

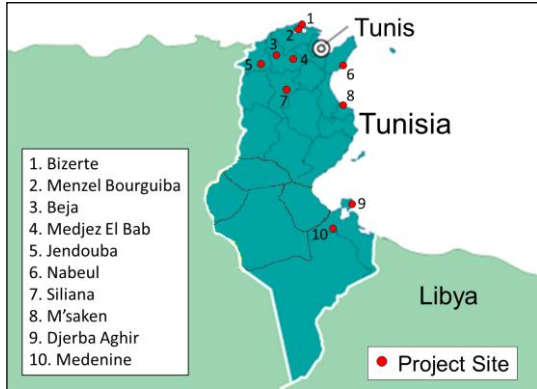
Ex-Post Monitoring of Japanese ODA Loan Project

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
Total	1,276	814	555	652	680	685	685

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 sewage¹; (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

¹ 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 2011.² 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.

² 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: BOD₅ (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 dissolved³ 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,

³ 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/m³) 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)	

¹⁹ There are no data on the breakdown