of olives by sending military troops to the region. This problem has not yet been solved. The problem not only concerns the targeted area covered by this project, but is in fact a common issue for the entire southern region.

The project's impact of improvement in salt damage from saline soil, decrease in water outage, and increase in the diversity of crops continues to take effect. Decrease in the salt damage and increase in the volume of distributed water have raised the precision of calculation for water distribution, which led to diversification of crops and decreased water outage. Agricultural production and household income increased as a result. This project's positive impact on the improvement of living standards of farmers in the target area continues to take effect. There are a growing number of farmers that have purchased new cars or have built house extensions. In addition, owing to the positive effects observed in terms of water efficiency through the concrete canals installed by this project, some farmers have installed in their own parcel, concrete canals similar to the ones used in the project at their own cost. This is also another positive effect of the project.

### 3.2.2 Other Impacts

#### 3.2.2.1 Environmental Impact

The negative impact of the project that was mentioned in the ex-post evaluation concerning the decrease in the number of birds as well as the decrease of cooling effect inside the oasis was not based on empirical and scientific data, but rather on the personal opinion of the interviewed persons. According to the Ministry of Environment, there has been no scientific study conducted concerning



the decrease in the number of birds or on the decrease in the cooling effect inside the oasis. The Ministry of Agriculture, in collaboration with the Ministry of Environment and UNESCO, has jointly proceeded to the starting of a project on the protection of the oasis, and the results of the study are expected from this project. As for the decrease of cooling effects of the oasis, the CRDA of Gabes is not aware of such impact.

The Ministry of Environment has stated that this project had a positive impact on the protection of oases, protection of nonrenewable resources such as fossil water, protection of soil, and prevention of desertification. Continual effects of these impacts reported in the ex-post evaluation were confirmed.

According to the interview with the CRDA of Gabés, “water is rare in this region; carefully attention is paid to maintain the balance between the production and the preservation of water resources when using water for agriculture. Therefore, there are no negative changes concerning water”.

#### 3.2.2.2 Impact to Surrounding Regions

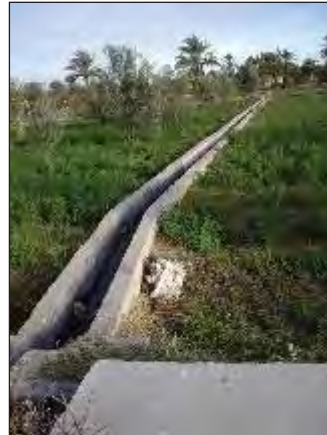
At the time of ex-post evaluation, it was confirmed that this project was contributing to the improvement of economic and social life of the surrounding regions by reclamation of farmland in the outer regions of the oasis using surplus water. According to the CRDA of Gabes, efficient water distribution continues to be possible since the time of ex-post evaluation, and reclamation of oases' outer region is also continually pursued; these impacts are continues to take effect. On the other hand, the Ministry of Agriculture states that it is necessary to reinforce and enforce the law, since the public order has become unstable after the revolution and more people are using the water illegally. This issue is not peculiar only to the oases targeted by this project, but a common problem in all of the oases. Since the illegal users do not pay the water fee, it is possible that there could be negative effects on the sustainable management of the oasis. However, the Ministry of Agriculture considers the current condition of Tunisia to be temporary, and expects this situation of the illegal usage of water to improve in the future.

#### 3.2.2.3 Land Acquisition, Relocation

There have been no land acquisitions or relocation since the time of ex-post evaluation.



Concrete canals



Copied concrete canal

Delamination from salt damage can be seen  
(See 3.3.3.1 and 3.3.4)

The continued consistency of the impact of this project was confirmed. However, there were no scientific studies on the impact of the environment; the scientific results are expected from the UNESCO project on oasis preservation.

### 3.3 Sustainability

#### 3.3.1 Structural Aspects of Operation and Maintenance

##### 3.3.1.1 CRDA

According to the Ministry of Agriculture, there were no notable changes in the maintenance and operation system since the ex-post evaluation. The activities related to operation and maintenance of the facilities and the equipment is shared between the CRDA and the GDA. However, the shared roles differ by region. Relations between the CRDA and the GDA are good.<sup>1</sup> The system of task sharing between the CRDA and the GDA in the region of Gabes, based on the interviews and the site visit, will be presented below.

The organization of the CRDA has been enhanced by the increase in the number of staff compared to the time of ex-post evaluation. According to the answers to the questionnaire sent to the CRDA, the CRDA is responsible for repairs of large-scale facilities (irrigation facilities, main irrigation channels, secondary irrigation channels) and maintenance requiring certain expertise. This has not changed since the ex-post evaluation. The CRDA also provides for the GDA the necessary

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<sup>1</sup> Cultural background of the oasis: Since water is scarce in the southern oases region, management of oases water has been carried out by communities since ancient times. Irrigation techniques were developed. Irrigational rotation system and the volume of water according to the area and types of crop were calculated by engineers. In the 16th century, an agricultural organization, a predecessor of the GDA, was established. This organization was carried over to the GDA, making a solid foundation. Therefore, after the revolution of 2011, while the GDAs in other regions were dissolved, those in the southern regions remained intact and have built a firm relationship with the CRDA.

calculations for water rotation system.<sup>2</sup> In the CRDA of Gabes, the Maintenance Unit and the Department of Operations of Irrigated Perimeters (DOIP) perform the operation and maintenance of the facilities. The Maintenance Unit and the DOIP, which is under the Division of Hydraulics and Rural Equipment, conducts the maintenance of pumping stations and cooling facilities upon the request from the GDA.

At the time of ex-post evaluation, there were 1 to 2 engineers, several technicians, and 10 to 20 skilled workers at each CRDA. Currently, each CRDA hires, as full-time employees, 1 to 24 engineers, 7 to 40 technicians, and 10 to 33 skilled workers.

The ex-post evaluation report mentioned that there was a growing tendency for the CRDA to outsource its activities. This tendency continues to be present within the CRDA. However, the reason for outsourcing is not only the shortage of staff, but upon the expectation to stimulate the local economy through promotion of sound competition.

#### 3.3.1.2 GDA

Since the last assessment, there have been no significant changes regarding the organizational system of the GDA. The GDA is in charge of small-scale repairs and daily maintenance of irrigation facilities. However, there are regions such as Gabes, where most of the maintenance activities are entrusted to the GDA by the CRDA. In Gabes, all the maintenance activities of the facilities and equipment are performed by the GDA. The cost of the maintenance is borne by the GDA, and collected from each rural household. Henceforth, the CRDA of Gabes is urging the GDA to directly hire external subcontractors themselves for the repairs of the facilities and without the involvement of the CRDA. According to the interviewed with the CRDA of Gabes, the GDA is increasingly resorting to outsourcing to external subcontractors. However, the GDA desires to return to the traditional system of the CRDA managing the large-scale repairs, and the GDA managing the small-scale repairs. The cost of repair by the CRDA is considerably lower. On the other hand, the CRDA claims that the GDA has sufficient financial capacity to manage the operation and maintenance of the facilities as the policy of the State also promotes the GDA participation in covering the operation and maintenance cost of water systems.

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<sup>2</sup> The frequency and duration of water distribution is determined by the area and the types of crop. Based on these factors, "calculation for rotation system" is the process of calculating frequency and time of irrigation usage.

Table 5 Operation and Maintenance Structure of the GDA

		2007	2008	2009	2010	2011
Gafsa	Irrigated Area (ha)	3,584	3,584	3,584	3,584	3,584
	Number of GDA	9	9	9	9	9
	GDA Membership	7,055	7,055	7,070	7,070	7,080
	GDA Representatives	54	54	54	54	54
Tozeur	Irrigated Area (ha)	3,285	3,285	3,285	3,285	3,285
	Number of GDA	31	31	31	31	31
	GDA Membership	186	186	186	186	186
	GDA Representatives	31	31	31	31	31
Kebili	Irrigated Area (ha)	3,735	3,735	3,735	3,735	3,735
	Number of GDA	30	30	30	30	30
	GDA Membership	180	180	180	180	180
	GDA Representatives	0	0	0	0	0
Gabes	Irrigated Area (ha)	4,424	4,435	4,443	4,443	4,443
	Number of GDA	30	34	34	34	34
	GDA Membership	168	168	168	168	168
	GDA Representatives	127	140	140	140	140

Source: CRDA

In the southern region, one or more GDA is established for each oasis. The numbers of GDAs presented in the ex-post evaluation differ significantly from the numbers obtained by this study. Therefore, comparison analysis is performed using the data for 2007 obtained by this study. Based on these premises, the numbers of GDAs have not changed, other than the increase due to the aforementioned division of the GDA in Gabes in 2008 (Table 5). Moreover, in each CRDA there are two workers in charge of each GDA and, concerning this point, there are no changes compared to the ex-post evaluation.

### 3.3.2 Technical Aspects of Operation and Maintenance

#### 3.3.2.1 CRDA

The CRDA is continually providing technical assistance to the GDA since the ex-post evaluation. According to the CRDA, it is providing training seminars and workshops upon request from the GDA. Workshop is held at the training center. In addition, outsourced training is held upon request from farmers who wish to receive training on a specialized subject, and on-site trainings on the farmland are also held. Regular topics of the workshops relate to water saving techniques, such as, the methods of drip irrigation (method of irrigation by drips of water through emitters), and methods for increasing the efficiency of gravity irrigation (irrigation method using the natural gravity of the grounds); pomegranate cultivation; beekeeping; labeling management for exporting crops; and organizational management such as, expense management and meeting facilitation. Data regarding the number of trainees by age group could not be obtained.

In Gabes, the CRDA offers outsourced training sessions in order to provide farmers with a wide

variety of expertise, in addition to the seminars given by its own engineers. Also, the CRDA holds meetings semi-annually with representatives from each GDA to share the knowledge concerning irrigation and water efficiency.

#### 3.3.2.2 GDA

Technical assistance by the CRDA is continually being provided since the ex-post evaluation. Through CRDA's technical assistance, the GDA has become able to carry out the maintenance operations by themselves. The training sessions offered by the CRDA are basically free of charge. The GDA actively attend these training courses and apply the knowledge such as new irrigational techniques and cultivation of various crops them in the agricultural lands they are managing, to their agricultural activities.

According to the interview with the GDA, apart from the various free training courses offered by the CRDA, they attend the CRDA's outsourced training sessions such as pomegranate cultivation and labeling management for exporting pomegranates. The CRDA bears the cost of the training; however, if the training topic benefits only some of the farmers, then the beneficiaries share the cost. At the time of ex-post evaluation, GDAs were hiring technical experts, such as engineers. However, the number of technical experts could not be obtained. Currently, most GDAs hire a technical director who manages the technical and financial affairs of the GDA.

#### 3.3.2.3 Ministry of Agriculture

In the ex-post assessment of the project, it was mentioned that the Ministry of Agriculture organizes orientation meetings for the farmers. Currently, these meetings are held by the CRDA and not the Ministry of Agriculture as the CRDA is the regional office of the Ministry of Agriculture. Actual implementation such as technical assistance to the GDA is done by the CRDA, and the Ministry of Agriculture is responsible for general affairs and overall management. Ministry of Agriculture holds irregular sensitization sessions and training sessions for water-saving and irrigation techniques for the GDAs and the farmers. In addition, the Ministry of Agriculture holds a meeting once a month with the representatives of all CRDAs to provide the necessary information.

According to the Ministry of Agriculture, the water efficiency is one of the national agenda. It is cooperating with the Ministry of Environment to carry out water saving campaigns through television commercials and regional television programs. Annual "Water Day" was established to send a variety of messages for the importance of water resource.

### 3.3.3 Financial Aspects of Operation and Maintenance

#### 3.3.3.1 CRDA

Water fee collection rate from the GDA continues to be close to 100% since the ex-post evaluation.

According to the questionnaire to the CRDA, Gafsa, whose decline in the collection rate was indicated in the ex-post evaluation report, has raised its collection rate to 100% since 2007. Regarding the ratio of operation and maintenance cost borne by the CRDA and the GDA, the ratio is CRDA 30% and GDA 70%. However in Gabes, almost all of the operation and maintenance cost is borne by the GDA.

Cost of daily operation and maintenance is borne by the GDA. Although the CRDA in Gabes is lacking funds for a large-scale repair of pumping stations and cooling towers, there are no problems concerning the current status of the maintenance of the facilities of this project.

In Gabes, there is no financial assistance given from the CRDA to the GDA. According to the interview to the CRDA of Gabes, the deterioration of concrete indicated in the ex-post evaluation report is only at the surface and there is no effect on the irrigation. On the other hand the GDA, which is responsible for the maintenance, desires a large-scale repair of the deteriorated concrete canals, and is negotiating with the CRDA to provide financial assistance for the repair of the canals. According to the interview to the Ministry of Agriculture and the answers from the questionnaire to the CRDA, ratio of concrete canals with surface damage is limited. CRDA of each region lacks the funds to implement a large-scale repair of the irrigation facilities. Each CRDA has an annual budget for maintenance of irrigation and drainage networks, and are implementing the necessary repairs based on schedule of annual priority. However, financial statements to confirm the balance of revenue and costs of maintenance were not available.

### 3.3.3.2 GDA

The GDA collects the irrigation water fees directly from the users and, the necessary maintenance costs are collected from each farmer according to the volume of utilized water. Farmers' incomes have increased overall; there are no problems regarding the finance of maintenance costs (Table 6).

Table 6 Balance of the GDA

(Unit: TND)

		2006****	2007	2008	2009	2010	2011
Gafsa	Revenue	620,060	734,634	761,658	753,979	669,187	702,647
	Expense	424,226	680,560	709,823	760,440	836,484	1,003,781
Tozeur	Revenue	2,601,124	112,000	111,000	112,200	125,600	125,600
	Expense	2,686,805	87,000	68,000	94,000	113,000	113,000
Kebili	Revenue	2,563,425	1,813,897	1,581,279	1,972,982	2,184,765	1,771,088
	Expense	2,626,415	181,054	125,085	225,244	289,854	114,874
Gabes	Revenue	N/A	708,546	1,065,917**	1,433,691***	1,540,239***	1,471,791
	Expense	N/A	663,683*	1,039,623**	1,349,252***	1,480,346***	1,402,124

Source: CRDA, GDA \*data missing from 11GDAs \*\*data missing from 5 GDAs \*\*\*data missing from 1 GDA  
\*\*\*\*value from ex-post evaluation

Ratio of funds to the cost of operation and maintenance has not changed, with the exception of Kebili, compared to the ex-post evaluation, and generally speaking, collected water fee and costs borne by the farmers cover the maintenance costs (Table 7). The reason for the low ratio in Kebili could not be investigated due to the limited timeframe of the study.

Table 7 Ratio of the GDA funds to Cost of Operation and Maintenance

(Unit: %)

	2006*	2007	2008	2009	2010	2011
All Oases (excluding Kebili)	-	92	94	96	104	110
Kebili	-	10	8	11	13	6
Total	118	48	55	57	60	65

Source: CRDA, GDA \*value from ex-post evaluation

In Gabes, the neighboring markets have vitalized, and price of agricultural products have risen. In addition, since increase in production was made possible by this project, farmers' incomes are rising. According to the CRDA of Gabes, because the financial capacity of the farmers increased, the costs associated with maintenance of facilities are almost entirely born by the GDA. Although the GDA cannot afford the aforementioned large-scale concrete canal repair, it is currently carrying out the maintenance of pumping station to tertiary canals. The collected fees of water utilization from the farmers are maintained at affordable prices, and the remainder of the amount required for the cost of maintenance is borne by the farmers based on the volume of used irrigation water. There is no problem with the financial capacity of the farmers, since their income is increasing. Collection rate of the water fees is 75% to 100% in all GDAs, except Tozeur, and has continually maintained a high level since the ex-post evaluation (Table 8). The reason for the low collection rate in Tozeur could not be ascertained due to the limited timeframe of the study.

According to the Ministry of Agriculture, the parity in terms of operation and maintenance costs between the CRDA and the GDA is respectively of 30% and 70%. However, the reduction of state budget and the rising incomes of the GDAs have created the tendency for the increase in the GDA's ratio of bearing the maintenance cost.

Table 8 Water Fee Collection Rate

(Unit: %)

	2007	2008	2009	2010	2011
Gafsa	100	100	100	100	100
Tozeur	30	35	24	25	14
Kebili	80	82	79	75	75
Gabes	93	101	89	91	80

Source: CRDA, GDA

### 3.3.3.3 Ministry of Agriculture

Ex-post evaluation reported that the Ministry of Agriculture was granting subsidy to the GDA. However, the subsidy is currently not being given. The Ministry of Agriculture undertakes measures through the CRDA, and no direct subsidy towards the GDA is being implemented. According to the interview, large-scale repair is being undertaken by cooperation of the CRDA and the GDA, and small-scale repair and daily maintenance is undertaken by the GDA; granting subsidy is not necessary.

Moreover, as additional information, from an interview with the Ministry of Agriculture, and information on the website of the Ministry of Planning and Regional Development, there is a fund called FOSDAP (Special Fund for Agriculture and Fisheries Development), intended for small-scale farmers. The fund is managed by the BNA (National Agriculture Bank) and allocated indirectly to small farmers through the CRDAs in order to assist in financing of the costs associated with irrigation activities. The fund also assists the GDAs through financing the costs for the renovation and maintenance of the irrigational network. The allocated amounts are limited to 60% of the cost, and in 2012, 23.5million Dinars have been disbursed to the 24 CRDAs.

### 3.3.4 Current Status of Operation and Maintenance

The deterioration of the concrete irrigation channels, mentioned in the ex-post evaluation, was seen in certain facilities during the field survey at the CRDA of Gabes. According to the Ministry of Agriculture, delamination of concrete is due to salt damage from the salinity of soil and salt contained in the moisture. According to the CRDA of Gabes, it is due to salinity and sulfurization from the soil, and also, the effect of the quality of concrete used for the project. At the time of construction, the concrete with “high resistance to salinity” was selected. However, since the selection was made considering the balance between cost and quality, the selected concrete was not of highest quality, but one that can withstand the use for irrigation. Therefore, the concrete has deteriorated with time. However, the deterioration is only on the surface, and there is no influence on the capacity of irrigation. During the site visit, new concrete canals could not be seen, but the surface of the canals was repaired with additional layer of concrete. According to the answers to the questionnaires, in Kebili and Tozeur, repair has not been undertaken since the deterioration is only on the surface of the concrete, and is evident in only 3% of all canals. The repair of the concrete surface is being undertaken by the CRDA, but due to budget constraints, the repair work is undertaken according to priority. At the CRDA of Kebili, maintenance is thoroughly conducted whereas all water pipes in the cooling facilities, descaling of the cooling tower, replacing of pipes and wooden grids are done once every two years. In Tozeur, maintenance of cooling facilities maintenance is jointly executed by the CRDA and the GDA. During the site visit in Gabes, the



facilities were in order, and no problems could be detected.

Thus, the operation and maintenance has been properly carried out by the cooperation of the CRDA and the GDA. The study confirmed that there is no problem from the time of ex-post evaluation.

#### 4. Conclusion, Lessons Learned and Recommendations

##### 4.1 Conclusion

The number of beneficiary rural households as well as that of the cultivated areas is increasing. On the other hand, qualitative effects reported in the ex-post evaluation such as the increase in the number of the returned farmers, the reduction of soil salinity, the rise in the standard of living, have once again been confirmed. Deteriorations of concrete canals, indicated in the ex-post evaluation, were also confirmed. However, the authorities noted that this deterioration was only on the surface of the concrete. Also, from the fact that the CRDA judged that there were no problems with the function of the canal, and although elementary efforts to repair the deteriorating surface were seen, it can be concluded that there is no problem with the sustainability of the project. Taking into consideration the above-mentioned findings, it is concluded that the positive effects of the project continue to be seen after the ex-post evaluation.

##### 4.2 Recommendations

None.

##### 4.3 Lessons Learned

From ancient times, certain distinctive culture exists in the southern region of Tunisia which stipulates that selling oasis lands inherited from the ancestors is perceived as a shame. This is the cause for limited sales of land, and few new entrants. Therefore, utilizing “the number of beneficiary rural households” as an indicator to assess the effect of project is inappropriate. Rather, indicators such as “irrigation usage rate”, “change in agricultural production” should have been analyzed. Based on this, when selecting operation and effect indicators for this type of project, it is necessary to take into account the regional cultural background and characteristics of the targeted region.

Comparison of the Original and Actual Scope of the Project

Item	Breakdown	Original	Actual
Output	Number of oases		
	Gafsa	8	As planned
	Tozeur	30	20
	Kebili	67	30
	Gabes	48	30
	Area of target sites (ha)		
	Gafsa	3467	As planned
	Tozeur	5622	3,143
	Kebili	7213	3,700
	Gabes	7133	4,115
	Construction of terminal earth canals (meter)		
	Gafsa	483,242	325,124
	Tozeur	494,454	157,971
	Kebili	1,080,683	870,240
	Gabes	1,033,188	370,791
	Construction of drainage canals (meter)		
Gafsa	37,465	31,888	
Tozeur	352,500	353,614	
Kebili	573,782	347,095	
Gabes	649,681	193,730	
Consulting Services		78 MM	87 MM
Period	Dec. 1996 – Jun. 2003 (6 years and 7 months) 79 months	Dec. 1996 – Dec. 2005 (9 years and 1 month) 109 months	
Project Cost	5,847 million yen		*15
Foreign Currency	4,961 million yen		
Local Currency	(Local currency: 45,106,000 TD)		
Total	10,808 million yen		8,102 million yen
ODA Loan	8,106 million yen		6,417 million yen
Portion	1TND = 110 yen		1TND = 95.45yen
Exchange Rate	(As of Dec. 1996)		(Average Dec. 1996 – Dec. 2005)

15 There are no data on the breakdown.

## 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,<sup>1</sup> 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

<sup>1</sup> 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<sup>2</sup> to

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



Ex-Post Monitoring of Japanese ODA Loan Project

Jordan

Second Human Resources Development Sector Investment

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

1. Project Description



Project Location  
(the entire country)



Sewing Class at Vocational Training Center (VTC)  
(Amman)

1.1 Project Objective

The objective of this project is to expand education opportunity, including basic, secondary and vocational education, and to assure its quality, all across Jordan through construction and expansion of school facilities and provision of equipment and furniture targeting (i) comprehensive schools (academic and vocational education), (ii) community colleges (two-year junior colleges), and (iii) vocational training centers (VTCs); thereby contributing to Jordan’s industrial development.

1.2 Outline of the Loan Agreement

Approved Amount / Disbursed Amount	7,123 million yen / 6,027 million yen
Loan Agreement Signing Date / Final Disbursement Date	July 1997 / November 2005
Ex-post Evaluation	2007-2008
Executing Agencies	National Center for Human Resources Development (NCHRD)(in charge of overall coordination), Ministry of Education (MOE), Al-Balqa Applied University (BAU), Vocational Training Corporation
Main Contractor	-

Main Consultant	-
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### 1.3 Background of Ex-post Monitoring

Since the availability of a highly skilled labor force is what attracts direct investments to Jordan, which is otherwise poor in natural resources, provision of high-quality education is unalterably a challenge of national importance to Jordan. In the National Conference on Education Development, which the Government of Jordan held in 1987, “improving the quality of education” was selected as one of the national agenda, and the government of Jordan had been striving to upgrade and expand academic and vocational education. Under these circumstances, this project has implemented the construction and the expansion of school facilities and the provision of equipment and furniture targeting (i) comprehensive schools (academic and vocational education), (ii) community colleges (two-year junior colleges), and (iii) VTCs.

At the time of ex-post evaluation in 2007, the project goals had been partially attained. However, since the demand for vocational education did not increase throughout Jordan as expected, a decreasing tendency could be seen in the number of students in comprehensive schools' vocational education program. The number of enrolled students for VTC was also level, and the filling rate, graduation rate, and employment rate were showing a downward trend. In this context, it was concluded that the effectiveness of this project was limited. In addition, the operation rate of school facilities and equipment implemented by this project remained lower than expected, and some of the equipment provided by this project remained unused. Therefore, the sustainability of this project was rated as “moderate”.

Under these circumstances, the ex-post evaluation made a recommendation to the Jordanian government to vigorously promote measures that will expand the demand for vocational education/training.

In this context, this project was selected for ex-post monitoring and was reviewed through the findings from the field survey and other research activities. Its final conclusion was drawn based on all these findings concerned.

## 2. Outline of the Monitoring Study

### 2.1 External Monitoring Consultants

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

### 2.2 Duration of Monitoring Study

Duration of the Study: September 2012 – June 2013

Duration of the Field Study: November 18, 2012 – November 26, 2012

### 3. Monitoring Results

#### 3.1 Effectiveness

Since the users and curriculum differ with each school, effectiveness will be analyzed separately for (1) comprehensive schools, (2) VTCs, and (3) community colleges.

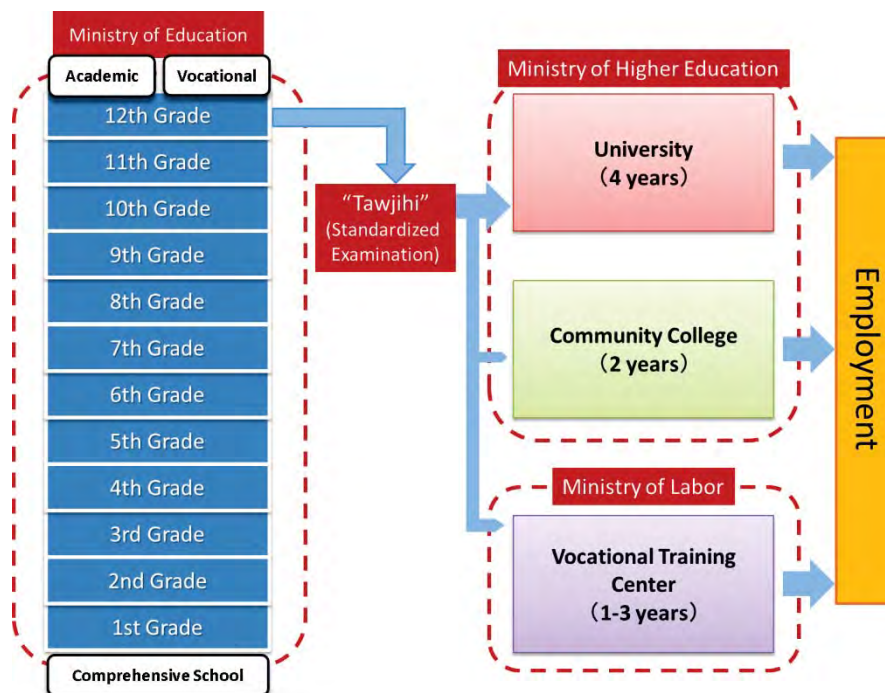
##### 3.1.1 Quantitative Effects

###### 3.1.1.1 Operation and Effect Indicators

###### 3.1.1.1.1 Comprehensive School

###### (1) Trends in Enrollment of Comprehensive Schools

In 2008, the government of Jordan implemented the Education Reform for Knowledge Economy Project (ERfKE1), and changed the school curriculum. In this context, some of the vocational education programs were incorporated into the academic education. As a result, there are significant changes in the school programs since the time when the ex-post evaluation was conducted, and a simple comparison of the findings from this monitoring with those of the ex-post evaluation became difficult. The diagram below shows the education programs and their responsible ministries (Figure 1).



Source: Ministry of Education, Ministry of Higher Education, Ministry of Labor

Figure 1 Education Programs and Responsible Ministries



Woodwork Workshop at Community College  
(Al Husn)



Chemistry Lab at Comprehensive School  
(Al Mujoor)

Since the enrollment in comprehensive schools has been, on average, increasing (Table 1: Grades 11 and 12 were selected as representing values for calculation), and has already exceeded the expected level set at the time of project appraisal, it can be said that the overall effect of this project continues to be produced from the time of ex-post evaluation. Increase of enrollment in comprehensive schools overall is due to the rise in the youth population, and the rise in proportion of students pursuing higher education.

Table 1. Changes in the Enrollment at Comprehensive School  
(Unit: students)

	Academic	Vocational	Total
2007/2008	139,921	22,804	162,725
	86%	14%	100%
2008/2009	142,866	23,491	166,357
	86%	14%	100%
2009/2010	144,393	22,848	167,241
	86%	14%	100%
2010/2011	152,696	24,621	177,317
	86%	14%	100%

Source: MOE

On the other hand, the enrollment in the vocational education program has remained level at 15% for the past six years. This is due to the Jordanian people's general inclination to aim for higher education, and most of the students at comprehensive school have a tendency to desire education at four-year universities. In other words, vocational education is relatively unpopular compared to academic education. In addition, nearly 100% of students in vocational education go on to a four-year university. In order to raise the enrollment rate in vocational education, MOE, which is the responsible ministry, has taken the following actions: 1) conducting of campaigns toward the tenth



grade students who have not decided the course to pursue, 2) introduction of vocational education at the 8th grade career counseling, 3) introduction of the latest technologies into the vocational education workshops, 4) reviewing of programs on a regular basis to provide a curriculum that meets the needs of the labor market.

## (2) Filling Rate

According to the MOE and the comprehensive school of Al Mujoor, one of the sites visited during the survey, there are not much fluctuations in the filling rate; the filling rate for vocational education continues to be under 50%. That of comprehensive school is generally near 100% and in some cases exceeds 100%. On the other hand, vocational education's filling rate, with the exception of popular programs, is often below 50%. This can also be considered as a result of the impact of Jordanian inclination to aim for higher education in general. Statistical data for the filling rate for vocational education was not available since the data is not gathered at the MOE or in the sites that were visited.

At the time of ex-post evaluation, there was a concern over the insufficient capacities of schools resulting from declining number of youths. In this regard, in an interview, MOE stated that it “is planning the capacity of schools taking into account the increase in population and the number of students entering the 1st grade as well as those graduating the class.”.

## (3) Graduation Rate and Career Options after Graduation

Graduation rates for academic education and vocational education are both 100%. The graduation rate for vocational education has shown improvement from 55%, the figure confirmed at the time of ex-post evaluation. This can be surmised to be the influence of inclination among Jordanian citizens to aim for higher education. While the majority of graduates will go on to four-year universities, unemployment rate of the graduates from four-year universities is rising every year. On the other hand, there is rising demand for the students with skills obtained from vocational education, and National Center for Human Resources Development (NCHRD) is showing concern over the imbalance in supply and demand of the graduates and the labor market.

For student's course after graduation, jurisdiction is under Ministry of Higher Education, which is in charge of the career of four-year university students after graduation. Therefore, the MOE has no knowledge over the students' course after graduating from university. In an interview with the MOE, their understanding is that collecting information on employment is not the role of comprehensive schools. The response was the same in an interview with Al-Mujoor comprehensive school personnel during the site visit. For this reason, the employment rate data of graduates could not be obtained.

The rise in the unemployment rate among four-year university graduates can be conjectured to be caused by the gap between the demand of the labor market and the curriculum. In conferring the

MOE about this issue, the MOE stated that it is reviewing its programs on a regular basis in order to provide curricula that meet the needs of the labor market. However, on the other hand, there is a contradiction in this explanation since, as stated above, the comprehensive schools are supposedly unaware of the students' courses after graduation, and employment data is gathered after the students' graduation from universities. The MOE is aware of this point, and also of the necessity to cooperate with the Ministry of Higher Education, which is the overseeing agency for universities. This issue will be addressed in the future in the national agenda, Education Reform for Knowledge Economy Project II (ERfKE2) (See 3.4 Others (1) Follow-up of the Ex-post Evaluation Recommendation). Therefore, the gap between the labor market demand and the curriculum cannot be judged only from the data obtained from comprehensive schools. In order to draw a conclusion on this matter, it is necessary to analyze the data on how the curricula of comprehensive schools are contributing to the labor market needs after graduating from four-year universities, the most standard career course for the students from comprehensive schools.

#### (4) Sustainability of Effectiveness

The number of enrollment has already exceeded the expected number at the time of appraisal (143,125 students), and the schools are filled to their capacities. It can be concluded that the project continues to produce effect. However, in comprehensive schools, although the effectiveness of the support to academic education is high, filling rate for vocational education remains low. This is due to the young people's inclination to aim for higher education.

In the sense that this project provided an opportunity for vocational education, and widened the choice of students after graduation, the effectiveness of this project can be said to be high.

#### 3.1.1.1.2 VTC

##### (1) Trends in the Enrollment of VTC

The number of students enrolled in VTCs has decreased compared to that during the time of the ex-post evaluation. Although the number has fluctuated since then, it has been stable within a certain range. (Table 2, Table 3) Many students drop out of VTC, and the graduation rate is not 100%.

Table 2. Changes in the Entering and Graduating Students of all VTCs and Five Schools Supported by this Project

(Unit: students)

	VTC overall		Five Schools Supported by this Project	
	Number of Entering Students	Number of Graduating Students	Number of Entering Students	Number of Graduating Students
07/08*	8,790	5,878	1,703	705
08/09	10,456	7,460	2,660	1,106
09/10	10,833	5,768	2,573	907
10/11	10,087	6,462	1,406	970

Source: Vocational Training Corporation Head Office

\*value from ex-post evaluation

Table 3. Changes in the Number of Entering and Graduating Students of Five Schools Supported by this Project by School

(Unit: students)

		07/08	08/09	09/10	10/11
Yajouz	Number of Entering Students	655	1,210	1,436	595
	Number of Graduating Students	337	400	207	387
Zarqa	Number of Entering Students	282	386	245	154
	Number of Graduating Students	120	205	177	149
Middle Ghor	Number of Entering Students	291	402	413	255
	Number of Graduating Students	110	110	257	190
Madaba	Number of Entering Students	190	356	165	139
	Number of Graduating Students	59	128	58	84
Abu Nusair	Number of Entering Students	285	306	314	263
	Number of Graduating Students	79	263	208	160

Source: Vocational Training Corporation Head Office

## (2) Number of Students by Program

The intention was to obtain by-program information for comparison through this study, but the names of the programs differ by school, and each school offers different programs every academic year. Also, VTC does not collect such statistical data. Therefore, the aggregation of data by the approximative contents and academic level of program contents was performed. (Table 4)

Table 4. Changes in the Number of Entering and Graduating Students of Five Schools Supported by this Project by Level

(Unit: students)

		2009	2010	2011
Continuous Training	Number of Entering Students	230	739	269
	Number of Graduating Students	178	573	243
Continuous Training / First Level	Number of Entering Students	0	67	0
	Number of Graduating Students	0	0	0
Craftsman	Number of Entering Students	127	184	108
	Number of Graduating Students	42	65	104
First Level	Number of Entering Students	261	0	92
	Number of Graduating Students	457	46	52
Semi-Skilled	Number of Entering Students	317	228	178
	Number of Graduating Students	189	157	154
Skilled	Number of Entering Students	879	779	720
	Number of Graduating Students	414	138	430
Technical Diploma	Number of Entering Students	0	0	26
	Number of Graduating Students	0	0	0

Source: Vocational Training Corporation Annual Report, 2011

### (3) Filling Rate

The filling Rate of 5 supported schools has improved from 43.7%-169%, at the time of ex-post evaluation, to 176%-300%. (Table 5)

Table 5. Changes in the Filling Rate of Five Schools Supported by this Project

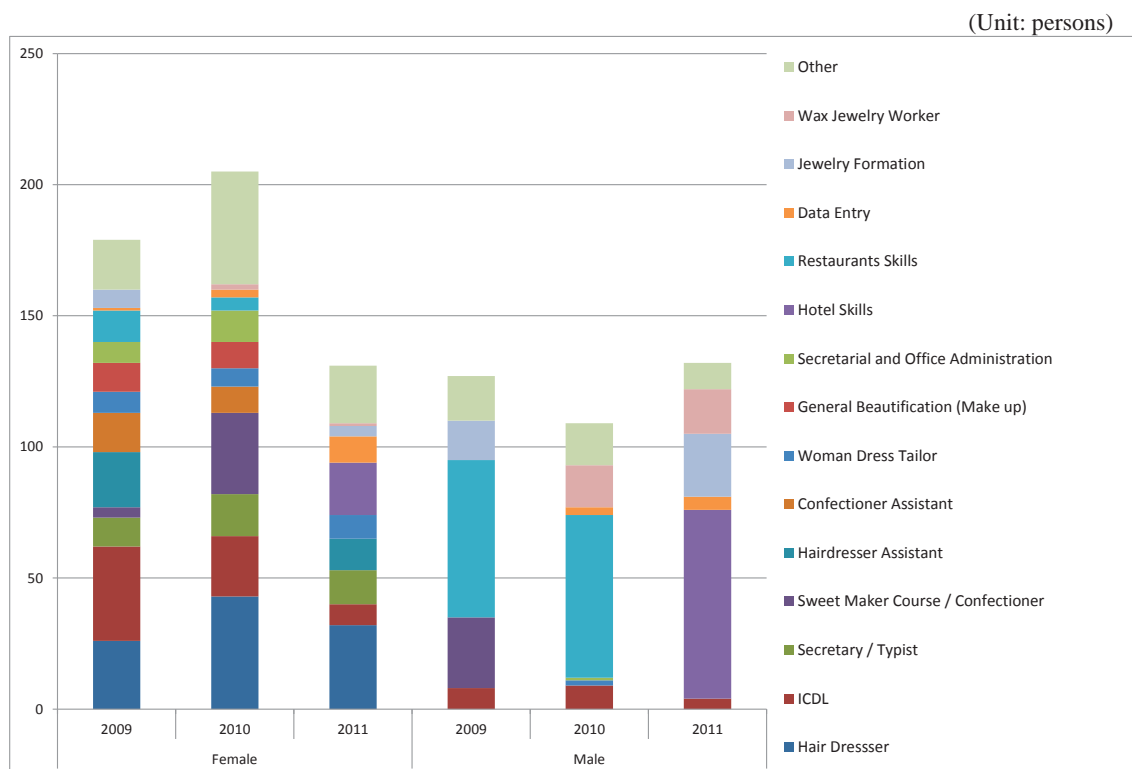
(Unit: students)

		07/08	08/09	09/10	10/11
Yajouz	Number of Male Students	933	1,116	1,337	1,440
	Number of Female Students	123	94	99	54
	Total Number of Students	1,056	1,210	1,436	1,494
	School Capacity	337	450	450	386
	Filling Rate	313%	269%	319%	387%
Zarqa	Number of Male Students	10	0	6	7
	Number of Female Students	524	386	322	257
	Total Number of Students	534	386	328	264
	School Capacity	213	200	200	105
	Filling Rate	251%	193%	164%	251%
Middle Ghor	Number of Male Students	171	132	163	165
	Number of Female Students	120	270	343	191
	Total Number of Students	291	402	506	356
	School Capacity	102	100	100	143
	Filling Rate	285%	402%	506%	249%
Madaba	Number of Male Students	156	305	320	172
	Number of Female Students	34	51	11	39
	Total Number of Students	190	356	331	211
	School Capacity	184	200	200	120
	Filling Rate	103%	178%	166%	176%
Abu Nusair	Number of Male Students	170	196	189	208
	Number of Female Students	331	299	326	203
	Total Number of Students	501	495	515	411
	School Capacity	161	200	200	161
	Filling Rate	311%	248%	258%	255%
Total VTC	Capacity	7,423	10,044	9,660	8,838
	Filling Rate	120%	104%	112%	114%

Source: Vocational Training Corporation Head Office

Filling rate, for the most part, is over 100%. This is due to the revisions in the course capacity resulting from discontinuation of unpopular courses, and switching to popular courses, rather than the increase in the number of students. Filling rate exceeds 300% in some years, and inquiry was done to the responsible government officials on the "accuracy of data" during an interview. According to one of the interviewees at the Vocational Training Corporation, "this is the effect from frequently reviewing the capacity of each course, and there is no problem". There was no information available on filling rate by program.

Capacity of VTC has been slightly decreasing since 2009. According to VTC, this is due to discontinuations and modifications of unpopular courses in order to conform to the demands of the industry. The process of modification and resumption of a course to conform to the market needs generally take nearly one year. As a result, this is reflected in the fluctuation in the capacity of the schools.



Source: Vocational Training Corporation Head Office

Figure 2. Change in the Number of Students at Abu Nsair VTC by Program

Figure 2 shows the number of students by programs at Abu Nsair VTC in the capital, Amman. There are a number of programs at the VTC, and the change of colors indicates the modifications that take place every year in the content of the program. This is due to the fact that the VTC is reflecting the results from the survey regarding the occupational skill conducted to the labor market, on its programs.

#### (4) Graduation Rate and Employment Rate

VTC's graduation rate is on average 64%, and the employment rate is high at 74.3%. (Table 6, Table 7) Graduation rate has remained unchanged since the time of ex-post evaluation; and this trend has been sustained. According to the interview with VTC, the employment rates of schools supported by this project differ from one another, but are showing trends of improvement overall. It is assumed that the rise in the employment rate is the effect of industry needs study by VTC being reflected on the programs. The Abu Nsair VTC that we visited is located in an area with high demand for sewing technicians. Computerized cutting technology using the latest sewing machine introduced to the school has been highly rated, and the school can hold training programs for garment companies.

Further, through the "Project for Strengthening the Capacity of Training Management of VTC" (November 2006-November 2010) undertaken by Japan International Cooperation Agency (JICA)

created three model VTCs which can provide training programs meeting the needs of the industrial market. Because this project was successful, VTC has expanded the project to nine schools, and currently is proceeding to apply this project to all the remaining schools. Zarqa, a school supported by this program, is included in the nine schools to which the application was extended.

Table 6. Change in the Employment Situation of all VTC

	(Unit: %)			
	07/08	08/09	09/10	10/11
Employment Rate	74.6	-	77.1	74.3
Students with Job Compatible to their Training	36.6	-	28.4	25.4

Source: Vocational Training Corporation Head Office

Table 7. Change in the Graduation Rate of Five Schools Supported by this Project

	(Unit: %)			
	07/08	08/09	09/10	10/11
Yajouz	51.5	33.1	14.4	65.0
Zarqa	42.6	53.1	72.2	96.8
Middle Ghor	37.8	27.4	62.2	74.5
Madaba	31.1	36.0	35.2	60.4
Abu Nusair	27.7	85.9	66.2	60.8
VTC Total	66.9	78.0	53.2	64.0

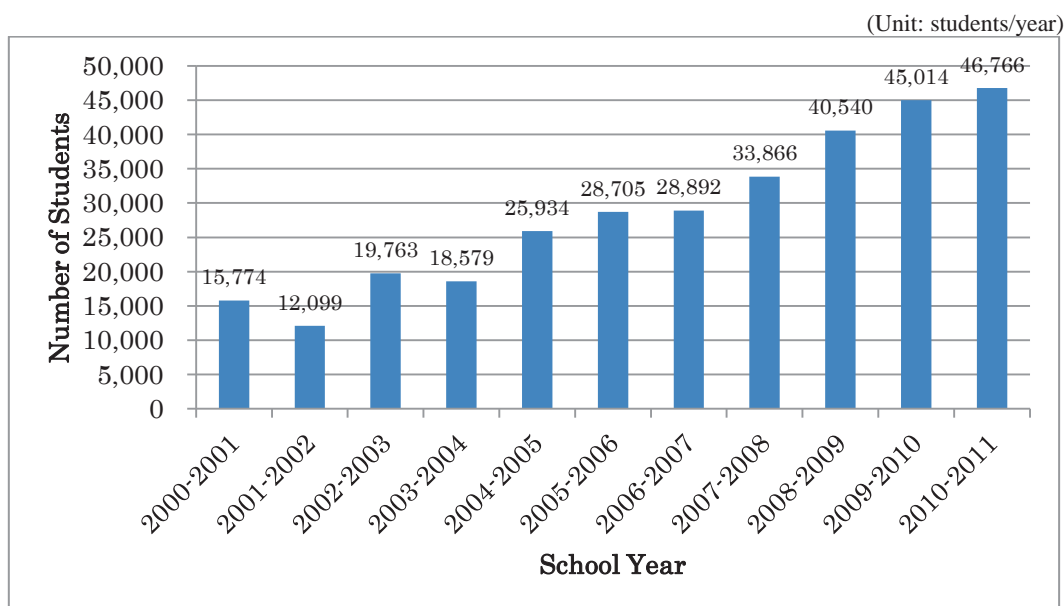
Source: Vocational Training Corporation Head Office

Although the numbers of students are fluctuating, they are stable within a certain range in the long run. Employment rate has exceeded 70%, and is stable. It can be concluded that the project continues to take effect.

### 3.1.1.1.3 Community College

#### (1) Trends in the Enrollment at Community College

The reasons for the increase in the enrollment in community colleges are, Balqa University, which is the regulatory agency for community colleges, undertaking a significant reform of the programs to reflect the needs of the labor market; community colleges' constant reviewing of their programs and the attractive programs after the reform; and provision of a chance for the students to transfer to a four-year university which is appealing to Jordanian people with general inclination to aim for higher education. (Figure 3)



Source: BAU

Figure 3. Change in the Number of Students at Community College

Table 10. Changes in the Enrollment at Community Colleges Supported by this Project

	(Unit: students)		
	2009/2010	2010/2011	2011/2012
Amman University College	260	176	0
Al-Husn Polytechnic	913	823	483
Salt	785	730	474
Al-Karak	406	461	562
Ma'an	227	103	185
Irbid	973	892	958
Zarqa	1,074	733	889
Ajloun	482	230	282
Amman Engineering Polytechnic	1,092	625	1,055
Alia	650	572	501

Source: BAU

The number of students at community colleges supported by this project, which was 6,098 at the time of ex-post evaluation, declined after reaching its peak in 2009 (Table 10). From an interview, the reasons for the decrease in the number of students are the discontinuation of an unpopular program major in accordance with the industry demand, and the government's change in its policy for "Tawjihi", which is a standardized examination for universities (required score for entrance into



university was reduced and community college lost students to universities). The government of Jordan is tackling this problem in the national agenda, ERfKE2. (See “3.4 Follow-up of Recommendation (1)”) From the information obtained from Balqa University and from an interview with a school director of each school, reasons for the fluctuation by school are as follows:

- Amman University College: Number of enrollment is zero in 2011, because of the discontinuation of Banking and Finance Program from a lack of market demand. The students attended their classes at another community college (Alia College), and the facilities were continually utilized by the college.

- Al Husn Polytechnic University: The number of students decreased in 2011 because of its closure of the Department of Literature. The purpose of this closure was to make the school a 100% science and technology university, and construction work for expansion of its facilities is under way. In the near future, the school is planning to start new programs in the fields of health and safety, and energy.

- Salt: The number of students in 2011 decreased because of the discontinuation of two-thirds of the juvenile education program due to limited market needs.

- Ma'an: Decrease in the number of students in 2010 is due to the policy of Ma'an municipality to reduce the passing score of Tawjihi. This resulted in more students choosing to attend four-year universities. The passing score was restored to its original score the following year, and number of students has also returned to its previous level.

- Ajloun: The decrease in the number of students from 2010 is due to the replacement of programs which were unpopular with the students. It takes approximately two years to recruit the desired number of students following the renewal of program content, dissemination, and recruitment of students.

- Amman Engineering Polytechnic: The reason for the increase in the number of students after its decline in 2010 is the government's policy, which lowered the passing score of Tawjihi to 55% in 2010, and raising the score to 65% in the subsequent year. In the year the score was lowered, more students chose to go to universities instead of community colleges.

Concerning the impact of the change in the passing score of Tawjihi, it can be reasoned upon observation that the government should take measures in order to conform to the country's policy to increase the number of student enrollment in community colleges.

## (2) Graduation Rate and Employment Rate

Employment rate for graduates from community colleges continues to be near 100% due to the high demand for graduates who have mastered the professional skills to meet the community-based needs. Data on the overall employment rate of community colleges are not compiled, but other than female students, who do not wish to work, close to 100% is employed. Graduates often work in

occupations that meet the needs of the community. In addition, many students are working in foreign countries such as the Gulf.

Overall, the number of students at community colleges is increasing. At the community colleges supported by this project, the numbers of students have shown fluctuation, but have remained within a certain range. The main reasons for the fluctuation are the effects of the change in market demand, and the change in the entering number of students from the government's policy to change the passing score of Tawjihi. Students have a tendency to choose four-year universities over community colleges when the Tawjihi score is lowered. Under these circumstances, community colleges are committed on reviewing the programs to reflect the needs of the market, and employment rate is high for graduates with skills that match the needs of the market.

#### 3.1.1.2 Internal Rates of Return (IRR)

In ex-post evaluation report, the internal rate of return was calculated to be 3.1%. In this study, the calculation of the internal rate of return will not be performed, since the basis of calculation used at the time of ex-post evaluation could not be obtained.

#### 3.1.2 Qualitative Effects

##### (1) Improvement in the Quality of Vocational Education

As can be seen in majors utilizing new technology and establishment of majors utilizing modern facilities, project's contribution to the improvement of the quality of vocational education continues to take effect.

##### (2) Provision of Vocational Education that Meets Market Needs

project's contribution to the provision of vocational education that meets market needs continues to take effect through establishment of new majors that match the industry needs and through reviewing of existing majors,

##### (3) Improvement in the Quality of Academic Education

The project's contribution to the improvement in the quality of academic education continues to take effect. The number of students per class was optimized and double-shifts were reduced as a result of renovation and construction of school facilities. In addition, stable learning environment is now secured from the reduction of leased schools.

## 3.2 Impact

### 3.2.1 Intended Impacts

#### 3.2.1.1 Improvement of the Balance of Payments and Foreign Currency

It cannot be said that this project has had a direct effect on the balance of international accounts. However, in the interviews with Vocational Training Corporation and BAU, there were comments that there is contribution to the acquisition of foreign currency through remittances from graduates working in foreign countries, such as the Gulf. Also, the MOE stated that “one of the goals is that this project will ultimately lead to an increase in GDP”.

#### 3.2.1.2 Industrial Structure

Although VTC and BAU continue to produce high-level technicians, contribution of this project to the advancement of industrial structure is unknown.

#### 3.2.1.3 Women's Advance into Society

The project continues to support the social advancement of women through provision of vocational training which are useful for their employment. From this effort, increase in the employment opportunities of women can be seen particularly in occupations such as fashion, childcare, and secretary. In an interview, BAU stated that "pertaining to employment of women, even if they do not work after graduation, the level of higher education will ultimately have a positive impact on society as a whole through parenting".

#### 3.2.1.4 Social Stability

Although the project has continued to contribute to the employment of younger generations, the contribution to social stability is unclear.

#### 3.2.1.5 Regional Development

At VTC and community college, the project continues to provide community-based vocational training that meets the needs of local industry, and has contributed to the industry in the region. Also, the project has contributed to regional development through cooperative vocational training with local companies and providing special courses for the companies utilizing the latest facilities installed in the schools. By constantly reviewing the curriculum to reflect the market needs, and producing the graduates with the demanded skills, BAU and VTC has served as a bridge between industry (society) and human resources.

### 3.2.2 Other Impacts

None

From the above, this project is playing an important role in the social advancement of women and the development of the region. It can be determined that at the time of ex-post monitoring, the impact of this project continues to take effect.

### 3.3 Sustainability

#### 3.3.1 Structural Aspects of Operation and Maintenance

There has been no change since the ex-post evaluation, and sustainable structure has been maintained. The central executing agency of this project is NCHRD, and presiding agencies for each schools system are: MOE (comprehensive schools), Balqa University under the Ministry of Higher Education (community colleges), and Vocational Training Corporation under the Ministry of Labor (VTCs).

##### (1) Status of the Operation and Maintenance of Facilities and Equipment

According to the observation and the interview at the time of the site visit, improvement could be seen in the management conditions of buildings, equipment, and facilities invested by this project from the time of ex-post evaluation. From the site visits, it was confirmed that the statuses of the facilities were satisfactory, and they were properly managed. However, since the list of assets which were invested by this project did not exist, the only sources of information were memories and records kept by school staff. There were also cases where the personnel in charge has moved to another school or the record did not exist (fixed asset ledgers exist, but there is no information linking the project and assets), and therefore, overall assessment of the equipment could not be made. According to the interview, service life of most of the equipment provided by this project has already expired; there is much equipment such as computers which need to be replaced, or those which operation and maintenance cost have become substantial.

##### (2) Other Status of the Operation and Maintenance

Processes for reviewing and modifying the curriculum have been established, and improvement can be seen in the operation and maintenance. VTC and community college is conducting a unified research on employment and market needs, and reflecting these results during the review of the program.

Since almost all of the comprehensive school students proceed to universities, comprehensive schools do not have information on the employment of graduates. In order to conduct a follow-up research for the career path from comprehensive school to university, VTC, or community college, cooperation between the ministries (MOE, Ministry of Higher Education, and Ministry of Labor) is necessary. In response to ERfKE1, NCHRD created an information database in 2012, encompassing

comprehensive schools, universities, and community colleges. Such information is useful in the operation and maintenance of this project. This information is also distributed as a booklet in summarized version, and is planned to be disclosed over the internet in the near future. This data is expected to be used in decision-making for the operation and maintenance of the education system. There is also a plan to encompass data for VTC.

### 3.3.2 Technical Aspects of Operation and Maintenance

The technical skills of operation and maintenance continue to be provided, and high level of sustainability can be expected. Each school receives adequate technical support from its supervising agencies: comprehensive school, VTC, and Balqa University. In addition, concerning operation and maintenance of curriculum, through the implementation of JICA's "Project for Strengthening the Capacity of Training management of Vocational Training Corporation" the findings from research on employment and industrial needs are reflected systematically to the review processes of the curricula. Its effect can be seen in the employment rate and the filling rate. Application of this successful case of the initial model school is planned to be expanded to all schools.

### 3.3.3 Financial Aspects of Operation and Maintenance

#### (1) Government Budget

10% of the government budget, 4.5% of the GDP, is allocated for education (2011). This remains unchanged since the ex-post evaluation.

#### (2) Budget for Facility Operation and Maintenance Expense

The overall budget of the MOE is 6 million Jordan Dinars (JOD). This is the budget for the maintenance cost of the existing facilities, and does not include the replacement cost. Budget for the VTC, which fluctuates by year, is 85,000 to 100,000 JOD. Tuition revenue per student at Balqa University is one-third of the total cost; university budgets are in a tight situation. At Balqa University, the shortfall is complemented by the revenues from the diploma programs.

As a shared comment from the interviews, the budget is insufficient for the replacement of facilities and equipment which is near or past its service life. The costs for maintaining these equipment are increasing every year. At the time of this study, no measures have been taken for budget allowance. However, the state of the facilities and equipment were satisfactory; by using the equipment with care, the equipment continued to be fully utilized after the expiration of its service life.

From the above, no problem was detected concerning the operation and maintenance, and there is no problem with sustainability. However, regarding the equipment ending its service life in the near

future, action is necessary since the allowance budget has not been secured.

### 3.4 Others

#### (1) Follow-up of the Ex-Post Evaluation Recommendation

Jordan is committed to the realization of the recommendations mentioned in the ex-post evaluation report, through the national agenda, ERfKE2. Until now, the Jordanian government has continually placed emphasis on vocational education. However, in actuality, there were discrepancies in the supply and demand such as those mentioned below, and the plan could not be realized:

1. Student's general inclination to aim for higher education, and high unemployment rate of university graduates.

2. Demands are high for skilled workers such as industrial technicians, but those occupations are unpopular with students.

The government of Jordan is aiming to ultimately expand the vocational education by reviewing the career path and vocational training through cooperation with MOE, Ministry of Higher Education, and Ministry of Labor, which are the three ministries responsible for the educational system. This objective is also listed in the action plan of National Agenda, ERfKE2, and is targeted to be achieved by 2015.

Currently, VTC is conducting an assessment every two years for training needs and follow-up study of graduates, and utilizing this information to review its programs. BAU is building an information database of all graduates, and advancing the construction of Career Development Center. There is currently one Center operating in the middle region. BAU is planning on building one center each in the northern and southern regions, and utilize these three centers to cover the entire country.

## 4. Conclusion, Lessons Learned and Recommendations

### 4.1 Conclusion

Educational equipment and facilities built and renovated by this project continue to be utilized, and are contributing to the expansion of educational opportunities and to improving the quality of education. Also, the impact on the acquisition of foreign currency and on the contribution to the local economy continues to take effect. The enrollment rate for the vocational education remains low, just under 15%, but this is recognized to be a problem solved by cooperation between ministries, and its resolution is set as an objective in the context of education reform. It is expected that the efforts by policy makers continue in the future. As for sustainability, equipment invested by this project is maintained in good condition, and, as a result of ERfKE, a review of vocational training to meet the market needs is being held every year. In addition, it can be concluded that the sustainability of this

project has improved, since it was confirmed that the source of funds needed to sustain this education system was secured.

## 4.2 Recommendations

### 4.2.1 Recommendations to the Implementing Agency

It was generally noted that, there is insufficient budget for replacement of certain facilities and equipment which is near to or has already passed its service life (especially computers). These equipment's operation and maintenance cost is substantial and therefore requires replacement. School personnel commonly asserted that the budget was insufficient. It is desirable for the government of Jordan to consider provision of budget for the replacement of these equipment and facilities.

## 4.3 Lessons Learned

When verifying the status of the operation and maintenance of equipment and facilities, there was no choice but to rely on the memory of school staff and on the records kept by individual school staff since the list of the assets invested by this project did not exist. In this context, a comprehensive checking of the equipment could not be performed, since the personnel in charge have moved to another school since, and the records in the schools' fixed asset ledger did not mention the project name by which the equipment was invested. It is desirable for the recipient government to create and store a list of equipment upon the completion of the project, and to utilize this at the time of ex-post evaluation and ex-post monitoring.

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
(1) Output		
(a) Comprehensive Schools	New construction: 31 schools Expansion: 21 schools Procurement of equipment and furniture: 66 schools	New construction: 31 schools Expansion: 21 schools Procurement of equipment and furniture: 66 schools
(b) Community Colleges	Expansion: 7 schools Procurement of equipment and furniture: 11 schools	Expansion: 7 schools Procurement of equipment and furniture: 10 schools
(c) VTCs	Expansion: 3 schools Procurement of equipment and furniture: 5 schools	Expansion: 3 schools Procurement of equipment and furniture: 5 schools
(2) Project Period	July 30, 1997–June 2002	July 30, 1997–Nov. 13, 2005
(3) Project Cost		
Total of ODA Loan Portion	7,123 million yen	6,027 million yen
Civil Works	3,914 million yen	3,826.85 million yen
Equipment & Furniture	2,761 million yen	2,235.62 million yen
Consulting Services	110 million yen	87.91 million yen
Slush Fund	638 million yen	1JD = 169.49 yen
Exchange Rate	1JD = 154.62 yen (Jan. 1997 at time of appraisal)	(Nov.2005 completion of disbursement)



## Ex-Post Monitoring of Japanese ODA Loan Project

South Africa

### Kwandebele Region Water Augmentation Project

External Monitoring Consultant: Katsumi Matsuyama, Nakamoto&Associates Co., Ltd.

#### 1. Project Description



Project Location



Bronkhorstspruit Water Purification Plant

#### 1.1 Project Objective

The project aims to fulfill the present and future water demand in Kwandebele region, one of the former homelands, by installing conduits and water pipes and expanding water purification and pumping facilities in the region thereby contribute to the improvement of the sanitation environment and the activation of industries.

#### 1.2 Outline of the Loan Agreement

Approved Amount / Disbursed Amount	3,097 million yen / 1,814million yen
Loan Agreement Signing Date / Final Disbursement Date	May 1996 / November 2003
Ex-Post Evaluation	2006
Executing Agency	Department of Water Affairs (DWAf)
Main Contractor	Fregold-Construction (South Africa)• Valente-Bros (South Africa) (JV)
Main Consultant	-

#### 1.3 Background of Ex-post Monitoring

Kwandebele region, located approximately 60 km east of the capital Pretoria, is one of the former

homelands. Because of its geographical location, Kwandebele region was developing as the largest township for black residents commuting to Pretoria. The region was experiencing rapid population growth marking an annual growth rate of approximately 7.5% for several years prior to the appraisal of this project. However, Kwandebele region did not have sufficient infrastructure such as water supply. To improve this situation, this project implemented installation of water pipes, construction of water treatment plants, and expansion of pump facilities.

However, with the enactment of the Constitution of the Republic of South Africa in 1997, Water Service Act was signed into law according to a policy on water supply and sanitation and water supply policies of local municipalities were reviewed on a national scale.<sup>1</sup> Review of the water policy of the Kwandebele region uncovered the fact that expending a large capital for drawing water from Great Dry Dam was unnecessary. Hence, the project was cancelled in 2000. As a result of the policy change of the country, the jurisdiction of water supply was planned to be transferred from Ministry of Water Affairs (DWAF) to local municipalities. But since the local governments had not been established, and organizations to assume the role of water service provider (WSP) in the region were nonexistent, Ikangala Water Board (IWB) was organized as a body to implement the installation of water supply infrastructure and the operation and maintenance of the facilities. At the time of ex-post evaluation (2006), the DWAF was providing IWB with personnel and financial support. However, they were insufficient. The local municipalities had not entered into a water supply agreement with IWB, and payments for water supply were not being made. Based upon the fact that the IWB had not employed any engineers, and the resignation of CEO and five members of the management staff, it was judged that IWB was lacking the capacity to sustain the water supply service. There was concern over the sustainability over the project, as the capacity was insufficient to effectively utilize the facilities installed by this project and satisfy the water needs for the region.

Under these circumstances, in the ex-post evaluation report, recommendations were made to Japan International Cooperation Agency (JICA) to organize the problems, carefully analyze the situation, and apply the lessons learned from this project to future project formation. Recommendation was also made to the South African local governments to establish relations with appropriate Water Service Providers (WSP) as Water Service Authority (WSA) as soon as possible.

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.

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<sup>1</sup> (1) Water Services Authority (WSA): Functions of administration, planning, and regulations concerning water supply services (it was stipulated that the local municipalities having jurisdiction over each service area shall serve as WSAs)  
(2) Water Services Provider (WSP): Functions of designing, construction, ownership, operation, maintenance and customer relations concerning water supply services

## 2. Outline of the Monitoring Study

### 2.1 External Monitoring Consultant

Katsumi Matsuyama (Nakamoto & Associates Co., Ltd.)

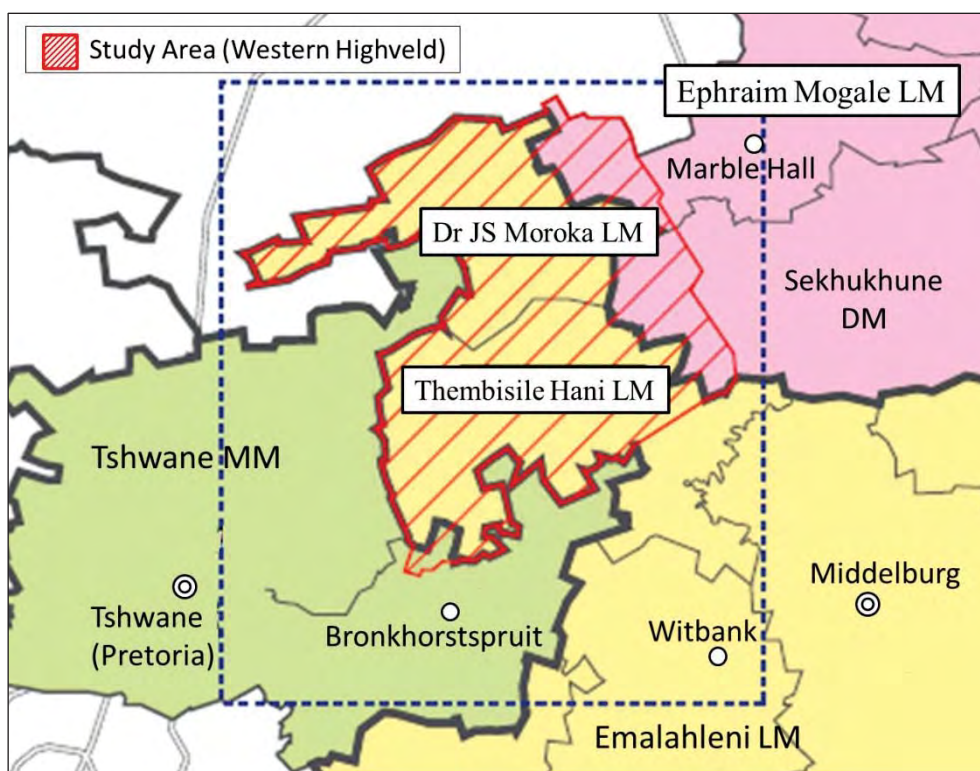
### 2.2 Duration of Monitoring Study

Duration of the Study: September 2012 – June 2013

Duration of the Field Study: November 16, 2012 – November 24, 2012

### 2.3 Constraints During the Monitoring Study

At the time of the appraisal of this project in 1996, current Western Highveld region (former Kwandebele region) represented an administrative area of former homeland. However, according to the interview with DWAF, Western Highveld is merely a name for the historical region, in which, currently, its boundary passes through four local municipalities (There were five municipalities at the time of ex-post evaluation. The municipalities were reorganized subsequently). The region name is used by the water suppliers for the operation of the facilities, since multiple municipalities share the facilities within the region. The water supplied by the facility is utilized by municipalities inside and outside of the region.



Source: Reference obtained from Japan International Cooperation Agency (JICA)  
 MM (Metropolitan Municipality): administrative body of metropolitan area. Also holds authority as regional district municipality.  
 DM (District Municipality): administrative organization under the state and above LM  
 LM (Local Municipality): administrative organization under DM. Lowest in the hierarchy of administrative bodies.

Figure 1 Western Highveld Region

This study revealed that the data pertaining to this area does not exist, since Western Highveld region is neither a name of an administrative district nor a collection of administrative districts. Western Highveld is a region designated for the purpose of operating the water service facilities, and its boundary passes through parts of the four neighboring local municipalities.

Since Western Highveld is not an administrative district, water supply and consumption data pertaining to this particular region could not be obtained. Therefore, efforts were made to obtain alternative data which are comparable to the ex-post evaluation.

### 3. Monitoring Results

#### 3.1 Effectiveness

##### 3.1.1 Quantitative Effects

##### 3.1.1.1 Results from Operation and Effect Indicators

##### (1) Volume of Water Supply and Water Supplied Population

According to "Blue Drop Report 2011" issued by DWAF, the water-supplied populations of four municipalities, which are partially a part of Western Highveld (Greater Sekhukhune, Dr. JS Moroka,

Thembisile, City of Tshwane) have reached 3.7million, and the volume of supplied water is 300,000 m<sup>3</sup> per day (Table 1). According to the interview with DWAF, although there are persistent problems of leakage and illegal connection to water supply pipes, Western Highveld region have not experienced any water shortage due to the above mentioned reasons or any other reasons. At the time of the study, there were problems with water pipes near some villages, and DWAF was working to repair the pipelines.

Table 1 Water supplied population and Volume of Water Supply in four municipalities

Municipality	Population supplied with water (persons)	Volume of water supply (m <sup>3</sup> /day)
G. Sekhukhune DM	854,093	95,627
Dr. JS Moroka LM	218,290	2,000
Thembisile LM	264,400	50,399
City of Tshwane MM	2,445,083	156,497

Source: DWAF Blue Drop Report 2011 \*value from ex-post evaluation

Calculating from the data from Table 1, each resident of the four municipalities receive approximately 79 liters (0.07 m<sup>3</sup>) of water per day. In the Reconstruction and Development Program, water supply of 20-30 liters per person per day was held as a short-term goal, and 50-60 liters per person per day was held as a mid-term goal. Current numbers exceed both of these goals.

For the reasons mentioned above, data for the supply and demand of water pertaining to the Kwandebele region could not be obtained. However, considering the calculation from the water supplied population and supplied volume and the result from the DWAF interview, water shortage could not be detected in the four municipalities studied by this project.

## (2) Component Capacity

The capacities of the 4 components installed by this project are as follows:

Table 2: Capacity of Components

Component		Capacity	
		2006*	2012
1	Installation of Ekangala-Enkeldoornoo Gembokkspruit water pipe	Length: 42km Capacity: 1 m <sup>3</sup> /s	Length: 42km Capacity: 1 m <sup>3</sup> /s
2	Ekangala regulating reservoir	Capacity : 20,000m <sup>3</sup>	Capacity : 20,000m <sup>3</sup>
	Enkeldoornoo regulating reservoir	Capacity : 11,000m <sup>3</sup>	Capacity : 11,000m <sup>3</sup>
3	Kwandebele Region regulating reservoir	Capacity : 10,000m <sup>3</sup> × 2	Capacity : 10,000m <sup>3</sup> × 2
4	Procurement of equipment for Bronkhorstspruit water treatment facilities	Treatment Capacity : 21 million m <sup>3</sup> /day	Treatment Capacity : 54 million m <sup>3</sup> /day

Source: DWAF \*data from ex-post evaluation

The data obtained for the capacity of Bronkhorstspruit water treatment plant differ from those reported in the ex-post evaluation report. According to an interview with DWAF, there were no renovations made after the ex-post evaluation, and the reason for the difference between the two numbers is unknown. Otherwise, there are no changes in the capacity of the components from the time of ex-post evaluation.

Utilization statuses of the four components are as follows.

- Bronkhorstspruit water treatment plant treats 43,000 m<sup>3</sup> of water per day supplied from Rand Water Board, utilizing the water treatment facility implemented by this project.
- Of these, 30,000 m<sup>3</sup> per day is supplied to City of Tshwane. The remaining 13,000 m<sup>3</sup> per day is combined with 31,000 m<sup>3</sup> per day supplied from Rand Water Board, and the total of 44,000 m<sup>3</sup> per day is sent to Thembisile through the Enkeldoornoo water pipe and Enkeldoornoo regulating reservoir. The water supplied population for the four components could not be obtained due to the reasons mentioned in the "Constraints during the Monitoring Study".

From Table 1, total water supply to the four municipality is 304,523 m<sup>3</sup> per day. Amount of water conveyed to Enkeldoornoo regulating reservoir through Ekangala-Enkeldoornoo water pipe is 44,000 m<sup>3</sup> per day, which is the capacity of the pipeline. Assuming that all of the water is supplied in one day, the percentage of contribution to the entire water supply is 14.4%. Also, in assuming that, of the 43,000 m<sup>3</sup> that is treated at Bronkhorstspruit water treatment plant, the remaining 30,000 m<sup>3</sup> which is not sent through Ekangala-Enkeldoornoo pipeline (volume consumed in City of Tshwane), is consumed in one day, the percentage of contribution to the entire water supply is 9.8%. From the above, the contribution of the four components to the water supply to the entire municipality can be

speculated to be approximately 24.2%.

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

Re-calculation of Internal rate of return (IRR) will not be performed since IRR was not calculated at the time of ex-post evaluation.

#### 3.1.2 Qualitative Effects

See Impact.

From the above, concerning effectiveness, it was confirmed that four components implemented by this project continue to be in operation since the time of ex-post evaluation. From the aforementioned reasons, data on the balance of supply and demand of water cannot be compared to those in the ex-post evaluation. However, from the data obtained by this study, water shortage could not be seen, and the contributions of this project to the water supply to the four municipalities (approximately 24.2% of the total water supply) were confirmed.

### 3.2 Impact

#### 3.2.1 Intended Impacts

##### 3.2.1.1 Improvement of Living Conditions

According to the interviews to residents of Bronkhorstspuit, located within the Western Highveld region, there is no problem with the quality or quantity of tap or drinking water. There were also no reports of leakage.

Concerning the impact on living conditions, information required for confirming the improvement of public health in the targeted region could not be obtained from the Ministry of Health (MOH). As alternative indicators, "under-five mortality" from "Mortality and Causes of Death in South Africa, 2009: Findings from Death Notification"(MCD) issued by MOH, and "water piped onto premises" from "Estimates for the Use of Improved Drinking-Water Sources of South Africa" (EIDW) issued by World Health Organization (WHO) and United Nations Children's Fund (UNICEF) were collected and compared (Table 3).

Table 3 Under-five Mortality and the Portion of Families Using Potable Water

	Under-5 mortality (persons)	Use of Drinking Water Sources (%)	
		Urban	Rural
2001	41,094	97.6	60.5
2002	46,470	Data Not Available	
2003	51,881	98.2	64.1
2004	57,355	Data Not Available	
2005	62,029	Data Not Available	
2006	64,326	98.8	64.3
2007	61,540	98.3	67.4

Source: "Mortality and Causes of Death in South Africa: 2009" Ministry of Health, "Estimates for the Use of Improved Drinking-Water Sources South Africa (EIDW): March 2010" WHO/UNICEF

According to CIA World Factbook and World Bank, life expectancy of South Africa is as follows:

Table 4 Average Life Expectancy Rate of South Africa

(Unit: years)	
	Life Expectancy
2001	48.09
2002	45.43
2003	46.56
2004	44.19
2005	43.27
2006	42.73
2007	42.45
2008	51.24*
2009	51.61*
2010	52.08*
2012	49.41

Source: CIA World Factbook  
\*World Bank

Compared to the time of ex-post evaluation, improvement was seen in the under-five mortality and life expectancy. However, since the components implemented by this project are limited in comparison with the scope of the project, it is impossible to present a clear causal relationship.



### 3.2.2 Other Impacts

#### 3.2.2.1 Environmental Impact

No negative environmental impact has been detected from the time of ex-post evaluation. According to an interview with DWAF, no particular comment can be made concerning the environmental impact of this project since its implementation was limited.

From the above, concerning the impact, the components implemented by this project were limited compared to the plan, as indicated in the ex-post evaluation report, and therefore, it is impossible to perceive the above figures as impacts resulting from this project.

### 3.3 Sustainability

#### 3.3.1 Structural Aspects of Operation and Maintenance

At the time of ex-post evaluation, Western Highveld region was under direct jurisdiction of DWAF, since the region was not included in the service area of Water Service Company and the local municipality had not been established. Currently, WSP is the local government itself, company partially-owned by the local government, private contractor, NGO, or community organizations which follow WSA's procedures in carrying out the operations. IWB was providing services to the region at the time of ex-post evaluation; however, IWB has been liquidated.

WSA's regional offices of the four municipalities are located in remote locations, and interviewing all of the offices under the conditions of this study was impossible. Therefore, interviews were done with officials, in charge of operation and maintenance, from Dr. JS Moroka and Thembisile, where the four components are operating. Under the supervision of DWAF, plan for water supply is made by local government (WSA), and WSP collects water fees and performs the operation and maintenance of the facilities. Among the local municipalities, in Dr. JS Moroka, WSP is the local government itself, and in Thembisile, multiple private contractors and local governments (Rand Water Board; Lekwa, municipality located in the neighboring district; Dr. JS Moroka; City of Tshwane) are acting as WSPs and conducting the supply of water and the operation and maintenance of the facilities. Fee collection is implemented by the local government itself. Operation and maintenance personnel for Greater Sekhukhune and City of Tshwane could not be interviewed, but following information concerning the operation and maintenance were obtained from the "Blue Drop Report 2011":

Table 5 Names of WSA and WSP

WSA	WSP
Greater Sekhukhune DM	Greater Sekhukhune DM; Lepelle Water; Elias Motswaledib
City of Tshwane MM	City of Tshwane MM; Rand Water; Magalies Water

Source: Blue Drop Report 2011

In the ex-post evaluation, concern was shown over the relationship between the IWB, which was the WSP, and the local municipality. However, the IWB has already been liquidated, and service agreement between WSA and WSP is stable. The contract is renewed every year. Information on the number of workers could not be obtained, but through an interview with the officials in charge of operation and maintenance at Thembisile and Dr. JS Moroka, there are no shortages of workers.

Every year, DWAF conducts an audit targeting all WSAs over water quality, maintenance status of the facilities, and management structure, and publishes the results as the “Blue Drop Report”. Municipality with a high score receives an award. Similar audit is also done for sewage treatment, and the results are published annually as the “Green Drop Report”. The water service framework of DWAF-WSA-WSP is currently established throughout the country. Under these circumstances, DWAF conducts audit and rating to each WSA, and the results are disclosed to the public. This procedure has been carried out for the past several years. Therefore, it can be concluded that the operation and maintenance structure has improved since the time of ex-post evaluation.

According to an interview with DWAF, concerning the operation and maintenance structure of the four municipalities, imbalance in the supply and demand of water has been recognized as a common problem. Intake of water is ultimately twice the volume of consumed water. In other words, treated water is twice the amount of the water demand, and there exists an imbalance. The causes of this imbalance are: lack of technical knowledge to draft a plan and control the volume of intake based on ascertained demand volume of water, inefficiency of water treatment facilities due to deterioration and leaks from water pipes, and the consumer's low awareness towards economizing water consumption. In order to improve the situation, WSA is working to repair the failing facilities and educating the consumers on water economy through seminars and pamphlets.

Although adequate system for operation and maintenance is organized, there is still room for improvement in water economy such as, systematic planning of water supplier, facility improvement, and educating and raising public awareness on water economy.



Ekangala-Enkeldoornoog Aqueduct facility



Ekangala Regulating Reservoir  
Minor leakage can be seen

### 3.3.2 Technical Aspects of Operation and Maintenance

Interview was conducted to respective officials in charge of operation and maintenance at Thembisile and Dr. JS Moroka. From the interviews, the problems of worker shortages and inadequate skill level, detected at the time of ex-post evaluation, have been resolved. In Thembisile, WSP is the local government itself, and in Dr. JS Moroka, in addition to Rand Water Board, three municipalities of Lekwa, City of Tshwane, and Dr. JS Moroka are WSPs. At Thembisile, engineer staff carries out the basic operation and maintenance procedures such as leakage inspection, and repair of minor malfunctions. In case of complex malfunctions, the repair is commissioned to private contractors. Thembisile is planning to hire three highly-skilled engineers in order to manage to these problems themselves in the future. Also in the near future, there are plans to separate departments for water supply and sewage in order to raise the efficiency of water business management. Furthermore, by increasing the number of regional offices, Thembisile is expecting to decentralize the operation and maintenance of facilities and the collection of water fee. In Dr. JS Moroka, water business is divided into water treatment department and water supply department. Interview could only be held with the water treatment department. The department currently has a staff size of 35. There is no shortage of workers, and they have no plans of recruiting. According to the official of the water treatment department, the water supply department is mainly in charge of counter services such as fee collection.

### 3.3.3 Financial Aspects of Operation and Maintenance

In Thembisile, improvements were made based on the proposals made in the “Special Assistance for Project Sustainability” (SAPS) report of 2011. Improvement could be seen since the

implementation of SAPS (2011). Currently, Revenue from water services is processed separately from general account, in accordance with the SAPS report. Although the details of the budget could not be obtained through the field studies in Thembisile and Dr. JS Moroka, according to an interview with DWAF, there is no shortage of the budget for water services. Currently, in addition to conducting the operation and maintenance of the facilities, DWAF is holding meetings in various places and publishing pamphlets in order to raise public awareness on water economy. These were activities that were not possible in the past. Further, water rates are reviewed annually, though they are not necessarily revised each year. Payment of water fee is generally done through pre-paid card for corporations, and individuals pay a fixed rate at a regional office or through bank transfer.

According to the interview to the official in charge of water treatment department at Dr. JS Moroka, there is ample budget provided for operation. However, data on the budget could not be obtained.

#### 3.3.4 Current Status of Operation and Maintenance

The following were selected for site visits:

Water pipe between Ekangala and Enkeldoornoog-Gemsbokkspruit

Ekangala Regulating Reservoir

Bronkhorstspuit Water Treatment Plant

The ex-post evaluation indicated that the four components were not in the state to be operated and managed effectively. Currently, the components are operated and managed effectively, and are operating under good condition. According to an interview with DWAF, Enkeldoornoog Regulating Reservoir and Kwandebele Region Regulating Reservoir, which were not selected for on-site surveys, are also functioning properly.

#### 3.4 Others

Urgent agreement between local governments and WSA was recommended in the ex-post evaluation. Currently, the problem has been resolved, and no problems can be detected in the relation between local governments and WSP.

There is a necessity for water supplier in the region to initiate more advanced and complex issues such as securing of water resource, building industrial water facilities, and sewage recycling plants.

From the above, concerning sustainability, improvement can be seen from the time of ex-post evaluation. Shortage of employees and insufficient technical knowledge has been resolved in Thembisile and Dr. JS Moroka. Furthermore, there are no problems with the maintenance of the components implemented by this project. The problem with the relation between WSP and WSA reported in the ex-post evaluation report has been resolved. Systems for performing the operations

are established between DWAF, WSA, and WSP and functioning satisfactorily. However, since there are problems such as the volume of water intake far exceeding the demand, there is still room for improvement.

## 4. Conclusion, Lessons Learned and Recommendations

### 4.1 Conclusion

#### (1) Utilization and Contribution of Implemented Components

Four components installed by this project are operating in satisfactory condition, and provides 24% of the total water supply to the four municipalities which are part of Western Highveld region. The components are serving a role in fulfilling the water demand of the region. However, since only a limited portion of the planned components has been implemented, the project's contribution to the improvement of living environment and industrial development was unclear.

WSA of Thembisile and Dr. JS Moroka have ample personnel and the maintenance of the facilities was adequately performed. In addition, accounting issues identified by the SAPS report have been addressed. According to the interviews to the officials of each region, sufficient budget is secured for the operation and maintenance expenses.

This project was terminated without the implementation of all planned components. Since ex-post evaluation was conducted based upon the evaluation plan to evaluate all of the planned components, this ex-monitoring was also conducted under the same premises. Therefore, there were many difficulties in the verification of the direct effects of this project and analyses of information. Under these circumstances, the following conclusion was drawn. Although the installed component provides 24%, which is only a portion, of the volume of water demand of the region, no water shortage could be seen in the region. Therefore, there is a possibility that the original plan for water intake was too large.

#### (2) Situation of Local Government

Local government is functioning as WSA, but there are recommendations described in the following sections.

#### (3) Operation and Maintenance

Although there are no problems with water supply to the Western Highveld Region with respect to the region's water demand, there are recommendations described in the following section.

### 4.2 Recommendations

#### 4.2.1 Recommendation to WSA

WSA has currently initiated a reparation project with Rand Water Board to replace corroded water

pipes as indicated in the SAPS report. It is desirable to continue to ensure future repairs and extend the lifespan of the components.

#### 4.2.2 Recommendation to DWAF and the Government of South Africa

1. It is desirable to continue to provide adequate budgetary measures and guidance on the operation and maintenance, including the maintenance of facilities, to the water suppliers of local municipalities. Also, as mentioned in the SAPS report, DWAF is expected to take initiative in combining WSAs and organizing the joint management of water supply facilities, which is currently being managed by individual WSAs.

2. South Africa's water service environment has changed considerably from the 1990s. Actions toward problems resulting from economic development such as, preventing water resources pollution, securing industrial water and construction of water treatment facilities, installation of sewage pipelines as a premise of the increase in flush toilets from improved living standards, securing a dependable water source to respond to the progression of desertification need to be addressed promptly with central government and local government as a team. Meanwhile, DWAF and municipalities are aware of their technical inability and insufficient management knowledge to solve these problems. It is desirable therefore to strengthen the cooperation with other countries to obtain the necessary technology and knowledge.

#### 4.3 Lessons Learned

None.

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1. Outputs		
1) Installation of Ekangala-Enkeldoornoog Gemsbokkspruit conduit	42-km long, capacity 0.52 m <sup>3</sup> /s	42-km long, capacity 1m <sup>3</sup> /s
2) Construction of Ekangala Regulating Reservoir and Enkeldoornoog Regulating Reservoir	Capacity 10,000 m <sup>3</sup> and 40,000 m <sup>3</sup>	Capacity 20,000 m <sup>3</sup> and 11,000 m <sup>3</sup>
3) Procurement of equipment for Bronkhorstspuit Water Purification Works (Stage 2)	Add 6.0 million m <sup>3</sup> , total capacity 21.0 million m <sup>3</sup>	Procured (used for other region)
4) Civil works for the expansion of Bronkhorstspuit Water Purification Works (Stage 2)	Expansion of the intake from the river, intake pumping station and the conduit	Suspended
5) Construction and installation of Kendal Regulating Reservoir, Matla-Khutala conduit and Kendal-Bronkhorstspuit Dam conduit	10,400m <sup>3</sup> , 2.3 km long, capacity 0.6 m <sup>3</sup> /s, and 35km long, capacity 0.5 m <sup>3</sup> /s	Suspended
6) Installation of Bronkhorstspuit-Ekangala conduit	10km long, capacity 0.68 m <sup>3</sup> /s	Suspended
7) Procurement of equipment for Bronkhorstspuit Water Purification Works (Stage 3)	Add 5.0 million m <sup>3</sup> , total capacity 26.0 million m <sup>3</sup>	Suspended
8) Civil works for the expansion of Bronkhorstspuit Water Purification Works (Stage 3)	Details undecided	Suspended
9) Construction of Kwandebele Region Regulating Reservoir	Capacity 10,000 m <sup>3</sup>	10,000 m <sup>3</sup> x 2
10) Construction of the Second Kendal Regulating Reservoir	Capacity 10,400 m <sup>3</sup>	Suspended
11) Construction of Tweefontein Reservoir and Kwandebele Region Regulating Reservoir	Capacity 40,000 m <sup>3</sup> and 10,000 m <sup>3</sup>	Suspended
2. Project Period	May 1996 – May 2001 (61 months)	Oct. 1996 – Nov. 2003 (86 months)
3. Project Cost		
Foreign Currency	732 million yen	N/A
Local Currency (In local currency)	3,408 million yen (144 million rand)	N/A
Total	4,129 million yen	2,327 million yen
ODA Loan Portion	3,097 million yen	1,814 million yen
Exchange Rate	1 rand = 23.67 yen	1 rand = 20.07 yen

Note 1) The total 4,129 million yen, which is the amount shown in appraisal material provided by JICA, does not agree with the total of the foreign and local currency portions converted into yen (4,140 million yen).

Note 2) Calculated based on the JICA loan amount (in rand) stated in the Project Completion Report and the amount actually provided by JICA (in yen).





## Ex-Post Monitoring of Japanese ODA Loan Project

### Zimbabwe

#### Matabeleland Telecommunications Network Development Project

External Monitoring Consultant: Katsumi Matsuyama, Nakamoto&Associates Co., Ltd.

### 1. Project Description



Project Location



Central Management and Operations Center  
(Bulawayo)

#### 1.1 Project Objective

The project's objective was to promote the improvement of telecommunications in the major cities in the state of Matabeleland through installing and expanding telecommunications facilities in the regions, and thereby contributing to the improvement of the living environment and the investment climate in the region.

#### 1.2 Outline of the Loan Agreement

Approved Amount / Disbursed Amount	9,523 million yen/9,189 million yen
Loan Agreement Signing Date / Final Disbursement Date	August 1993 / December 2002
Ex-post Evaluation	2004
Executing Agency	TelOne Pvt. Ltd.(TelOne)
Main Contractor	Telecommunication (India), Itochu Corporation (Japan)
Main Consultant	DETECON (Germany)

### 1.3 Background of Ex-post Monitoring

The state of Matebeleland (cf. approximately three times the size of Kyushu in Japan) is located in southwestern Zimbabwe, and its capital city of Bulawayo (population 500,000 in 1993 appraisal (cf. nearly the same size at Matsuyama City in Aichi Prefecture in Japan)) is the second largest city in the country. Matebeleland was a region central to the support of the country's thriving processing industry and manufacturing industry. However, at the time of the appraisal, the existing communications facilities including the switchboards, transmission lines, and subscriber cables were conspicuously aged. Moreover, there were as many as 23,700 telephone service applications on the waiting list, which amounted to approximately 30% of the entire domestic waiting list for telephone service. Thus, improvement of telecommunications was an important issue for the development of the industrial infrastructure in the state. Thus, this project installed and expanded telecommunications network in Matabeleland's Bulawayo and surrounding cities.

At the time of ex-post evaluation (2004) several problems were pointed out as there was an outflow of workers and difficulty obtaining spare parts. Also, there were concerns over the sustainability of the project. TelOne incurred losses of 184 billion Zimbabwe dollars due to the inflation which occurred as a result of economic downturn.

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 Consultant

Katsumi Matsuyama (Nakamoto & Associates Co., Ltd.)

### 2.2 Duration of Monitoring Study

Duration of the Study: September 2012 – June 2013

Duration of the Field Study: November 24, 2012 – December 5, 2012

## 3. Monitoring Results

### 3.1 Effectiveness

#### 3.1.1 Quantitative Effects

##### 3.1.1.1 Operation and Effect Indicators

###### (1) Number of Subscriber Cables

The number of subscriber cables has increased from the time of ex-post evaluation. However, as shown in Table 1, the number has declined since 2009. According to the interview with TelOne, this is due to customer outflow by the spread of cell-phones.

Table 1. Change in the Number of Subscriber Cables in the Project Regions

	(Unit: cables)							
	2004*	2005	2006	2007	2008	2009	2010	2011
Number of Subscriber Cables	74,040	73,514	74,317	72,820	73,341	79,918	74,560	74,165

Source: TelOne \*value from ex-post evaluation

According to information obtained from Postal and Telecommunications Regulatory Authority (POTRAZ), numbers of subscribership to the three largest mobile operators are: Econet 6.4 million, NetOne (100% subsidiary of TelOne) 2.5 million, and TelCell: 2 million. As can be seen in Table 2, the mobile phone penetration rate, which was 7% in 2006, has increased nine times to 61% after 5 years in 2011.

Table 2. Mobile Phone Penetration Rate in Zimbabwe

	2006	2007	2008	2009	2011
Penetration Rate (%)	6.78	9.82	13.29	31.99	61.25
Number of Subscribers (1,000 people)	849	1,225	1,654	3,991	7,700

Source: Ministry of Internal Affairs and Communication

## (2) Landline Telephone Penetration Rate

While the mobile phone is showing rapid spread in the country, landline phone has increased 16%, between the time of ex-post evaluation and 2011, in the region that showed the most increment. The



other two regions show a decrease. Similar to subscriber cables, penetration rate of landline phone is affected by that of mobile phone. However, there is a difference between the urban area (Victoria Falls, Bulawayo) and rural area (Hwange, Gwanda). According to the interview with TelOne, reason for the decrease in the penetration rate of landline phone in the urban area is the customers'

tendency to switch to rapidly spreading mobile phone. On the other hand, in the rural areas, although there is a demand for telecommunication, antenna facilities for mobile phone do not exist, and, therefore, cannot switch to mobile phone. This is the reason for the increase in landline phone penetration rate between 2004 and 2009.

Table 3. Landline Telephone Penetration Rate in Zimbabwe

(Unit: %)

	2004*	2009	2010	2011	Difference (2004-2011)
Victoria Falls	14.8	17.0	10.7	9.6	-5.2
Bulawayo	9.7	9.6	9.2	9.1	-0.6
Hwange	2.2	6.3	6.0	6.2	4.0
Gwanda	1.3	18.1	17.9	17.8	16.5

Source: TelOne \*value from ex-post evaluation

### (3) Number of Lines on the Waiting List

According to the interview with TelOne, the number of lines on the waiting list from 2005 to 2011 is zero. Since the source of the numbers cannot be identified, it is unknown whether the number of lines on the waiting list was completely solved in 2005, or the number obtained in the ex-post evaluation was erroneous. Reason for the zero number of waiting lines is the fact that there is still reserve capacity in the switchboards, although the penetration rate of landline phones are rising in the rural areas. In addition, it can be conjectured that the decrease in the penetration rate of landline phones in the urban area has led to a decrease in the required number of subscriber cables.

### (4) Switchboard Usage Rate

Switchboard Usage Rate is shown in Table 4. The average switchboard usage rates for the targeted four regions have decreased since the time of ex-post evaluation. The fact that the numbers decline after reaching its peak in 2009 reflects the decrease seen in the number of subscriber cables. Improvement could be seen in the delay in the laying of landlines, which was indicated in the ex-post evaluation report. After 2004, extension was made to the cable facility, and, compared to before, connection area has been extended.

Table 4. Switchboard Usage Rate

(Unit: %)

	2004*	2009	2010	2011
Victoria Falls	-	81.8	79.5	71.4
Bulawayo	-	81.3	77.6	77.5
Hwange	-	65.4	63.1	65.2
Gwanda	-	78.5	72.5	71.8
Average	75.0	76.8	73.2	71.5

Source: TelOne \*value from ex-post evaluation

(5) Call Quality

Call quality has improved; call completion rate is almost 100%. This would mean a significant improvement from 70% in 2004, but TelOne is unsure of the validity of the information from 2004, and the reason for the improvement is unknown. Table 5 shows the fault rate and the rate of failures fixed by the end of the next working day. Call completion rate can be calculated by the difference between fault rate and 100 (100-fault rate). Fault rate is low in all of the regions, and it can be seen that call completion rate is maintained at a high standard. Rate of failures fixed by the end of the next working day has also shown an improvement, and maintains a high restoration rate in all of the regions. Failures such as lightning in which Pinpointing the accident location is difficult and arriving at the accident scene is time consuming make restoration by the next day difficult. Such cases are preventing the further rise of the rate.

Table 5. Fault Rate and Rate of Failures Fixed by the End of the Next Working Day  
(Unit: %)

		2004*	2007	2008	2009	2010	2011
Victoria Falls	Fault Rate	-	0.02	0.03	0.03	0.25	0.03
	Rate of Failures Fixed by the End of the Next Working Day	-	79	88	89	84	89
Bulawayo	Fault Rate	3.8	0.02	0.03	0.03	0.25	0.03
	Rate of Failures Fixed by the End of the Next Working Day	-	79	88	89	84	89
Hwange	Fault Rate	-	0.02	0.03	0.03	0.25	0.03
	Rate of Failures Fixed by the End of the Next Working Day	-	79	88	89	84	89
Gwanda	Fault Rate	-	0.02	0.03	0.03	0.25	0.03
	Rate of Failures Fixed by the End of the Next Working Day	-	79	88	89	84	89

Source: TelOne \*value from ex-post evaluation

Although improvement can be seen in the call quality and number of lines on the waiting list, penetration rate of landlines and number of subscriber cables is decreasing. In Zimbabwe, mobile phone is spreading more rapidly and widely than landline phone, and the effect of mobile phone can be considered substantial.

From the above indicators, the effect of this project can be judged to be limited. Although there are indicators such as “call quality” which have improved since the time of ex-post monitoring, overall landline penetration rate has decreased as a result of spread of mobile phone. In the rural areas, the landline penetration rate is increasing. However, it can be conjectured that this is due to a

passive motive that the mobile phone facility has not been constructed in the area. Since it is foreseeable that the cell-phone service will be available for the rural area in the future, further spread of landline phones cannot be expected.

#### 3.1.1.2 Internal Rates of Return (IRR)

According to the interview with TelOne, the facilities installed by this project are only in a part of Matabeleland, and it is impossible to calculate the revenue by each facility. Therefore, financial IRR will not be calculated. Regarding economic IRR, the calculation will not be performed since the economic IRR was not calculated at the time of ex-post evaluation.

#### 3.1.2 Qualitative Effects

See Impact for optimization and facilitation of the industry.

### 3.2 Impact

#### 3.2.1 Intended Impacts

##### 3.2.1.1 Contribution to the Improvement of Investment Environment

Ex-post evaluation reported that foreign direct investment was fluctuating yearly since 2000. However, according to the information obtained through this study, the amount of foreign direct investment from 2009 to 2011 is zero. The reasons are as follows: First, following the Lehman Crisis in 2008, many countries suffered from global economic crisis. As a result, government loan programs were reduced. Second, Zimbabwe economy was unstable; Zimbabwe has experienced repeated hyper-inflation and currency devaluation, and switched its national currency to U.S. Dollars in 2009. Third, developed countries are keeping a distance from the tyrannical government of Zimbabwe, and the countries are paying attention to the outcome of the general election to take place in 2013.

##### 3.2.1.2 Contribution to the Improvement of Living Environment

According to the interview with the Customer Service Department of TelOne, there are no significant problems with the call quality, and there are no problems which might hinder the living environment. However, data concerning customer satisfaction could not be obtained, and contribution to the improvement of living environment could not be ascertained.

#### 3.2.2 Resettlement, Land Acquisition, and Other Impacts

According to the interview with TelOne, there have been no resettlement or land acquisitions resulting from this project since the ex-post evaluation. There are no other positive or negative impacts.

As mentioned above, impact of this project could not be confirmed. Furthermore, foreign direct investment in Bulawayo continues to be zero. However, since factors such as economic instability, which the period of recovery cannot be determined, are involved, prediction of the future impacts of this project is difficult.

### 3.3 Sustainability

#### 3.3.1 Structural Aspects of Operation and Maintenance

There is no change in TelOne's status of shareholders or the organization of Customer Service Department since the time of ex-post evaluation. 100% of TelOne's stock is owned by the government of Zimbabwe, and there is no plan of privatization. Operation and maintenance is conducted by Central Management and Operations Center (CMOC) in the Customer Service Division under the Commercial Department of TelOne. It is responsible for new installation of telephone, maintenance and inspection, telephone fee collection, and directory assistance. At the time of ex-post evaluation, insufficient manpower as a result of the economic downturn was indicated, but currently, there are no shortages of personnel. There is always an application to fill the vacant position, and there are no problems. According to "Zimbabwe 2012 Facts and Figures" published by World Food Program, Zimbabwe's unemployment rate is 60%. Therefore, there should be plenty of applicants, and TelOne is equipped with a training facility. From these facts, it is conceivable that there is no shortage of personnel. Regarding the shortage of workers reported in the ex-post evaluation report, TelOne had no knowledge of the problem.

#### 3.3.2 Technical Aspects of Operation and Maintenance

There are no significant changes in the procedure of sharing technical information or the level of technical skill concerning the telecommunications system installed by this project. Regarding the operation and maintenance of telecommunications system installed by this project, there are maintenance manuals, and knowledge concerning operation and management is being spread by sharing of technical skills between workers at the workplace. Training on new technology such as optical fiber or technical training for new services is conducted at TelOne Training Center in Harare, when entering the company or when there is a change in personnel.

During nighttime, CMOC uses computers to conduct centralized management. However, computer's operating system and hardware of the computer management system installed by this project have become obsolete. Storage medium for the hardware are no longer in production and new storage cannot be obtained. There is a possibility to obstruct business performance.

### 3.3.3 Financial Aspects of Operation and Maintenance

At the time of ex-post evaluation, operating profit ratio was 4.1%. Currently, consolidated operating profit ratio, including NetOne, is 2%, and have worsened since the time of ex-post evaluation. In 2011, Revenue was 150 million US dollars (13.5 billion yen / 16% decrease from previous year), total comprehensive income was 3 million US dollars (260 million yen / 50% decrease from previous year), and balance in equity was insolvency of 160 million US dollars. Operating loss was 30 million dollars. The main reasons for the loss are decrease in revenue due to the expansion of the mobile telephone market, constant appropriation of bad debt loss, and increases in personnel expenses resulting from the inflation from the switching of national currency in 2009. Loss for a single fiscal year has decreased by 20 billion yen from the time of ex-post evaluation, but this is due to the fact that temporary factors such as inflation and currency devaluation were not present in 2010. Although TelOne has an insolvency of 160 million US dollars, 150 million US dollars which amounts to 90% is ODA loan from the Japanese government. 40 million US dollars is a loan from African Development Bank.

It is very unlikely that TelOne will suspend its business. TelOne is a state-owned enterprise, and is engaging in an investment negotiation from a foreign company (South Africa). Its subsidiary is NetOne (established 1996), which is the second largest mobile phone company in Zimbabwe. However, the company's operating funds are insufficient, that obsolete switchboards cannot be replaced immediately. Furthermore, according to the interview with TelOne, landline telephone business is currently dominated by TelOne, but within the next few years, a foreign telecommunications company is planning to move into Zimbabwe. The company has made preparations for constructing cable facilities. Since cooperation between the foreign telecommunications company and TelOne's landline phone business cannot be expected, there is concern over the worsening financial status of TelOne from price competition.



Switchboards: empty slots can be seen



Mini-disc drive used as storage medium



### 3.3.4 Current Status of Operation and Maintenance

At nighttime, CMOC uses computers to conduct centralized management of operation and maintenance. However, operating system and hardware of computer management system installed by this project has become obsolete. Storage medium for the hardware are no longer in production and new storage medium cannot be obtained. Since new storage mediums are unavailable, CMOC is constantly reusing the existing mediums. In addition, new computer applications cannot be used due to the obsolete operating system. These factors cause problems which obstruct business performance.

Switchboards installed by this project consist of the main component and the backup component, which operates in case of the failure of the main component. However, backup component is currently not functioning due to the lack of spare parts. This would mean that if the main component fails, telephone of the region covered by the switchboard will go down. The lack of spare parts is the result of Fujitsu closing its Zimbabwe office in 2004. The local manufacturer for the switchboard has also stopped its production. Problem with obtaining spare parts has persisted since 2005. Also, since there are also difficulties in obtaining other spare parts, the operating capacity of the facility has decreased to 70%.

From the above, concerning sustainability, technical skills of workers have been maintained from the time of ex-post evaluation, and no problem was detected. The number of workers is sufficient. As for financial aspects, although there are external factors such as economic instability, because TelOne is a state-owned business, and plus, it is the parent company of the country's second largest mobile phone company, it can be said that the continuity of the company is secured. However, TelOne's constant state of deficit has impeded the prompt upgrading of the equipment. Aged facilities and equipment are hindering the conducting of business as a telecommunications company. No solutions have been presented, and concerns remain.

## 4. Conclusion, Lessons Learned and Recommendations

### 4.1 Conclusion

Operation status of facilities installed by this project is unsatisfactory due to aging and lack of spare parts. The project has contributed to the improvement of telecommunications in the region since the installed facilities increased its capacity. However, its contribution to the improvement of living environment and investment climate in the country is unclear. TelOne is continually in a deficit, and this has led to negative effects in its operation such as its inability to promptly replace obsolete switchboards. In a few years, a foreign telecommunications company is planned to enter the Zimbabwe telecommunications market, and further losses by TelOne is expected as a result of competition. On the other hand, there is sufficient number of workers, and communication of

technical knowledge is effectively done through seminars and utilization of training centers. Although outflow of workers to rapidly growing mobile phone industry can be seen , TelOne has been constantly hiring new workers to fill the vacant posts, and there is no problem. At the time of ex-post evaluation, outflow of workers due to inflation was indicated, but in this study, no such outflow was detected. Also, concerning the problem of the lack of spare parts, the primary factor is not inflation, but the withdrawal of the parts vendor from Zimbabwe.

The effect of the spread of mobile phone on this project is prominent. Mobile phone is spreading rapidly. Between 2006 and 2011, the mobile phone penetration rate has risen nine times to 61%. On the other hand, the penetration rate of landline phones of the target area of this study was 17% in the highest region, and in almost all the regions, the numbers show a decrease after 2009. Zimbabwe's telecommunication demand is changing, and the penetration rate of the landline phone is not expected to increase dramatically in the near future.

#### 4.2 Recommendations

None.

#### 4.3 Lessons Learned

None.

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1. Output		
(1) Switchboard renovations and new installations		
a) 4 locations in cities	Total: 75,000 lines	Total: 95,000 lines
-Bulawayo	67,000 lines	83,000 lines
-Hwange	3,000 lines	4,000 lines
-Victoria Falls	2,000 lines	4,500 lines
-Gwanda	3,000 lines	3,500 lines
b) 3 locations outside cities	Total: 1,180 lines	Total: 10,000 lines
-Bulawayo	-	7,000 lines
-Hwange	500 lines	1,500 lines
-Victoria Falls	180 lines	500 lines
-Gwanda	500 lines	1,000 lines
(2) Installation of Transmission Lines		
a) In city(in Bulawayo city)	Optic cable 53 km	As planned
b) Outside city(between Bulawayo, Hwange, and Victoria Falls)	Digital microwave 674 km Optic cable 18 km	As planned
(3) Installation of Subscriber Cables	239,400 pairs	388,769 pairs
(4) Consulting Service	233 M/M	438 M/M
2. Project Period	August 1993 – March 1998 (56 months)	August 1993 – September 2002 (110 months) (excluding additional output of 84 months)
3. Project Cost		
Foreign Currency	9,523 million yen	(unclear) million yen
Local Currency	2,204 million yen (ZW\$87 million)	(unclear) million yen (local currency)
Total	11,727 million yen	(unclear) million yen
ODA Loan Portion	9,523 million yen	9,180 million yen
Exchange Rate	US\$1 = ZW\$4.97 = 125 yen (March 1992)	US\$1 = ZW\$27.94 = 114 yen (average of rates from 1994 to 2002)



## Ex-Post Monitoring of Japanese ODA Loan Project

### Zimbabwe

#### Mashonaland Manicaland Digitalization Project (II)

External Monitoring Consultant: Katsumi Matsuyama, Nakamoto&Associates Co., Ltd.

### 1. Project Description



Project Location



Switching Station (Harare)

#### 1.1 Project Objective

The project aims to fulfill the increasing demand for telecommunications by developing telecommunication facilities including switchboards, transmission facilities and out-station facilities in the Mashonaland Provinces including the capital Harare and Manicaland to install an additional 128,800 lines (excluding suburbs), thereby contributing to the improvement of the living and investment environments of the region.

#### 1.2 Outline of the Loan Agreement

Approved Amount / Disbursed Amount	11,451 million yen / 1,745 million yen
Loan Agreement Signing Date / Final Disbursement Date	July 1996 / October 2001
Ex-post Evaluation	2006
Executing Agency	TelOne Pvt. Ltd.(TelOne)
Main Contractor	-
Main Consultant	Nippon Information Technology Consulting Co., Ltd. (Japan)

### 1.3 Background and Reason of Ex-post Monitoring

Zimbabwe's existing facilities such as analogue switchboards were decrepit, and could not fulfill the rapidly growing telephone demand. Especially in central regions of Zimbabwe's economy such as Mashonaland and Manicaland which include the capital, Harare, there was concern over the shortage of telecommunication facilities that could be a bottleneck for business activities and constitute an obstacle to everyday life. In addition, shortage of subscriber cables created problems in the effective utilization of the telecommunication system as a whole, making it difficult to satisfy the tight demand for telephone services. In order to improve this situation, this project follows the installation of telecommunications facilities by Japanese ODA Loan, "Telecommunication Expansion Project (ZI-P3)", and implemented the installation of switchboards, switchboards, transmission facilities and out-station facilities in the Mashonaland Provinces including the capital Harare and Manicaland.

However, due to a series of problems related to the implementation process, the project was canceled. Of the planned installation of 125,800 subscriber cables, only 38,300 cables (excluding long-distance) were installed in Mashonaland; and in Manicaland, neither the replacement of the switchboards nor the installation of subscriber cables was implemented. In Zimbabwe, there is a problem of communication failure due to capacity shortage and aging of subscribed cables; the effect of the installation of switchboards only is believed to be limited.

This project was planned to be managed by Post & Telecommunication Corporation (PTC), but PTC was split and incorporated in July 2000 and the telecommunication service division was succeeded by TelOne (Pvt) Ltd. (TelOne). At the time of ex-post evaluation (2006), the government of Zimbabwe owned all shares of TelOne, but it had been decided by the Cabinet that TelOne will be privatized. Shares after privatization were planned as, Zimbabwe holding 70% of the share and the remaining 30% by a private entity. However, the specifics of the privatization had not been decided, and the future of TelOne was unclear. In addition, TelOne was continually in a deficit due to the country's economic downturn, and there were concerns over the procurement of spare parts and securing of budget necessary for personnel training.

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 Consultant

Katsumi Matsuyama (Nakamoto & Associates Co., Ltd.)

## 2.2 Duration of Monitoring Study

Duration of the Study: September 2012 – June 2013

Duration of the Field Study: November 24, 2012 – December 5, 2012

## 3. Monitoring Results

### 3.1 Effectiveness

#### 3.1.1 Quantitative Effects

##### 3.1.1.1 Operation and Effect Indicators

###### (1) Installation of Switchboards

Switchboards installed by this project were only a part the switchboards operating in Mashonaland and Manicaland. In the region, there are older switchboards still operating, and there has been installation of subscriber cables. From 2002, year following the completion of the project, to present, TelOne is implementing the gradual replacement of operating outdated switchboards to switchboards made by Chinese manufacturer, Huawei. The replacement is taking time due to the limited budget provided by the government of Zimbabwe. In addition, switchboards installed by this project are classified as outdated, and is targeted for replacement. Regarding the number of subscriber cables, according to the interview with TelOne, currently there is a total capacity of 400,000 lines for switchboards and subscriber cables in Mashonaland and Manicaland. Capacities of the switchboards installed by this project, which are a part of the 400,000 lines, have decreased its capacity to 60% of its original capacity due to the lack of spare parts. The number of subscriber cables only for switchboards installed by this project could not be obtained.

On the contrary, ex-post evaluation report reported the number of subscriber cables as a total of 38,300 cables. From the fact that the difference in the number of subscriber cable is nearly 10 times between the number of subscriber cables reported in the ex-post evaluation and the findings of this study, and from the finding from an interview result that the older switchboards were in operation at the time of ex-post evaluation, it can be assumed that the ex-post evaluation's report pertained only to the switchboards installed by this project. Therefore, the comparison is not possible, since the definition for the number of subscriber cables seems to differ. However, according to the interview with TelOne, the capacity of switchboards and subscriber cables have increased as a result of the replacement of switchboards to Huawei switchboards and the additional installation of subscriber cables.

Table 1 shows the utilization rate of switchboards in Mashonaland and Manicaland. Utilization rate from 2006 to 2011 is approximately 70% in Mashonaland and 50% in Manicaland; there is surplus in capacity.

Table 1. Switchboard Utilization Rate

	(Unit: %)					
	2006	2007	2008	2009	2010	2011
Mashonaland	79	81	78	73	71	69
Manicaland	51	51	51	50	48	47

Source: TelOne

(2) Subscriber Cables

Subscriber cables were not installed through this project. However, according to the interview with TelOne, there is no waiting list for phone lines which is caused by shortages of subscriber cables in Mashonaland or Manicaland in 2012. According to statistics from Postal and Telecommunications Regulatory Authority of Zimbabwe (POTRAZ), the total number of subscriber cables in Zimbabwe was 346,211 in June of 2012. From the fact that the capacity of installed switchboards and subscriber cables is 400,000, it can be assumed that the service is rendered without any waiting list. The reason for the discrepancy from the ex-post evaluation report could not be obtained by this survey.

(3) Landline Telephone Penetration Rate

Landline telephone penetration rate in Mashonaland slightly increased in 2008, where it peaked at 7.9%, and have declined thereafter. Manicaland was leveled at 6% until 2008, and then declined. According to the interview with TelOne, outflow of customers due to the spread of mobile phones is the reason for the decline in landline telephone penetration rate after 2009.

Table 2. Landline Telephone Penetration Rate

	(Unit: %)					
	2006	2007	2008	2009	2010	2011
Mashonaland	7.1	7.9	7.9	7.3	7.4	6.9
Manicaland	6.6	6.6	6.6	6.5	6.2	6.1

Source: TelOne

Mobile phone penetration rate is shown in Table 3. According to statistics obtained from POTRAZ, numbers of subscribership to the three largest mobile operators are: Econet 6.4 million, NetOne (100% subsidiary of TelOne) 2.5 million, and TelCell: 2 million. As can be seen in Table 3, the penetration rate, which was 7% in 2006, has increased nine times to 61% after 5 years in 2011.



Table 3. Mobile Phone Penetration Rate

	2006	2007	2008	2009	2011
Penetration Rate (%)	6.78	9.82	13.29	31.99	61.25
Subscribers (1,000 people)	849	1,225	1,654	3,991	7,700

Source: Ministry of Internal Affairs and Communications

#### (4) Rate of Failures Fixed by the End of the Next Working Day

Rate of failures fixed by the end of the next working day in 2011 was 91% in Matabeleland and 88% in Mashonaland; the numbers have been maintained at high levels since 2009. The reason the rate of failures fixed by the end of the next working day does not reach 100%, can be accounted to failures such as lightning in which restoration by the next day is difficult. Pinpointing the accident location is difficult in such cases, and arriving at the accident scene is time consuming. Such failures are preventing the further rise of the rate.

Table 4. Rate of Failures Fixed by the End of the Next Working Day

	(Unit: %)				
	2007	2008	2009	2010	2011
Mashonaland	52	89	91	93	91
Manicaland	62	87	90	89	88

Source: TelOne

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

This project was terminated in the initial stage of its implementation and its cost and benefits are limited. Therefore, calculation of the internal rate of return will not be performed.

#### 3.1.2 Qualitative Effects

See impact.

From the above indicators, the effectiveness of this project is satisfactory as the rate of failures fixed by the end of the next working day is maintained at a high level. Furthermore, there is ample telephone circuit and reserve in the capacity of switchboards from switchboard replacement and subscriber cable installation implemented by the Zimbabwe government. In addition, the number of people on the waiting list is currently zero, and quantitative effects were confirmed over the problems of insufficient switchboards and subscriber cables indicated at the time of ex-post evaluation. However, due to the spread of mobile phone, landline phone users have decreased, and as

a result, utilization rate and of switchboards and landline telephone penetration rate has decreased. This trend is expected to continue in the future.

### 3.2 Impact

#### 3.2.1 Intended Impacts

##### 3.2.1.1 Customer Satisfaction of TelOne’s Communication Status

Data, such as customer surveys to ascertain the satisfaction of the communication status were not available. However, in an interview with the residents of Harare, there were no problems detected in the usage of landline telephone. The fault rates, shown in Table 5, are considerably low, and no problem can be seen. According to the interview with TelOne customer service department, since TelOne has engaged in the replacement and installation of subscriber cables, there is no significant problem. Typical complaints to the call center are due to unusual circumstances such as call failures caused by lightning or nearby construction work. Fault rate is very low. From the interview with residents and the fact that the fault is caused not by the failure of facilities but by external events, it can be concluded that the call quality has greatly improved from the time of ex-post evaluation.

Table 5. Fault Rate

	(Unit: %)				
	2007	2008	2009	2010	2011
Mashonaland	0.38	0.42	0.39	0.41	0.42
Manicaland	0.33	0.45	0.38	0.4	0.39

Source: TelOne

#### 3.2.2. Other Impacts

##### 3.2.2.1 Environmental Impact

According to the interview with TelOne, there are no environmental impacts caused by this project since the time of ex-post evaluation

##### 3.2.2.2 Resettlement and Land Acquisition

According to the interview with TelOne, there are no resettlement or land acquisitions since the ex-post evaluation.

From the above, during this ex-post monitoring, impact of improvement in the telecommunication environment could be seen compared to the time of ex-post evaluation. In addition, communication failure rate has been maintained at a low level, and there are almost no complaints over call quality.

### 3.3 Sustainability

#### 3.3.1 Structural Aspects of Operation and Maintenance

At the time of ex-post evaluation, TelOne's privatization was decided by the Cabinet. However, the government of Zimbabwe continues to hold all shares of TelOne. According to the interview with TelOne, there is no plan of privatization in the future. There is no change in the status of shareholders or the organizational structure of TelOne from the time of the ex-post evaluation.

Considering the innovation and the rapid spread of mobile phones, TelOne does not have an optimistic outlook of the landline telephone sector. However, TelOne is planning to expand its ISDN business focusing on services to companies that use landline telephones. Also, NetOne, the second largest mobile phone company in the country, is a 100% subsidiary of TelOne. Expansion of new business apart from landline telephone has become an urgent management issue.

Operation and maintenance of facilities in Mashonaland and Manicaland is conducted by the Central Management and Operations Center (CMOC) in the Customer Service Division under the Commercial Department of TelOne. Problems of staff shortage and outflow of engineers indicated at the time of ex-post evaluation have been resolved. Although information on the number of staff were not available, according to the interviews, there is approximately 105 exchange facilities with more than one engineer at each facility; and so, there is no problem of staff shortage. Engineers regularly receive training at TelOne's training center, and new engineers are recruited constantly to fill vacant positions. Application form for job seekers is available on the company website.

#### 3.3.2 Technical Aspects of Operation and Maintenance

TelOne has a training center in Harare, where technical training is offered to its employees. The center is also the country's only training institution where acquisition of a variety of national qualifications related to communication is possible. Staff shortage, anticipated at the time of ex-post evaluation, has not occurred. According to the interview with TelOne, technical skills of individual workers, in addition to maintenance manuals, are shared at the working site, and there are currently no problem with the necessary technical skills for operation and maintenance. However, there is a need for TelOne to upgrade its training contents in order to expand its business to ISDN. Currently, TelOne is searching for a partner that can provide the knowledge of this technology.

#### 3.3.3 Financial Aspects of Operation and Maintenance

At the time of ex-post evaluation, operating profit ratio was 4.1%. Currently, consolidated operating profit ratio, including NetOne, is 2%, and have worsened since the time of ex-post evaluation. In 2011, Revenue was 150 million US dollars (13.5 billion yen / 16% decrease from previous year), total comprehensive income was 3 million US dollars (260 million yen / 50%

decrease from previous year), and balance in equity was insolvency of 160 million US dollars. Operating loss was 30 million dollars. The main reasons for the loss are decrease in revenue due to the expansion of the mobile telephone market, constant appropriation of bad debt loss, and increases in personnel expenses resulting from the inflation from the switching of national currency in 2009. Loss for a single fiscal year has decreased by 20 billion yen from the time of ex-post evaluation, but this is due to the fact that temporary factors such as inflation and currency devaluation were not present in 2010. Although TelOne has an insolvency of 160 million US dollars, 150 million US dollars which amounts to 90% is ODA loan from the Japanese government. 40 million US dollars is a loan from African Development Bank.

It is very unlikely that TelOne will suspend its business. TelOne is a state-owned enterprise, and is engaging in an investment negotiation from a foreign company. Its subsidiary is NetOne (established 1996), which is the second largest mobile phone company in Zimbabwe. However, the company's operating funds are insufficient, and obsolete switchboards cannot be replaced immediately. Furthermore, according to the interview with TelOne, although landline telephone business is currently dominated by TelOne, a foreign telecommunications company is planning to move into Zimbabwe within the next few years. The company has begun preparations for constructing cable facilities. Since cooperation between the foreign telecommunications company and TelOne's landline phone business cannot be expected, there is concern over the worsening of the financial status of TelOne from price competition.



Switching board: empty slots can be seen



Fan is used to substitute for cooling system

### 3.3.4 Current Status of Operation and Maintenance

The CMOC, visited during this study, acts as the central management center for all the switching stations. Switchboards installed by this project are also operated and maintained, according to the maintenance manual, by the CMOC, and the switchboards are properly operated. Regarding the status of operation and maintenance, the equipment is showing significant signs of deterioration

compared to the time of ex-post evaluation due to lack of spare parts. Switchboards installed by this project have already become obsolete. Fujitsu, which is the vendor of the parts, closed its Zimbabwe office in 2004. The local manufacturer of spare parts has also stopped its operation. Spare parts have been lacking since 2005, and the usage rate of the switchboards is declining. In addition to the lack of spare parts, from the rapid innovation of information technology, the switchboards have become obsolete. TelOne is planning on replacing the switchboards to those made by Huawei as soon as budget is secured.

From the above, problems with organizational structure and technical capacity, which were indicated in the ex-post evaluation report, could not be seen. However, financial situation has continued to be insolvent, and this has led to an obstruction to the company's operations, such as its inability to promptly replace obsolete switchboards. In addition, the entry of the private company has been scheduled in the near future, and the current monopoly of the telephone business by TelOne will cease. It is likely that the financial situation of TelOne will worsen. Although the existing facilities are managed properly, the equipment is dilapidated due to the lack of replacement parts. However, for the budget is insufficient to replace the existing switchboards.

#### 4. Conclusion, Lessons Learned and Recommendations

##### 4.1 Conclusion

According to the interview with TelOne, overall capacities of the switchboards and subscriber cables have increased since the time of ex-post evaluation. TelOne has engaged in the replacement of cables and additional construction of cable facilities, and there is no significant problem with the call quality. However, the operation of facilities installed by this project is unsatisfactory due to aging and lack of spare parts. Concerning impact, communication environment has improved in the regions where the facilities were constructed by this project, leading to the reinforcement of the capacity. However, the project's contribution to the living environment and the improvement in investment condition in the country is unclear.

In financial terms, TelOne is in a deficit, and this has resulted in the obstruction of some of the company's operations such as its inability to promptly replace obsolete switchboards. In addition, foreign telecommunications company is planned to enter Zimbabwe in a few years, therefore TelOne's financial situation is expected to worsen. On the other hand, concerning the structural and technical aspects of operation and maintenance, there is sufficient number of staff, and communication of technical knowledge is effectively done through seminars and utilization of training centers; no problem could be seen in this respect. Concerning the outflow of engineers, there are cases where the engineers move to the rapidly-growing mobile phone industry, but TelOne recruits new engineers in such cases and there is no problem. The effect of the spread of mobile

phone on this project is prominent. Mobile phone is spreading rapidly. Between 2006 and 2011, the penetration rate has risen nine times to 61%. On the other hand, comparing the values landline phone penetration rate for 2006 and 2011, decrease can be seen in all of the regions targeted by this project. Zimbabwe's telecommunication demand is changing, and the penetration rate of the landline phone is not expected to increase dramatically in the near future.

#### 4.2 Recommendations

None.

#### 4.3 Lessons Learned

None.

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
<p>1. Outputs</p> <p>1) Installation of switchboards</p> <ul style="list-style-type: none"> <li>· Local switchboards</li> <li>· Long-distance switchboard</li> </ul> <p>2) Installation of subscriber cables</p> <p>3) Installation of transmission lines</p> <ul style="list-style-type: none"> <li>· Inter-station transmission lines</li> <li>· Backbone transmission lines</li> </ul> <p>4) Construction of station buildings</p> <p>5) Installation of batteries</p> <p>6) Consulting services</p> <p>7) Training services</p>	<p>128,800 lines in total</p> <p>125,800 lines</p> <p>3,000 lines</p> <p>131,364 pairs in total</p> <p>Fiber-optic cables</p> <p>Backbone transmission lines: 140 Mb/s system for Harare-Ruwa, 34 Mb/s system for Rusape-Mutare</p> <p>Expansion of existing buildings: 24 stations</p> <p>Installation of batteries</p> <p>Detailed design, preparation of bidding documents, bid evaluation, construction supervision</p> <p>Technical transfer to the staff of the executing agency by the consultants and contractors</p>	<p>38,300 lines</p> <p>Not started</p> <p>Not started</p> <p>Not started</p> <p>Construction of exchange stations (8 additional stations) in urban areas of Harare</p> <p>Not started</p> <p>Partially implemented (the portion involving the installed switchboards)</p> <p>Partially implemented (the portion involving the installed switchboards)</p>
2. Project Period	<p>44 months</p> <p>July 1996 – February 2000</p> <p>(Started with signing of L/A and ended with termination of the consultant contract)</p>	<p>64 months</p> <p>July 1996 – October 2001</p> <p>(Started with signing of L/A and ended with loan expiry because of the problem in procurement)</p>
<p>3. Project Cost</p> <p>Foreign Currency</p> <p>Local Currency</p> <p>Total</p> <p>ODA Loan Portion</p> <p>Exchange Rate</p>	<p>11,451 million yen</p> <p>1,504 million yen</p> <p>12,955 million yen</p> <p>11,451 million yen</p> <p>Foreign currency</p> <p>95.2 yen/US dollar</p> <p>Local currency</p> <p>11.2 yen/ZW dollar</p> <p>(As of October 1995)</p>	<p>1,591 million yen</p> <p>Not known (the portion involving construction of station buildings)</p> <p>Not known</p> <p>1,745 million yen</p>

