

**Ex-Post Project Evaluation 2012: Package IV-3  
(Tunisia, Morocco)**

**September 2013**

**JAPAN INTERNATIONAL COOPERATION AGENCY**

---

**OPMAC Corporation**

EV
JR
13-51

## Preface

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

This volume shows the results of the ex-post evaluation of ODA Loan projects that were mainly completed in fiscal year 2010, and Technical Cooperation projects and Grant Aid projects, most of which project cost exceeds 1 billion JPY, that were mainly completed in fiscal year 2009. The ex-post evaluation was entrusted to external evaluators to ensure objective analysis of the projects' effects and to draw lessons and recommendations to be utilized in similar projects.

The lessons and recommendations drawn from these evaluations will be shared with JICA's stakeholders in order to improve the quality of ODA projects.

Lastly, deep appreciation is given to those who have cooperated and supported the creation of this volume of evaluations.

September 2013  
Masato Watanabe  
Vice President  
Japan International Cooperation Agency (JICA)

## Disclaimer

This volume of evaluations, the English translation of the original Japanese version, shows the result of objective ex-post evaluations made by external evaluators. The views and recommendations herein do not necessarily reflect the official views and opinions of JICA. JICA is not responsible for the accuracy of English translation, and the Japanese version shall prevail in the event of any inconsistency with the English version.

Minor amendments may be made when the contents of this volume is posted on JICA's website.

JICA's comments may be added at the end of each report when the views held by the operations departments do not match those of the external evaluator.

No part of this report may be copied or reprinted without the consent of JICA.

Republic of Tunisia

Ex-Post Evaluation of Japanese ODA Loan

Rural Water Supply Project (I) (II)

External Evaluator: Keishi Miyazaki, OPMAC Corporation

## **0. Summary**

The objective of this project was to improve the coverage of the rural water supply by constructing small scale water supply facilities in 20 Governorates, thereby contributing to an improvement in people's living standards.

This project matched the Tunisian national development policy and development needs and Japan's ODA policy, therefore its relevance is high. Based on data analysis of 102 sub-projects in 14 Governorates (out of 270 sub-projects in 20 Governorates) obtained from the executing agency, it can be seen that the main operation and effect indicators such as water supply coverage, water production volume per person/day, water supply volume per person/day, accounted-for-water rate, and water price have achieved their target values. The water quality of the water source, which was newly developed by this project, met the Tunisian environmental standards. The beneficiary survey conducted with local residents revealed that residents were highly satisfied with the water quality and that there had been an improvement in the water quality of water supply facilities. There were some positive impacts which improved the living standards of local residents such as decreases in the labor of drawing water, improved convenience of living, and improved hygiene and health conditions. No negative impact on the natural environment was observed, and there was no land acquisition or resettlement. Therefore, the effectiveness and impact of the project is high.

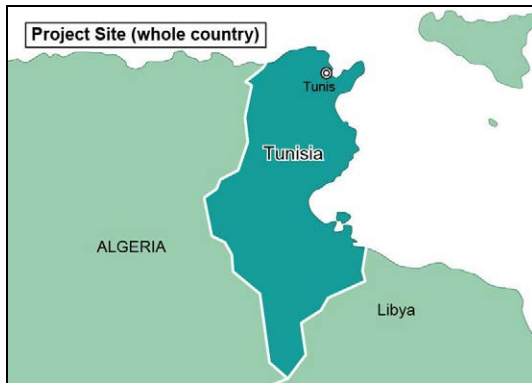
Although the project cost was within the plan, the project period slightly exceeded the plan, therefore the efficiency of the project is fair. The Jasmine revolution in 2011 caused political and social reform and a change in people's awareness and attitudes throughout Tunisia. It also had some negative influence on the capacity and organization management of the Water User's Association (GDA<sup>1</sup>) which was mainly in charge of the operation and maintenance of the project. For this reason, there were some issues observed in the structural, technical and financial aspects of the project's operation and maintenance. Thus, the sustainability of the project is fair.

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

---

<sup>1</sup> GDA: Groupement de Développement Agricole.

## 1. Project Description



Project Site (20 Governorates)



Public Water Tap in Mahdia Governorate

### 1.1 Background

In 1999, the average amount of rainfall in Tunisia was approximately 600 mm. In the northern region, where the amount of rainfall is relatively high, it was approximately 1,000 mm, but in the southern region, closer to the desert, it was approximately 100-200 mm. The country is located in a semi-arid region. For this reason, more efficient development and use of the limited water sources has been a major developmental task for the country. The domestic water and sewage services of Tunisia have been looked after by the National Water Exploitation and Distribution Company (SONEDE<sup>2</sup>) and the General Direction of Rural Water Works and Water Supply, Ministry of Agriculture. The former is in charge of the water supply service in urban areas and the latter in rural areas. Since the 1980s, the Ministry of Agriculture has promoted the construction of small scale water supply facilities in the areas. Although the water supply coverage in urban areas has reached almost 100%, the coverage rate in rural areas remained at 79% in 2000. Thus, the need for water supply development in such areas was high from the viewpoint of disparity rectification between urban and rural areas.

### 1.2 Project Outline

The objective of this project was to improve the coverage of the rural water supply by constructing small scale water supply facilities in 20 Governorates, thereby contributing to an improvement in people's living standards.

---

<sup>2</sup> SONEDE: Société Nationale d'Exploitation et de Distribution des Eaux.

	Phase I	Phase II
Loan Approved Amount/ Disbursed Amount	3,352 million yen / 3,201 million yen	4,495 million yen / 4,403 million yen
Exchange of Notes Date/ Loan Agreement Signing Date	February 2000 / March 2000	March 2003 / March 2003
Terms and Conditions	<u>Main contract</u> Interest rate: 1.7% Repayment period: 25 years (Grace period: 7 years) Condition of procurement: General untied <u>Consulting service</u> Interest rate: 0.75% Repayment period: 40 years (Grace period: 10 years) Condition of procurement: Bilateral tied	<u>Main contract</u> Interest rate: 1.8% Repayment period: 20 years (Grace period: 6 years) Condition of procurement: General untied <u>Consulting service</u> Interest rate: 1.8% Repayment period: 20 years (Grace period: 6 years) Condition of procurement: General untied
Borrower / Executing Agency	Government of Republic of Tunisia / Ministry of Agriculture	
Final Disbursement Date	June 2010	December 2010
Feasibility Studies, etc.	<ul style="list-style-type: none"> <li>• Special Assistance for Project Formation for Rural Water Supply Project in the Republic of Tunisia (JICA, 1993)</li> <li>• The detailed design study on the rural water supply project in the Republic of Tunisia (JICA, 2002)</li> <li>• The study on the rural water supply project (phase II) in the Republic of Tunisia (JICA, 2006)</li> </ul>	
Related Projects	<ul style="list-style-type: none"> <li>• Japanese ODA Loan Project: Agricultural Sector Investment Project (Signing of L/A: 1995)</li> </ul>	

## 2. Outline of the Evaluation Study

### 2.1 External Evaluator

Keishi Miyazaki, OPMAC Corporation

### 2.2 Duration of Evaluation Study

Duration of the Study: October 2012 – October 2013

Duration of the Field Study: February 17 – March 3, 2013, May 11 – 15, 2013

### 2.3 Constraints during the Evaluation Study

This project targeted 270 sub-projects in 20 Governorates in Tunisia. However, it was difficult to collect data on operation and effect indicators in all the sub-projects. For this reason, the evaluation analysis was conducted based on data obtained by the executing agency from 102 sub-projects in 14 Governorates.

### **3. Result of the Evaluation (Overall Rating: B<sup>3</sup>)**

#### **3.1 Relevance (Rating: ③<sup>4</sup>)**

##### **3.1.1 Relevance to the Development Plan of Tunisia**

The 9<sup>th</sup> Five-Year Socio-Economic Development Plan (1997-2000) of Tunisia at the time of the project appraisal (2000) targeted water source development as a priority for: (1) irrigation work that gives stability and high agricultural yields (agriculture making up the major part of Tunisia's economy), and (2) increased water supply and demand for the revitalization of economic activities as well as ongoing urbanization and tourism promotion (another of Tunisia's main industries). In addition, disparity rectification between urban and rural areas was another important policy task. The plan was to construct rural water supply facilities with 541 projects and 350,000 beneficiaries targeted at an increase in the national water supply coverage to 78% by 2001.

The Draft 12<sup>th</sup> Five-Year Socio-Economic Development Plan (2012-2016), which was in place at the time of the ex-post evaluation, listed the strengthening of social development as part of its developmental policy, and it described the need for promoting regional development programs and strengthening public services. Of all 24 Governorates in Tunisia, 20 have rural districts with limited accessibility to drinking water, and therefore the plan stated that its aim was to continuously increase the water supply coverage. The plan is to conduct 342 water supply projects (including the construction of 187 new water supply facilities and the rehabilitation of 155 existing water supply facilities) targeting an increase in the national water supply coverage to 98% by the end of the Plan.

##### **3.1.2 Relevance to the Development Needs of Tunisia**

At the time of the project appraisal (2000), water coverage in urban regions had reached 97.8%, while the coverage remained at 59% in rural regions of Tunisia. The problem of poverty was mostly localized in the rural regions, and 70% of the population in poverty resided in these regions. In particular, the northwestern mountainous areas had the highest percentage of the population in poverty and delayed development was prominent. In these regions, women and children had to put up with the long hours of labor involved in going back and forth between water sites and villages, as there were no water supply facilities in the surrounding areas. Even the villages with nearby wells did not necessarily have sufficient water supply in terms of volume and quality. The villages which received their water supply by water wagon were also in an inconvenient situation since the water supply came only once or twice a week and the water price was rather high. For these reasons, access to a safe and sufficient water supply in the rural regions was a priority issue. In addition, the need for water supply development in the rural regions was high from the viewpoint of disparity rectification.

---

<sup>3</sup> A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory.

<sup>4</sup> ③: High, ②: Fair, ①: Low.

At the time of the ex-post evaluation, the coverage of the water supply had improved to 93.8% in rural areas in comparison with 98.9% in urban areas, as of 2011 (Table 1). However, there are still some mountainous regions and remote villages with extremely limited access to drinking water. In particular, the water supply coverage in the northwestern regions remained at 87%, which was below the average for rural areas<sup>5</sup>. The traditional rural water supply was provided on a village or community base and used a public water tap system. However, the 10<sup>th</sup> Rural Drinking Water Supply Program (2002-2006) announced the policy of promoting a water supply system using individual water pipe connections. Ever since, the Ministry of Agriculture has promoted a shift from the public water tap system to the individual water pipe connection system. It has also strengthened the water supply capacity of water sources and has expanded the water supply pipe networks and buildings or has made changes to a water supply system which corresponds to the individual water pipe connection system. In this way, the development need for rural water supply facilities, such as the construction of new water supply facilities and expansion in the capacity of existing facilities continue to be acknowledged.

Table 1: Percentage of the Water Served Population

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
1. Urban Area	97.7	96.9	97.3	97.7	97.9	98.2	98.4	98.5	98.6	98.7	98.8	98.9
2. Rural Area (Individual pipe connection)	79.2 (32.0)	81.9 (35.3)	84.2 (37.1)	85.7 (38.8)	87.4 (52.0)	88.9 (53.0)	90.3 (53.4)	92.1 (53.8)	92.4 (54.4)	93.0 (54.9)	93.5 (55.5)	93.8 (55.7)
3. Entire Tunisia (Individual pipe connection)	92.3 (75.2)	93.6 (76.7)	94.4 (77.7)	95.0 (78.8)	95.6 (83.3)	96.1 (84.0)	96.7 (84.4)	97.3 (84.7)	97.4 (85.0)	97.6 (85.4)	97.8 (85.7)	97.9 (85.8)

Source: DGGREE, Ministry of Agriculture

### 3.1.3 Relevance to Japan's ODA Policy

The Japanese Government's Country Assistance Policy for Tunisia at the time of the project appraisal (2000) included the following five priority areas: (1) the development and promotion of agriculture and fishery, which are Tunisia's main industries, (2) water source development for agriculture and drinking water, (3) the development of a basic infrastructure to help sustainable economic growth, (4) rural development for disparity rectification between urban and rural regions, and (5) environmental conservation. This project planned the construction of small scale water supply facilities – basic infrastructure in rural regions with less development – and was therefore relevant to the above priority areas (2), (3) and (4).

Also, the Medium-Term Strategy for Overseas Cooperation Operations<sup>6</sup> (2002-2004)

<sup>5</sup> The water supply coverage in each part of Tunisia (2011) was 95% in the northeast, 87% in the northwest, 97% in the mid-east, 93% in the mid-west, 98% in the southeast and 99% in the southwest.

<sup>6</sup> It states the basic philosophy and direction of ODA loans for the development support of developing countries implemented by the Japan Bank for International Cooperation (JBIC, currently JICA).



stated “strengthening the strategy to decrease poverty” as one of its priority areas, and focused on effective and efficient support for basic infrastructure development, including the construction of water and sewage facilities in rural regions with a population in poverty. This project planned the construction of water supply systems in the rural regions of Tunisia with 70% population in poverty and therefore is relevant to the above implementation policy.

In the light of the above, this project has been highly relevant to Tunisia’s development plan, development needs, as well as to Japan’s ODA policy; therefore its relevance is high.

### 3.2 Effectiveness<sup>7</sup> (Rating: ③)

#### 3.2.1 Quantitative Effects (Operation and Effect Indicators)

This project constructed new small scale water supply facilities and rehabilitated others within 270 rural villages/communities of 20 Governorates in Tunisia. However, it was difficult to collect data on the operation and effect indicators in all the target sub-projects, therefore evaluation analysis was made based on data obtained by the executing agency for 102 sub-projects<sup>8</sup> in 14 Governorates.

For each operation and effect indicator, all actual values have reached the target values except for the “average duration of breakdowns in the water supply system” and “number of beneficiaries” (Table 2).

Table 2: Operation and Effect Indicator of the Project

Indicator	Baseline (2001)	Target (2010)	Actual (2012)
1. Percentage of Water Served Population (%)	81	94	94 (national average)
2. Water Production Volume per Person/Day (litre/person/day)	—	50	57.4
3. Water Supply Volume per Person/Day (litre/person/day)			
a) New Construction	—	42.5	41.3
b) Rehabilitation	21.25	42.5	41.3
4. Accounted-for-Water Rate (%)	—	60	78
5. Average Duration of Breakdowns in the Water Supply System (for New Construction Sub-Projects) (day)	—	Maximum 3 days for each breakdown	19 days
6. Water Charge (Tunisian Dinar/m <sup>3</sup> )	Average 1.5	Less than 1.0	0.83

<sup>7</sup> The impacts are taken into account when rating effectiveness.

<sup>8</sup> At the time of the ex-post evaluation, information on 128 sub-projects in 14 Governorates was provided by the executing agency. Analysis was conducted on 102 sub-projects in 14 Governorates excluding the ones with no data records due to the shift in operation and maintenance of the water supply facilities to SONEDE (7 sub-projects), the ones that were not in operation due to issues of water source capacity (10 sub-projects), and the ones with incomplete data (9 sub-projects).

Indicator	Baseline (2001)	Target (2010)	Actual (2012)
7. Average Annual Rehabilitation Cost per 1 m <sup>3</sup> of water (for Rehabilitation Sub-Projects) (Tunisian Dinar)	—	Decrease in rehabilitation cost	N.A.
8. Participation Rate of Water User's Association (%)	51	75	N.A.
9. No. of Beneficiaries (person)			
Phase I	(1998)	(2015)	
a) New Construction	96,706 (84 villages)	114,233 (84 villages)	130,000 (104 villages)
Phase II	(2002)	(2010)	
a) New Construction	103,694 (161 villages)	123,721 (161 villages)	100,000 (133 villages)
b) Rehabilitation	103,714 (85 villages)	125,469 (85 villages)	41,211 (33 villages)
Total	304,114	363,423	271,211

Source: JICA's appraisal documents for the Phase II project (20003), JICA's internal documents (1999), and DGGREE, Ministry of Agriculture.

Note 1: The operation and effect indicators and their targets were not set for the Phase I project.

Note 2: The target year of 2010 was anticipated as two years after completion of the Phase II project. However, since the indicator of number of the beneficiaries did not have a base line figure in 2001 or a target figure in 2010, alternative available data for the respective years was utilized.

Note 3: The actual figures for each indicator in 2012 were based on the average figures for the selected 102 sub-projects out of the 127 sub-projects in 14 Governorates that were provided by the executing agency. Regarding the actual figure of the percentage of the water served population in 2012, the national average figure was provided as an alternative due to the lack of information.

Note 4: The actual figure of the accounted-for-water rate in 2012 was calculated based on the average water loss (22%) of the 102 sub-projects as accurate data was not available.

Note 5: The actual figures of the water production volume per person/day and the water supply volume per person/day in 2012 were calculated based on the assumption that one household has 6 family members.

Note 6: "N.A." means that the respective data was not available because the executing agency did not record the data.

As of 2012, each indicator had achieved more than, or had almost achieved, the target values as seen in the "percentage of the water served population" at 94%, the "daily water production volume per person/day" at 57.4 liter/day/person, the "daily water supply volume per person/day" at 41.3 liter/person/day, the "accounted-for-water rate" at 78% and the "water charge" at 0.83 Tunisian dinar/m<sup>3</sup>. On the other hand, the actual value for the "number of beneficiaries" was 271,211, which was 75% of the target value of 363,423. The reason for this nonattainment in the "number of beneficiaries" was the reduction in the number of sub-projects from 330 at the time of the project appraisal to 270 (See 3.4 Efficiency, for the reason for the reduced output). For the "average duration of breakdowns in the new construction sub-projects", the target value was a maximum of 3 days for each malfunction, while the actual value was 19 days. However, the exact definition for a "maximum of 3 days for each malfunction" was not clear and therefore an accurate comparison analysis of the target and actual values for this particular indicator was difficult. In addition, actual data for the "average annual rehabilitation cost per 1 m<sup>3</sup> of water" and the "participation rate of the water user's association" could not be obtained and therefore the attainment for these two indicators could not be evaluated.

The leakage rate of the rural water supply in the Project's sub-projects was 22%, which was below the national average of 32% as of 2012.

## Photographs of the sub-projects



Board member and staff of GDA  
(Bir Ben Zahra Village,  
Nabeul Governorate)



Water Tower (Reservoir)  
(Bir Ben Zahra Village,  
Naneul Governorate)



Pumping Facility  
(Gmara Village, Beja Governorate)



Board member and staff of GDA  
(Soumara Bon Slim Village,  
Mahdia Governorate)



Individual water pipe connection  
(Soumara Bon Slim Village,  
Mahdia Governorate)



Public water tap  
(Ghanzour Village, Kairouan Governorate)

### 3.2.2 Quantitative Effects

#### (1) Improvement of Water Quality in the Water Supply Facilities

When the development of a new water source, such as water well drilling, was conducted during implementation of the project, a strict water quality investigation was carried out based on the Tunisian environmental standards. Only projects that fulfilled the standard value for all the investigation indices were developed<sup>9</sup>. For this reason, no water supply facility indicating a water quality issue was reported during the annual water quality test by the Ministry of Health from the time of project implementation to the present, according to the project executing agency. The beneficiary survey described later in this report revealed that 75% of the respondents considered that there was no problem in water quality. Prior to the implementation of the project, most residents had to obtain drinking water from remote water sources, household wells or water distributors/sellers. It is considered that the quality of water supplied by the water sources developed by this project and which meet Tunisian environmental standards, has improved compared to the water utilized before the project.

<sup>9</sup> Because of the strict water quality investigations, there were many sub-projects that were cancelled during Phase II as their water sources did not fulfill the water quality standards.

### 3.3 Impacts

#### 3.3.1 Intended Impacts

##### Results of Beneficiary Survey

At the time of ex-post evaluation, three Governorates (Beja, Kairouan, and Medenine) and 6 sub-project sites (three new constructions and three rehabilitations) were chosen from the 20 project target Governorates and an semi-structured interview survey<sup>10</sup> was conducted with 120 households on the project impacts.

##### (1) Reduced Labor in Water Drawing and Improved Life Convenience

As far as reductions in the labor of drawing water are concerned, 94.2% of respondents acknowledged an improvement. In addition, 93.3% of respondents acknowledged that their convenience of living improved. Prior to project implementation, 57.6% of respondents had bad access to water and most of them were dependent on a remote water source or water sales by water distributors. The remaining 31.4% used public water taps and 10.9% used domestic water wells. After project implementation, 57.5% had an individual water pipe connection and 42.5% received their water supply services by public water taps. Their workload of walking a great distance taking many hours of the day in order to draw water was significantly reduced. Their convenience of living was also greatly improved as more than half the total number of households possessed an individual water pipe connection, while the rest of the households were able to use public water taps nearby.

##### (2) Improved Hygiene and Health Conditions

For hygiene and health conditions, 91.7% of respondents acknowledge improvements. The increased amount of water usage for drinking, cooking, cleaning, washing, and bathing is considered to be due to the significant improvement in access to safe water. In addition, education on water and hygiene has been provided as a part of an awareness program for local residents, which led to raised hygiene awareness among the residents and promoted improved hygiene and health conditions. On the other hand, regarding the frequency of water-borne diseases, 38.3% of respondents considered that they had “decreased” while 23.3% said there had been “no change” and 38.3% responded “unknown/no answer”. The background for this relatively low improvement effect may be the under developed investigation system for water-borne diseases in rural areas as well as the respondents’ lack of knowledge about such diseases.

---

<sup>10</sup> For the survey, one Governorate was selected from each of the northern, mid and southern regions of Tunisia (Beja Governorate, Kairouan Governorate and Medenine Governorate) and each Governorate chose one new and rehabilitation sub-project each. The number of samples was set at 20 (20 households) from each sub-project - 120 in total. The samples were randomly selected from rural residents where each sub-project was implemented and an interview style survey was conducted.

### (3) Evaluation of Water Supply Services

When asked specific questions on water supply services, the response of “no problem” was given for 75% on water quality, 81.7% on water volume, 68.3% on water pressure, 70.8% on water stoppages and 89.2% on maintenance of facilities. However, frequent drops in water pressure or water stoppages seem to occur during the summer season when demand for water is high. In Medenine Governorate, the level of residents’ satisfaction on water quality was lower compared to other two governorates as the water tasted a little salty and bitter. As for water supply services overall, the level of satisfaction for local residents was extremely high and 96.6% of the respondents answered “satisfied” (18.3% “very much satisfied”, and 78.3% “satisfied to some extent”). On the other hand, 83.3% of the respondents considered the water charge to be high (18.3% “high”, and 65% “high to some extent”). This may be due to the fact that 55.4% of the respondents had used natural spring water or public/domestic well water at no cost prior to project implementation, and their financial burden increased with the introduction of water bills after project implementation. For this reason, 70% of the respondents answered that their water charge burden has “increased”.

The main requests from beneficiaries included improvement in water pressure, fewer water stoppages during the summer season, price cuts for water bills, and improvements in the financial foundation of the water user’s association (GDA).

At the time of project appraisal, improvements in the Human Deprivation Index<sup>11</sup> and the Beneficiary Household Rates by the National Aid Program for Poor Families (PNAFN)<sup>12</sup> were expected as a poverty alleviation impact. However data for these indices could not be obtained at the time of the ex-post evaluation, and therefore there is no verification of the said impact.

#### 3.3.2 Other Impacts

##### (1) Impact on the Natural Environment

This project was categorized as Type-B in the JBIC Guideline for ODA Loan Environmental Consideration and there was no Environmental Impact Assessment (EIA) requirement for the construction of small scale water supply facilities under Tunisian Environmental Acts, therefore no EIA was conducted. According to the executing agency, each water supply facility was small scale and there was no negative influence observed during implementation of the project. The Regional Agricultural Development Offices (CRDA<sup>13</sup>),

---

<sup>11</sup> The Human Deprivation Index is calculated with the average of the following four indices that are quantified: (i) Rate of population with no access to health services, (ii) Female child illiteracy rate, (iii) Dropout rate from elementary school and (iv) Rate of population with no access to safe water. At the beginning, the plan was to improve the 2001 standard value “median of 0.417” after the completion of the project.

<sup>12</sup> The Beneficiary Household Rates by PNAFN are calculated with the rate of the beneficiary household by the national aid program for poor families (Programme National d’Aide aux Familles Necessiteuses: PNAFN). At the beginning, the plan was to improve the 2001 standard value “median of 5.7” after the completion of the project.

<sup>13</sup> CRDA: Commissariat Régional au Développement Agricole.

which are regional branch offices of the Ministry of Agriculture in each governorate, are in charge of the environmental monitoring of each rural water supply facility. However, annual water sampling investigations on water quality are conducted by the Ministry of Health.

Sewage, including household wastewater is treated in a septic tank of individual household and is regularly collected by service providers such as the National Sanitation Office (ONAS)<sup>14</sup>, local governments and the private sector. At the time of the ex-post evaluation, project site visits were conducted in 7 rural villages but there were no reported environmental issues caused by wastewater. During the beneficiary survey, 90.9% of respondents answered that there had been “no” negative impact on the natural environment related to this project (51.7% “none” and 39.2% “almost none”). For wastewater treatment, 96.7% of the respondents had an individual septic tank in their household while the wastewater of the remaining 3.3% drained into a gutter. For this reason, 77% of the respondents answered that there was no negative impact on the natural environment.

On the other hand, according to the Ministry of Agriculture and the African Development Bank<sup>15</sup>, the sewage volume has increased as the water supply coverage to rural areas has improved and individual water supply has become widespread. Regarding this issue, the Ministry of Agriculture plans to work on primarily including the establishment of related regulations and an implementation system for the sewage treatment in the rural areas<sup>16</sup>.

## (2) Land Acquisition and Resettlement

Land for the facilities was provided by land owners free of charge according to an agreement between the land owners and the local governments, therefore there was no land acquisition and resettlement.

In summary, the major operation and effect indicators such as the percentage of the water served population, the water production volume per person/day, the water supply volume per person/day, the accounted-for-water rate and the water charge attained their target values. The water quality of the newly developed water sources has met the Tunisian environmental standards and the level of satisfaction of water quality among local residents was high according to the beneficiary survey. There was also a reported improvement in the water quality of the water supply facilities. There were some positive impacts on the living standards of local residents such as reduced labor in drawing water, improved convenience of living and improved

---

<sup>14</sup> ONAS: Office National de l'Assainissement.

<sup>15</sup> The African Development Bank (AfDB) has a temporary headquarters office in Tunis, the capital of Tunisia (it was temporarily moved from Abidjan in Côte d'Ivoire) and it is a major donor providing much support to rural water supply development projects in Tunisia including this project.

<sup>16</sup> In Tunisia, a state-owned sewage company (ONAS) takes charge of the sewage system in urban regions, however, in rural regions, it is not legally clear who takes responsibility for the sewage system, whether it is each local government or the Ministry of Agriculture. The diffusion rate of sewage in the urban regions of Tunisia is 30-40%.

hygiene and health conditions. No negative impact on the natural environment was reported and no land acquisition and resettlement occurred. From the above, it can be agreed that there were positive impacts seen through the implementation of this project, and therefore its effects and impacts are high.

### **3.4 Efficiency (Rating: ②)**

#### **3.4.1 Project Outputs**

The project output was to construct new and rehabilitate old small-scale water supply facilities in 20 out of 24 Governorates in Tunisia. The planned output (total of Phase I and Phase II) was 330 sub-projects (245 new, 85 rehabilitation) whereas the actual output was 270 sub-projects (237 new and 33 rehabilitation). The attainment rate for the planned outputs was 82%. In detail, the planned output for Phase I<sup>17</sup> was 84 new sub-projects in 17 Governorates while the actual output was 104 sub-projects in 17 Governorates; an increase of 20 sub-projects. On the other hand, the planned output for Phase II<sup>18</sup> was 161 new sub-projects in 19 Governorates and 85 rehabilitation sub-projects in 16 Governorates whereas the actual output was 133 sub-projects in 19 Governorates and 33 rehabilitation sub-projects in 12 Governorates; a decrease of 28 new sub-projects and 52 rehabilitation projects (See Table 3).

The reason for the increase in the number of sub-projects in Phase I was a surplus fund (approximately 700 million JPY) due to changes in the foreign exchange rate and competitive bidding results. An addition of 20 sub-projects were conducted using the surplus fund. Of all 104 sub-projects in Phase I, 9 of them were not subject to the project implementation due to (i) changes in the project implementation period, (ii) the possibility of water supply from SONEDE, (iii) decreased water levels of water sources, and (iv) the water quality of water sources not fulfilling the Tunisian water quality standards. However, the same number of sub-projects were replaced.

The reasons for the reduction in the number of new sub-projects in Phase II were: (i) issues of water quality and the capacity of water sources, (ii) disagreements with local residents on the implementation of water supply project, and (iii) the possibility of water supply from SONEDE. A total of 28 sub-projects were excluded. Especially the major cause for such reductions in number was that the water quality of the water sources did not meet the standard value. While, the major cause for the reduction in rehabilitation sub-projects in Phase II was that a new diagnosis method for deteriorated water supply facilities developed by the project executing agency with the support of the German Development Bank (KfW) was introduced by the

---

<sup>17</sup> The sub-projects during Phase I were selected from the 2000-2001 program of the rural water supply plan while 'urgency', 'development of the implementation structure', 'secured water resources' and 'geographical distribution' were taken into consideration.

<sup>18</sup> The sub-projects during Phase II were selected from the 2004-2006 program of the rural water supply plan while 'poverty rate', 'water source and rural population', and 'investment amount per water source or beneficiary' were taken into consideration.

Ministry of Agriculture. Training for the new diagnosis method was provided for CRDA staff in each governorate. However the training took longer time and the implementation of the rehabilitation project in each CRDA was delayed. For this reason, the number of sub-projects that were ready to be implemented during the project period was reduced.

Table 3: Planned and Actual Project Outputs

Governorate	Plan				Actual			
	Phase I	Phase II		Total	Phase I	Phase II		Total
	New Construction	New Construction	Rehabilitation		New Construction	New Construction	Rehabilitation	
Ariana	5	3	-	8	5	3	-	8
Beja	6	14	10	30	6	11	5	22
Bizerte	3	11	3	17	5	12	2	19
Manouba	2	4	-	6	-	4	-	4
Nabeul	4	9	3	16	4	7	3	14
Ben Arous	2	-	1	3	1	-	-	1
Jendouba	9	5	3	17	8	3	-	11
Le Kef	4	6	7	17	8	5	1	14
Siliana	1	13	9	23	1	7	-	8
Zaghouan	4	2	1	7	4	2	1	7
Sousse	4	2	-	6	4	2	-	6
Kairouan	3	13	5	21	13	13	3	29
Mahdia	3	12	-	15	5	12	-	17
Kasserine	7	10	14	31	10	11	7	28
Sfax	2	3	2	7	-	3	-	3
Sidi Bouzid	7	20	9	36	9	14	2	25
Gafsa	6	14	7	27	9	13	4	26
Gabes	5	5	4	14	5	4	2	11
Medenine	7	12	4	23	7	5	1	13
Tataouine	-	3	3	6	-	2	2	4
<b>Total</b>	<b>84</b>	<b>161</b>	<b>85</b>	<b>330</b>	<b>104</b>	<b>133</b>	<b>33</b>	<b>270</b>

Source: DGGREE, Ministry of Agriculture

The original plan of this project was to target the rural water supply system using a public water tap system as its basic policy. However, as mentioned earlier, the 10<sup>th</sup> Rural Drinking Water Supply Program (2002-2006) announced the policy of promoting individual water pipe connection systems in rural areas and the demand for these on the part of local residents to CRDA was high. Therefore, some design changes were made such as an expansion in water pipe diameter supposing future individual water pipe connections during Phase II of the project. After project completion, each CRDA received a request from GDA and approved the changes from public water tap systems to individual water pipe connection systems with the provision that this could be catered for using the existing capacity of water supply facilities. Because of all this, many of the sub-projects of the project were changed from public water tap systems to



individual water pipe connection systems.

Furthermore, this project has given support with the technical cooperation of JICA (the detailed design study)<sup>19</sup> which was associated with JBIC at that time, and with JICA. The JICA technical cooperation supported implementation design, the preparation of tender documents, and the drawing up of an operation management plan for water supply facilities by the water user's association (GDA). The executing agency has listed advantages of cooperation in this ODA loan and technical cooperation, such as effects in technical transfer and the high quality of survey and design<sup>20</sup>.

In cases where rural water supply facilities had been designed and constructed based on the conventional designing guidelines of the General Direction of Rural Water Works and Water Supply, Ministry of Agriculture, some public water taps had output malfunction. On the other hand, there was also excessive amounts of water flow when public water taps were used by only a single or few units. This may have caused significant errors in water meters or trouble in the equipment used for the public water taps. In order to solve these problems, JICA has suggested a design system introducing a new hydraulic calculation method using software, as well as the carrying out of workshops for the Ministry of Agriculture and CRDA on design method correction. The Ministry of Agriculture has now introduced a new system and it is widely used as the standard method for designing rural water supply projects in Tunisia. JICA also introduced earthquake-proof water supply towers using Japan's experience with seismic countermeasures. These are listed as a part of the technical transfer effects of JICA.

In addition, JICA has worked intensively using all means during its cooperation period in order to provide optimal outputs. Its quality of survey was highly evaluated compared to that of the Ministry of Agriculture.

### 3.4.2 Project Inputs

#### 3.4.2.1 Project Cost

The actual project cost amounted to 9,030 million yen (equivalent to 85% of the original plan) against the planned cost of 10,664 million yen (total of Phase I and II), which was within the plan (Table 4).

---

<sup>19</sup> The detailed design study on the rural water supply project in the Republic of Tunisia (JICA, 2002); and the study on the rural water supply project (phase II) in the Republic of Tunisia (JICA, 2006).

<sup>20</sup> As for another advantage, the 'short implementation period for the design survey' was listed. When the Ministry of Agriculture conducts a survey/design while hiring a consultant, it is necessary to follow certain procedures according to governmental procurement guidelines, such as the preparation of terms of reference (TOR) for the consulting services, public announcement, bidding, evaluation and contract, and this is time consuming. On the other hand, for JICA technical cooperation, JICA conducts the procurement of local consultants and quality control according to the TOR for the survey agreed between JICA and the Ministry of Agriculture in advance. Therefore, the time needed to start survey activities and their implementation period are acknowledged to be shortened.

Table 4: Planned and Actual Project Cost

Unit: Million Yen

Item	Plan			Actual		
	Phase I	Phase II	Total	Phase I	Phase II	Total
1. Civil Works and Equipment	2,980	4,002	6,982	3,766	4,904	8,670
2. Physical Contingency	298	331	629	0	0	0
3. Consulting Services	346	162	508	207	153	360
4. Survey and Study	-	362	362	-	N.A.	N.A.
5. Deep Well Construction	-	178	178	-	N.A.	N.A.
6. Administration Costs	95	120	215	N.A.	N.A.	N.A.
7. Tax and Duties	750	1,040	1,790	N.A.	N.A.	N.A.
Total	4,469	6,195	10,664	3,973	5,057	9,030

Source: DGGREE, Ministry of Agriculture

Note 1: Exchange rate used for Planned Cost: TND 1 = JPY 104.71 (May 1999, Phase I), TND 1 = JPY 81.91 (September 2002, Phase II).

Note 2: Exchange rate used for Actual Cost: TND 1 = JPY 82.44 (Average 2000-2010, Phase I), TND 1 = JPY 81.95 (Average 2003-2010, Phase II).

Note 3: The actual cost for civil works and equipment includes costs for surveys and studies, deep well construction, administration and tax and duties.

The main reason for this was the reduced project outputs described earlier and the changes in the foreign exchange rate.

#### 3.4.2.2 Project Period

The project period planned was 106 months (Total of Phase I and II), or from March 2003 (ODA loan signing) to December 2008 (Completion of Phase II). The actual project period was 129 months, or from March 2000 to November 2010 (equivalent to 122% of the original plan). This was slightly longer than planned (Table 5).

Table 5: Planned and Actual Project Period

Activities	Plan	Actual
<b>Phase I</b>		
1-1. Signing of L/A	March 2000	March 2000
1-2. Tender	March 2000 – November 2000 (9 M)	June 1999 – February 2001 (20 M)
1-3. Civil Works	May 2000 – June 2003 (38 M)	March 2000 – June 2010 (124 M)
1-4. Consulting Service	May 2000 – December 2003 (44 M)	June 2000 – December 2003 (43 M)
1-5. Project Completion	December 2003	June 2010
1-6. Total Duration	March 2000 – December 2003 (46 M)	March 2000 – June 2010 (124 M)
<b>Phase II</b>		
2-1. Signing of L/A	March 2003	March 2003
2-2. Tender	February 2004 – August 2006 (31 M)	June 2003 – June 2006 (37 M)
2-3. Civil Works	April 2004 – March 2008 (48 M)	February 2004 – Nov. 2010 (82 M)
2-4. Consulting Service	October 2004 – December 2008 (51 M)	July 2005 – June 2009 (48 M)
2-5. Project Completion	December 2008	November 2010
2-6. Total Duration	March 2003 – December 2008 (70 M)	March 2003 – Nov. 2010 (93 M)

Source: DGGREE, Ministry of Agriculture

The reasons for the delay were as follows:

(1) Delay caused by additional scope of Phase I

During Phase I of the project, 20 sub-projects were implemented as an additional scope between 2007 and 2010. For this, the loan expiry date was extended from July 2007 to June 2010.

(2) Delay in detailed design by CRDA

For the detailed design of this project, it was planned that JICA technical cooperation was used for new sub-projects and CRDA was in charge of rehabilitation sub-projects, with a consultant. However, the detailed design of rehabilitation sub-projects during Phase II by CRDA was delayed due to the fact that it took time to introduce new survey methods for diagnosing deteriorated water supply facilities, also due to lack of CRDA manpower, and lack of time from the concurrent donor support project.

(3) Delay in supply for rehabilitation projects

During Phase II of the project, the coordination works for the rehabilitation of pump facilities, engineering work and water supply pipe construction work, needed to be carried out smoothly as the rehabilitation and expansion of existing facilities was to be done without any stoppage of the water supply system that was in operation. For that reason, at first, the executing agency decided to hire only one contractor to work on the above three works. However, it was difficult to agree a contract with a contractor which could fulfill all the technical requirements described above, and rebidding was necessary. As a result, the implementation of the Phase II rehabilitation project was delayed for a year.

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

#### Economic Internal Rates of Return (EIRR)

EIRR for Phase II of the project was calculated at the time of project appraisal (2001). For the new construction projects, it was 13.4% and for rehabilitation projects it was 23.3%. For the recalculation of EIRR, there was no detailed data on the calculation basis at the time of project planning, and it was difficult to collect the necessary data from the executing agency, therefore no recalculation was done at the time of the ex-post evaluation.

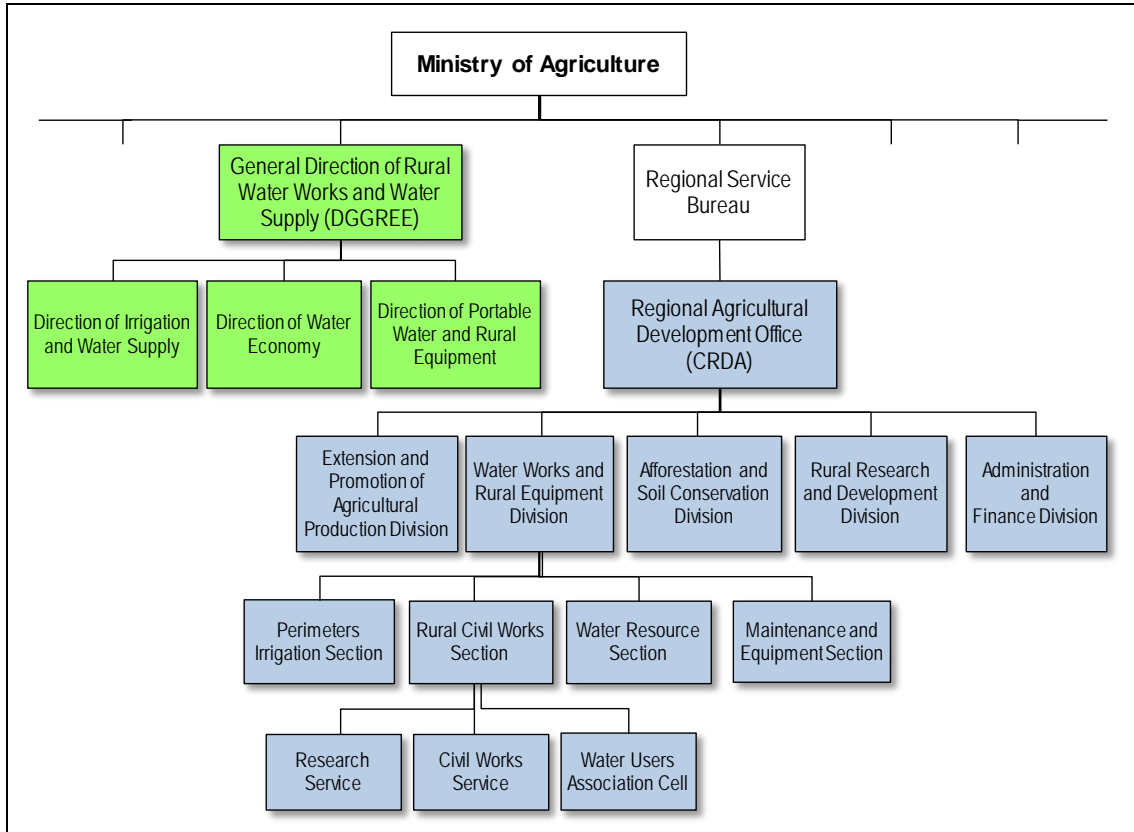
In the light of the above, although the project cost was within the plan, the project period slightly exceeded the plan; therefore the efficiency of the project is fair.

## **3.5 Sustainability (Rating: ②)**

### 3.5.1 Structural Aspects of Operation and Maintenance

The operation and maintenance (O&M) of this project is conducted on two levels: the Regional Agricultural Development Office (CRDA), a regional branch office of Ministry of

Agriculture in each Governorate, and the Water User’s Association (GDA) organized by the representatives of local residents. CRDA and GDA signed the management contract, and each is responsible for the operation and management of water supply facilities based on the tasks and responsibilities stipulated in the contract. The organization chart of CRDA is shown in Figure 1 below.



Source: CGGREE, Ministry of Agriculture

Note 1: The names of the departments and sections of Ministry of Agriculture directly involved in the operation and maintenance of this project are provided in this organization chart.

Note 2: The above organization chart of CRDA is a standardized formation. The formation of divisions and sections varies according to the size of each CRDA.

Figure 1: Organization Chart of CRDA

(1) CRDA

The main role of CRDA in O&M is the major rehabilitation of water supply facilities and support for GDA. In particular, the Maintenance and Equipment Section is in charge of the repair and rehabilitation of water supply pipes in the case of breakage and leakage, pumping equipment, and all the malfunctions that are relatively large and cannot be handled by GDA. Usually CRDA carries out rehabilitation of the pumping equipment every 7 years and of the water supply pipes every 25 years. On the other hand, the Rural Civil Works Section, consisting of Research Service, Civil Works Service, and Water User’s Association Cells, is in charge of supporting GDA from various aspects, such as establishing GDA, supporting the general

assembly meetings, advising and training on the O&M method of water supply facilities, collecting water bills, supporting the creation of annual budget plans, supporting record management, and mediating and giving advice for solving social issues. CRDA is also responsible for the management of the water quality in water supply facilities.

Although it varies depending on each Governorate, there are approximately 100 GDAs per Governorate for the rural water supply<sup>21</sup> and one member of CRDA staff of each Water User's Association Cell is to be in charge of supporting the activities of 20-30 GDAs. However, the rural water supply facilities are scattered extensively in each Governorate and in recent years there have been quite a few CRDA which experience difficulties in making the rounds of all GDA regularly due to the inconvenience of transportation because of undeveloped road infrastructures, a limited number of staff and a lack of vehicles and fuel.

#### (2) Water User's Association (GDA)

GDA is an organization with a juridical personality, which has the approval of the governor from each Governorate. The Ministry of Agriculture and Ministry of Home Office are the administrative bodies in charge of them. Each GDA is composed of three or six elected directors<sup>22</sup> (a chairman, treasurer, directors who are unpaid), as well as general association members (water users). In addition, a technical director (in charge of collecting water bills and the overall administrative management work, including financial management), a pump operator and a tap keeper (who manages the public water tap) are hired and paid by the GDA. However, some small-scale GDA do not have paid staff such as the technical director or pump operator due to a limited budget.

The role of GDA in O&M includes routine maintenance of water supply facilities, minor repair works including the changing of spare parts, controlling the operation inventory of the pump station, issuing and collecting water bills, and preparing financial reports and the annual budget plan<sup>23</sup>.

### 3.5.2 Technical Aspects of Operation and Maintenance

#### (1) CRDA

The Ministry of Agriculture conducts technical training for newly hired CRDA engineers on the O&M of water supply and irrigation systems twice a year. Furthermore, CRDA conducts training for GDA on the O&M of water supply systems.

---

<sup>21</sup> In Tunisia, GDAs for the irrigation facilities are also organized as O&M organizations with the participation of irrigation users. Although there are some exceptions, GDAs for rural water supply and GDAs for irrigation are separately established.

<sup>22</sup> The term for a director is 3 years and 1/3 of the directors are replaced annually. In other words, there is an executive election in the annual meeting and 1/3 of the directors are reelected.

<sup>23</sup> Some of the rural areas that were located relatively near to an urban area and received their water supply from the water pipes of SONEDE, a water supply company in urban areas, have transferred the O&M of their water supply facilities from GDA to SONEDE at the residents' will.

## (2) Water User's Association (GDA)

GDAs are in charge of routine maintenance, mainly preventive maintenance, based on an annual maintenance plan. Technical training by CRDA for GDA is conducted once during the startup of the organization, and then each GDA member shares and hands over their technical knowledge thereafter. If problems are too difficult to be handled by GDA, it is possible to outsource to a private repair company although there are some regions where this option is not available as there are no private maintenance companies. In these cases CRDA provides repair support upon the request of a GDA<sup>24</sup>.

The revolution in 2011 caused dramatic changes in Tunisian society and had a negative influence on the O&M of the rural water supply system nationwide. For example, the water charge collection rate decreased as the rate of water bill arrears increased after the revolution. This has had a negative influence on the financial capacity of GDA. According to the executing agency, there are many GDAs which are in debt to SONEDE or to electric companies and the number of GDA that can conduct necessary preventive maintenance is low. Furthermore, there are many cases where local residents connect individual water pipe connections without the approval of GDA and this had a negative influence on the efficiency of the water supply system; there is an increase in water leakages as well as insufficient water volume and water stoppages<sup>25</sup>. The increase in water bill arrears or illegal individual water pipe connections are thought to be related to a change in awareness on the part of local residents after the revolution, a distrust towards the directors of GDA<sup>26</sup>, moral hazards, and the decreased authority of administrative and law enforcement agencies. Although GDA reminds and persuades individuals with water bill arrears to pay water bills as well as giving warnings and taking legal action against illegal connections as much as it can, GDA are voluntary-based community organizations without legal force and it is difficult for them to take effective measures<sup>27</sup>.

---

<sup>24</sup> Support by CRDA for GDA rehabilitation may include the repair of water supply facilities by CRDA staff where outsourcing to a private maintenance company is difficult, in addition to mediation with private maintenance companies and procurement support for the replacement of parts. The repair of water pipes is carried out by CRDA free of charge, but the repair costs for electric equipment such as pump equipment and the actual cost of replacement parts are paid by GDA.

<sup>25</sup> In cases where residents have connected an individual water pipe without the approval of CRDA or GDA, this is ignored as long as the connection is made appropriately with the main pipe, with a proper water meter, and as long as residents pay the water bill. The largest problem is when the connections result in a decrease in water supply system efficiency due to low water pressure or a water leakage caused by inappropriate connection work, or when there is underreporting of water usage due to a deterioration of water meters .

<sup>26</sup> According to interviews with selected GDA at the time of the ex-post evaluation, before the revolution in 2011, there was political intervention in the election of board members and politically-connected people tended to be those elected. After the revolution, people distrusted the existing board members, and now almost a half of the entire GDA have re-elected their directors.

<sup>27</sup> According to interviews with selected GDAs, it was difficult to take measures such as a suspension of the water supply to recoup water bill arrears because of the possible bad influence on personal relationships within the rural society. Prior to the 2011 revolution, regulating offenders with the support of local police or administration was an effective means of problem solving where there had been an illegal connection. However, after the revolution, as the authority of the police or local government and people's trust in them decreased, they tend to avoid getting involved in problems like this.

Table 6: Performance Evaluation of All GDA in Tunisia by the Ministry of Agriculture

	2007	2008	2009	2012
Good	23%	22%	26%	21%
Moderate	58%	60%	49%	44%
Weak	19%	18%	24%	35%

Source: DGGREE, Ministry of Agriculture

Note: Ministry of Agriculture evaluates the performance and capacity of all GDA in Tunisia according to three criteria: Financial capacity (3 components), Technical capacity (4 components) and Organizational management capacity (9 components).

Table 6 shows the results of the performance evaluation of all GDA in Tunisia<sup>28</sup> which is conducted annually by the Ministry of Agriculture. When compared to the results of 2009, the rate of GDA evaluated as “Good” in 2012 decreased by 5 points while the rate of GDA evaluated as “Weak” increased by 11 points. The performance level of GDA has shown a declining trend nationwide due to changes in the social environment after the revolution of 2011.

### 3.5.3 Financial Aspects of Operation and Maintenance

#### (1) CRDA

Table 7 below shows the actual O&M budget for rural water supply facilities (2012) in the target CRDA in 20 Governorates.

Although the O&M budget allocated to each CRDA by the Ministry of Agriculture depends on regional characteristics or the number of GDA, the O&M budget for rural water supply facilities is allocated with the basis of 8,000 Tunisian dinar per GDA annually. In principle, the operation and maintenance budget is covered partly by water prices and each GDA is responsible for its execution and management. The operation and maintenance fee covered by CRDA are mainly for the repairs of pumping equipment and the mending of water pipes<sup>29</sup>. According to the executing agency, the budget allocation for each CRDA has been on a decreasing trend after the 2011 revolution, and there is a shortage of labor costs as well as costs for supporting activities for GDAs including visiting each GDA in particular.

<sup>28</sup> The Ministry of Agriculture conducts a performance evaluation of all GDA nationwide through CRDA every year based on the annual report submitted by GDA. However, annual reports were no longer submitted after 2009, therefore the Ministry of Agriculture has conducted a GDA performance evaluation based on the new rating standard since 2012.

<sup>29</sup> For those GDA that have financial difficulties and are unable to pay the operation and maintenance fee, there are cases where CRDA has given financial support as an exception.

Table 7: Actual Operation and Maintenance Budget for Rural Water Supply Facilities (2012)  
in the Target CRDA

Governorate	Amount (1,000 Dinar)	Governorate	Amount (1,000 Dinar)
Ariana	214	Sousse	356
Beja	661	Kairouan	4,801
Bizerte	1,162	Mahdia	2,620
Manouba	3,258	Kasserine	3,255
Nabeul	3,999	Sfax	4,230
Ben Arous	403	Sidi Bouzid	6,766
Jendouba	3,519	Gafsa	2,800
Le Kef	4,483	Gabes	649
Siliana	1,752	Medenine	1,844
Zaghouan	2,353	Tataouine	510
Total			<b>49,635</b>

DGGREE, Ministry of Agriculture

Note: The above actual operation and maintenance (O&M) budget of CRDA is the O&M of all small-scale rural water supply facilities including the sub-projects of this project.

## (2) Water User's Association (GDA)

Since the 2011 revolution, many GDA have faced financial difficulties due to an increase in overdue water bills. Many GDA have had trouble in reserving O&M expenses, which had led to delays in paying in electricity bills as well water bills to SONODE, for those receiving their water supply from SONODE. In addition, some GDA have made cuts in the water price after being pressed by the local residents, and quite a few GDA have been forced to set their water price below the water production/purchasing cost price<sup>30</sup>. For this reason, the cost recovery rate of the rural water supply project in Tunisia has significantly worsened, from 83% in 2009 to 66% in 2012 (Table 8).

Table 8: Cost Recovery Rate

	Average of All Rural Water Supply Projects in Tunisia				Average of this Project
	2007	2008	2009	2012	2012
Cost Recovery Rate (%)	80	77	83	66	106

Source: DGGREE, Ministry of Agriculture

Note 1: Cost recovery rate (%) = Water production cost per 1 m<sup>3</sup> / Water revenue per 1 m<sup>3</sup> x 100

Note 2: Cost recovery rate of this project is based upon the average cost recovery of 102 sub-projects in 14 Governorates

In this situation, the fact that the cost recovery rate in the target 102 sub-projects maintains an average of 106% is significant and this should be rated highly.

The reasons for the relatively high performance of the 102 sub-projects from this project as

<sup>30</sup> The water production and purchasing price vary in each water supply facility depending on the type of water source. The water production and purchasing price are generally more expensive in a water supply facility that purchases water from SONODE than for those with a water source that uses a well within or in a nearby area.



compared to the national average are thought to be: (i) a higher capability of GDA as the results of an effective awareness program for local residents and support for GDA and (ii) a higher satisfaction rate for local residents regarding the water supply services of these sub-projects as there are few breakdowns and malfunctions in the water supply system. However, the executing agency estimates that the minimum required O&M expenses are approximately 25% of the annual budget while for the target 102 sub-projects in 14 Governorates, the percentage of O&M expenses within the GDA overall expenses was 11% in 2012. There is, therefore, room for continuing improvements in assuring optimal O&M expenses through measures such as raising the water bill collection rate.

#### 3.5.4 Current Status of Operation and Maintenance

There was no major issue in its O&M status of the water supply facilities in 7 rural areas in 4 Governorates that were visited during the field survey of the ex-post evaluation. According to the Ministry of Agriculture, there are also no major issue in the current status of the O&M of water supply facilities from the sub-projects. However, 10 out of 127 sub-projects in 14 Governorates provided by the executing agency have stopped operating due to the issue of water source capacity. In order to solve this problem, some of them are currently under construction for rehabilitation.

As described earlier, there have been many problems in O&M since the revolution in 2011, and countermeasures, which include the status of conventional GDA, are being discussed within the Ministry of Agriculture. In relation to this, a technical cooperation project by KfW is in progress targeting 264 GDA in 8 Governorates. This is a pilot project in Tunisia (the sub-projects of this project are excluded). KfW is a major donor that has been providing support for rural water supply projects through a participatory approach in Tunisia since the 1990's. This technical cooperation project aims at strengthening the O&M capacity of rural water supply facilities by enhancing the legal framework of GDA, also at strengthening the O&M support system of the private sector and improving the financial management capacity of GDA.

In Summary, the 2011 revolution caused political and social changes in Tunisia as well as changes in people's awareness and attitudes, and it has had a negative influence on the organizational capacity of the GDA that were in charge of the O&M of this project. In particular, increases in water bill arrears have weakened the financial foundation of GDA and have had a negative influence on the implementation of appropriate O&M activities. However, despite such difficulties, O&M activities such as minimum preventive maintenance have continued within the sub-projects of this projects and the finance has been reserved. For each CRDA, although they are not sufficient, a certain level of O&M activities have been implemented within the rural water supply facilities under their supervision. There are some issues in the structural,

technological and financial aspects of O&M of this project, and therefore the sustainability of the project effect is fair.

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

### **4.1 Conclusion**

The objective of this project was to improve the coverage of the rural water supply by constructing small scale water supply facilities in 20 Governorates, thereby contributing to an improvement in people's living standards.

This project matched the Tunisian national development policy and development needs and Japan's ODA policy, therefore its relevance is high. Based on data analysis of 102 sub-projects in 14 Governorates (out of 270 sub-projects in 20 Governorates) obtained from the executing agency, it can be seen that the main operation and effect indicators such as water supply coverage, water production volume per person/day, water supply volume per person/day, accounted-for-water rate, and water price have achieved their target values. The water quality of the water source, which was newly developed by this project, met the Tunisian environmental standards. The beneficiary survey conducted with local residents revealed that residents were highly satisfied with the water quality and that there had been an improvement in the water quality of water supply facilities. There were some positive impacts which improved the living standards of local residents such as decreases in the labor of drawing water, improved convenience of living, and improved hygiene and health conditions. No negative impact on the natural environment was observed, and there was no land acquisition or resettlement. Therefore, the effectiveness and impact of the project is high.

Although the project cost was within the plan, the project period slightly exceeded the plan, therefore the efficiency of the project is fair. The Jasmine revolution in 2011 caused political and social reform and a change in people's awareness and attitudes throughout Tunisia. It also had some negative influence on the capacity and organization management of the Water User's Association (GDA) which was mainly in charge of the operation and maintenance of the project. For this reason, there were some issues observed in the structural, technical and financial aspects of the project's operation and maintenance. Thus, the sustainability of the project is fair.

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

### **4.2 Recommendations**

#### **4.2.1 Recommendations for the executing agency**

##### Strengthening the Capacity of GDA

This project had issues in its sustainability. In particular, the problems of water bill arrears and illegal individual water pipe connections need to be worked on as a priority. In the background to this, there are external factors that have had a significant influence such as the

changes in local residents' awareness and attitudes and political and social changes that came after the 2011 revolution. For example, it is now difficult to control those in arrears or other violators due to an increase in distrust that local residents feel towards GDA board of directors, changes in the awareness that residents have of their rights, moral hazards, and a decrease in the power of the administrative/law enforcement agencies. On the other hand, the water supply system is shifting from the public water tap system to an individual water pipe connection system. The water supply pipe network is expanding and the burden of operation and maintenance is increasing. This means that a situation arising cannot be handled sufficiently by the conventional GDA capability. It has been revealed that the structure and capacity of GDA based on residents' volunteer work are reaching their limits.

As a countermeasure to the above issues, a technical cooperation project by KfW is in progress targeting 264 GDAs in 8 Governorates. This is a pilot project focusing on strengthening the capacity of GDA. It is desirable that the General Direction of Rural Water Works and Water Supply, Ministry of Agriculture shares the outcomes of this project with the CRDA from each Governorate and the GDA of the sub-projects of the project, and that they are utilized in reviewing feasible countermeasures against water bill arrears and illegal individual water pipe connections, as well as in improving the capacity GDA.

#### The Rehabilitation of Non-Operating Water Supply Facilities

There are at least 10 sub-projects currently not operating due to problems such as water source capacity. It is desirable that these non-operating water supply facilities take necessary countermeasures such as rehabilitation.

#### 4.2.2 Recommendations for JICA

From the point of view of sustainability, it is desirable that JICA closely collaborate with the Ministry of Agriculture and share information on the KfW technical corporation project in progress. The Ministry should be advised to provide feedback on the outcomes of the KfW project to the GDA of the sub-projects. In addition, JICA is expected to consider the possibility of further assistance to improve the capacity GDA in the future.

### **4.3 Lessons Learned**

This project was implemented in collaboration with JBIC and JICA at that time. Prior to the project, the design and construction of rural water supply facilities were based on the design guidelines of the General Direction of Rural Water Works and Water Supply. However under these guidelines, there was the possibility of triggering malfunction of water supply equipment from output errors or excessive loads on the public water taps. Therefore, the JICA survey team suggested a design method based on a new hydraulic calculation that replaced the conventional design guidelines. This new method has been used as the standard for rural water supply project

design in Tunisia. In addition, this project introduced the design of an earthquake resistant water supply tower utilizing Japanese experience of earthquake countermeasures. The effects of technology transfer, as well as the quality of the survey and design of the JICA survey team were highly appreciated in Tunisia. From this, it can be seen that it is desirable that an elaborate survey is conducted prior to project implementation, and if technology or information is lacking in the partner country, that specialists and consultants are actively used to cover such insufficiencies. This can secure the sustainability of a project and encourage the partner country to acquire new techniques and information and to gain the effects of technical.

End

## Comparison of Original and Actual Scope

Item	Plan	Actual
<p>(1) Project Outputs [Phase I]</p> <p>a) New construction of small-scale water supply systems</p> <ul style="list-style-type: none"> <li>• Construction of water source developments, pumping stations, reservoirs, public water taps</li> <li>• Laying of water pipes</li> <li>• Procurement and installation of pumping machines</li> </ul> <p>b) Consulting services</p> <ul style="list-style-type: none"> <li>• Assistance with construction supervision</li> <li>• Environmental monitoring and advice of countermeasures.</li> <li>• Technical assistance for sensitization</li> <li>• Assistance in O&amp;M of the facilities</li> </ul> <p>[Phase II]</p> <p>c) New construction of small-scale water supply systems</p> <ul style="list-style-type: none"> <li>• Construction of pumping stations, disinfection facilities, reservoirs, public water taps</li> <li>• Laying of water pipes</li> <li>• Procurement and installation of pumping machines</li> </ul> <p>d) Rehabilitation of existing small-scale water supply systems</p> <ul style="list-style-type: none"> <li>• Rehabilitation of pumping stations and machines, public water taps</li> <li>• Protection work for pipelines</li> <li>• Replacement of aged water pipes</li> <li>• Installation of chemical injection pumps</li> </ul> <p>e) Procurement of equipment for civil works</p> <p>f) Consulting service</p> <ul style="list-style-type: none"> <li>• Assistance with project management</li> <li>• Review of sensitization programs and advice on countermeasures</li> <li>• Technical assistance for the management of GDA and the O&amp;M of the facilities</li> <li>• Assistance in monitoring of the Human Deprivation Index</li> </ul>	<p>84 sub-projects (17 governorates)</p> <p>Foreign experts: 21 M/M Local experts: 110.5 M/M</p> <p>161 sub-projects (19 governorates)</p> <p>85 sub-projects (16 governorates)</p> <p>Vehicles: 22 units Measuring instruments: 20 sets (1 set x 20 governorates) Computer software: 1 set</p> <p>Expert A: 13 M/M Expert B: 93 M/M</p>	<p>104 sub-projects (17 governorates)</p> <p>Foreign experts: 16.13 M/M Local experts: 110.82 M/M</p> <p>133 sub-projects (19 governorates)</p> <p>33 sub-projects (12 governorates)</p> <p>Vehicles: as planned Measuring instruments: N.A. Computer software: N.A.</p> <p>Expert A: 9.95 M/M Expert B: 79.2 M/M</p>

Item	Plan	Actual
(2) Project Period (Phase I and Phase II)	March 2000 – December 2008 (106 months)	March 2000 – November 2010 (129 months)
(3) Project Cost (Phase I and Phase II) Amount paid in Foreign Currency Amount paid in Local Currency  Total Japanese ODA Loan Portion Exchange Rate	602 million yen 10,062 million yen (112 million dinar) 10,664 million yen 7,874 million yen TND 1=JPY 104.7 (Phase I) (As of May 1999)  TND 1 = JPY 88.91 (Phase II) (As of September 2002)	N.A. N.A. (N.A.) 9,030 million yen 7,604 million yen TND 1 = JPY 82.44 (Phase I) (Average between 2000 and 2010) TND 1 = JPY 81.95 (Phase II) (Average between 2003 and 2010)

Kingdom of Morocco

Ex-Post Evaluation of Japanese ODA Loan  
Water Supply Sector Development Project (II)

External Evaluator: Keishi Miyazaki, OPMAC Corporation

**0. Summary**

The objective of this project was to provide a stable water supply in Oujda, Taourirt and El Aioun in the Eastern Region, and in Safi in the Western Region of Morocco as well as to conserve ground water in the area surrounding Oujda by new construction and an extension of existing water supply facilities.

The project was highly relevant to Morocco's development plan and development needs, as well as to Japan's ODA policy, and therefore its relevance is high. The water served population, the average and maximum water supply volume and the average water supply volume per person were improved. The percentage of water serving the population was enhanced to more than 90% in the four target cities of the project. Also, the long hours of water outage in the summer season when demand for water was the highest in the year were substantially reduced after project implementation. Thus, the first project objective, that is, a stable water supply, was largely achieved. However, the second objective, that is, conservation of ground water in the area surrounding Oujda has not yet been achieved as the quantity of intake water from ground water in Oujda, Taourirt and El Aioun has not met the target even though there was a reduction in the utilization of ground water in the three cities after project implementation. Overall, however, the project positively contributed to the improvement of people's living conditions in the project target area. Thus, its effectiveness is fair.

Although the project cost was within the plan, the project period was longer than planned, and thus project efficiency is fair. Project sustainability is deemed high in the structural, technical and financial aspects, and the operation and maintenance condition of project facilities and equipment is good.

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

## 1. Project Description



Location of Project Site



Water Purification Plant in Oujda

### 1.1 Background

In 1996, the total annual rainfall in Morocco was 150 billion m<sup>3</sup>, of which 121 billion m<sup>3</sup> (equal to approximately 80% of the total annual rainfall) evaporated. Among the remaining 29 billion m<sup>3</sup> of annual rainfall, water available for utilization was limited to 21 billion m<sup>3</sup> (16 billion m<sup>3</sup> of surface water and 5 billion m<sup>3</sup> of ground water).

Oujda, a central city in the Eastern Region of Morocco and its neighboring cities of Taourirt and El Aioun, depended on groundwater for their water supply, hence a decrease in the ground water level caused by heavy exploitation of ground water had become a serious problem. In addition, there was an increase in water demand due to population growth. Therefore, the development of a water supply system based on new water sources was urgently needed.

Similarly, in Safi, one of the major industrial cities in the Western Region of Morocco, it was estimated that water supply shortages would occur in 1998 due to population growth, and thus an expansion of the existing water supply facilities was an urgent issue.

### 1.2 Project Outline

The objective of this project was to provide a stable water supply in Oujda, Taourirt and El Aioun in the Eastern Region and in Safi in the Western Region of Morocco as well as to conserve ground water in the area surrounding Oujda by new construction and an extension of existing water supply facilities, thereby contributing to the improvement of people's living conditions.



Loan Approved Amount/ Disbursed Amount	9,000 million yen / 7,588 million yen
Exchange of Notes Date/ Loan Agreement Signing Date	May 1997 / December 1997
Terms and Conditions	Interest Rate: 2.5% (for main component) Interest Rate: 2.1% (for consulting services) Repayment Period: 30 years (Grade Period: 10 years) Condition for Procurement: General Untied
Borrower / Executing Agency	Office National de l'Electricite et de l'Eau (ONEE) / ONEE (Moroccan government guarantee)
Final Disbursement Date	May 2009
Main Contractor (Over 1 billion yen)	Flowserve (France) - Vws Wabag France Sas (France)- Cegelec (Morocco) (JV)
Main Consultant (Over 100 million yen)	Scet-Scom S.A. a Directoire et a Conseil de Surveillance (Morocco) - Hidroprojecto (Portuguese) (JV)
Feasibility Studies, etc.	Feasibility study by ONEP in October 1996
Related Projects	Japanese ODA loan project "Water Supply Sector Development Project" (signing of L/A in 1995)

## 2. Outline of the Evaluation Study

### 2.1 External Evaluator

Keishi Miyazaki, OPMAC Corporation

### 2.2 Duration of Evaluation Study

Duration of the Study: October 2012 – October 2013

Duration of the Field Study: February 2-17, 2013, May 15-18, 2013

## 3. Result of the Evaluation (Overall Rating: B<sup>1</sup>)

### 3.1 Relevance (Rating: ③<sup>2</sup>)

#### 3.1.1 Relevance to the Development Plan of Morocco

##### Relevance to National Policies

At the time of the appraisal of this project in 1997, the Moroccan Government's "Five Year Economic and Social Development Plan (1993-1997)" was emphasizing an improvement of public health and people's living standards by an expansion of the rural water supply system.

At the time of the ex-post evaluation, the current 2013 Finance Bill<sup>3</sup> stated the necessity

<sup>1</sup> A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory.

<sup>2</sup> ③: High, ②: Fair, ①: Low.

<sup>3</sup> Following the completion of the Economic and Social Development Plan (2000-2004), no new five-year long-term development plan has been formulated in Morocco. For the immediate future, it has been decided that provisional development policies will be denoted through the Finance Bill/Finance Act of each year.

for improvement of water demand/supply management focusing on the rural drinking water supply, the conservation of ground water, and the recycling of sewerage and waste water.

#### Relevance to Sectoral Policies

At the time of the appraisal of this project in 1997, the Water Supply Sector Development Strategy (1995-2010) aimed at an improvement of the water served population ratio and the water supply service, particularly focusing on an improvement in the accessibility of drinking water for the poor and an improvement in people's living standards. For this end, the National Office for Drinking Water Supply (ONEP: Office National de l'Eau Potable)<sup>4</sup> at that time targeted its improvement of the water served population ratio from 76% in 1995 to 94% in 2010 in urban areas, and from 14% in 1995 to 80% in 2015 in rural areas.

At the time of the ex-post evaluation, the Action Plan of the National Office for Electricity and Drinking Water Supply (ONEE: Office National de l'Electricite et de l'Eau) (2012-2016) emphasized continuous efforts towards enhancement of the provision of drinking water in rural areas with a low accessibility to water, the upgrading of the existing water supply facilities, and the development of individual water pipe connections in rural communities.

#### 3.1.2 Relevance to the Development Needs of Morocco

At the time of the appraisal of this project in 1997, Oujda, a central city in the Eastern Region of Morocco and its neighboring cities of Taourirt and El Aioun depended on groundwater for their water supply. Whilst the allowable amount of ground water to be used in the three cities was 591 litre/second, 1,244 litre/second of ground water was used for water supply in 1996. The ground water level declined by 3 meters every year during 1994 and 1995, and the decrease of the ground water level became a serious problem. Therefore, it was required that the heavy dependence on ground water be reduced and a water supply system based on new water sources such as surface water be developed in order to meet a future water demand associated with population growth and urbanization.

Meanwhile, in Safi, which is one of the major industrial cities in the Western Region of Morocco, the water supply depended on both ground water and surface water. However, it was estimated that water supply shortages in Safi would occur in 1998 due to an expansion of water demand caused by population growth and an increase in the water served population ratio. Therefore, an expansion of the water supply facilities, including the existing water purification plant (capacity: 350 litre/second), was an urgent issue.

At the time of the ex-post evaluation, the water supply population ratio in the target four cities had improved: from 87.9% (1997) to 98% (2011) in Oujda, from 88.9% (1997) to 97% (2011) in Taourirt, from 68.2% (1997) to 96% (2011) in El Aioun, and from 78% (2004) to 90%

---

<sup>4</sup> Office National de l'Electricite et de l'Eau (ONEE) was established in 2012 by the merger of the Office National de l'Eau Potable (ONEP) and the Office National de l'Electricite (ONE).

(2012) in Safi. However, in some places in the target areas, temporary water outages and decreases in the water supply volume have been observed during the summer season when the water demand is at its highest. Since a steady increase in the water served population is expected in the target four cities following progress in industrialization and urbanization and continuing population growth in the target areas and the surrounding areas, it is still necessary to further develop and expand the water supply facilities in order to ensure a stable water supply in response to the current water served population ratio. Meanwhile, it is expected that water demand in Safi will exceed the current water supply capacity in 2017. In order to cope with this, a plan for the construction of a new water purification plant (capacity: 970 litre/second) near Safi has been implemented by ONEE.

### 3.1.3 Relevance to Japan's ODA Policy

At the time of the appraisal of this project, the Japanese Government's Country Assistance Policies for Morocco had the following five priority areas: (i) agricultural and fisheries development, (ii) water source development for agriculture and drinking water, (iii) basic infrastructural development for sustainable economic development, (iv) rural development for narrowing the gap between urban and rural areas, and (v) environmental protection for sustainable development. The objectives of this project are consistent with the second priority area.

This project has been highly relevant to Morocco's development plan and development needs, as well as to Japan's ODA policy. Therefore, its relevance is high.

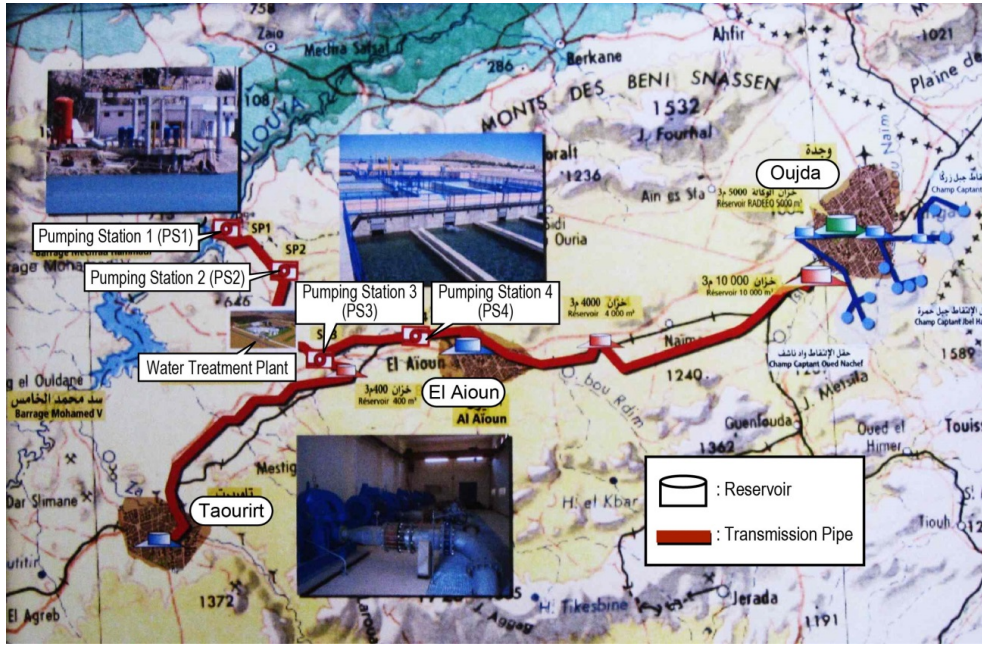
## 3.2 Effectiveness<sup>5</sup> (Rating:②)

### 3.2.1 Quantitative Effects (Operation and Effect Indicators)

This project consisted of two portions: (i) Oujda portion for water supply development in Oujda, Taourirt and El Aioun in the Eastern Region and (ii) Safi portion for water supply development in Safi in the Western Region. The main outputs of the Oujda portion were the new construction of a water purification plant (capacity: 1,050 litre/second), water intake facilities, water conveyance pipes, water pipes, pumping stations and reservoirs for water supply to the above three cities by utilizing water from the Mecraa Hamadi Dam. The main outputs of the Safi portion were the expansion of the existing water purification plant (expanded capacity: 190 litre/second) and the rehabilitation of the existing pumping stations (see the project site map in Figure 1 and Figure 2).

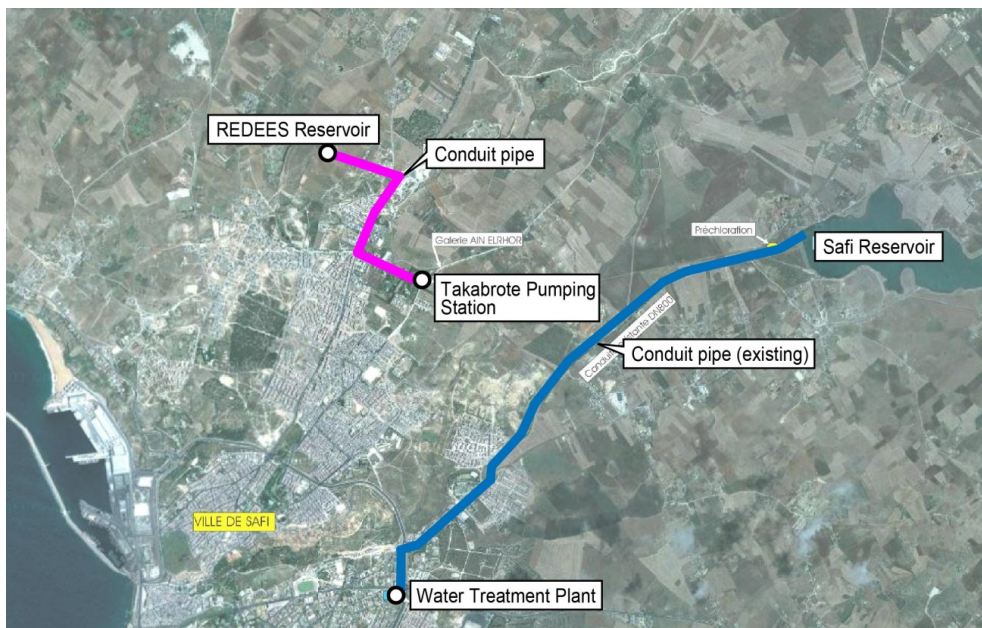
---

<sup>5</sup> Sub-rating for Effectiveness is to be put with consideration of Impact.



Source: ONEE

Figure 1: Project Site Map of Oujda Portion



Source: ONEE

Figure 2: Project Site Map of the Safi Portion

The key operation and effect indicators such as the water served population, the maximum and average water supply volumes and the average water supply volume per person in the target four cities, were greatly improved after project implementation (Table 1). In comparison with the situation before and after project implementation in 2007 and 2011, in Oujda, the water

served population increased 1.31 times, the maximum water supply volume increased 1.44 times, the average water supply volume increased 1.44 times, and the average water supply volume per person increased 1.23 times. In Taourirt, the water served population increased 1.71 times, the maximum water supply volume increased 1.78 times, the average water supply volume increased 1.64 times, and the average water supply volume per person increased 1.05 times. In El Aioun, the water served population increased 1.67 times, the maximum water supply volume increased 2.18 times, the average water supply volume increased 2.19 times, and the average water supply volume per person increased 1.85 times. In Safi, the water served population increased 1.13 times, the maximum water supply volume increased 1.15 times, the average water supply volume increased 1.80 times, and the average water supply volume per person increased 1.59 times. Similarly, the percentage of the water served population was largely improved in the target four cities. In Oujda, it was improved from 87.9% in 2007 to 98% in 2011. In Taourirt, it was improved from 88.9% in 1997 to 97% in 2011. In El Aioun, it was improved from 68.2% in 1997 to 96% in 2011. In Safi, it was improved from 78% in 2004 to 90% in 2012.

Table 1: Operation and Effect Indicators of the Target Four Cities

(i) Oujda

Indicator	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Water Served Population (person)	325,088	334,061	341,478	347,724	353,862	365,383	376,470	386,248	380,621	392,051	393,757	402,299	410,653	418,763	425,619
Maximum Water Supply Volume (m <sup>3</sup> /day)	63,274	73,280	79,006	77,047	75,953	77,817	81,590	89,100	88,301	86,314	87,696	93,053	91,930	93,139	91,152
Average Water Supply Volume (m <sup>3</sup> /day)	48,672	56,370	60,774	59,267	58,425	59,859	62,762	68,538	67,910	66,442	67,478	71,539	70,762	71,626	70,157
Average Water Supply Volume per Person (litre/person/day)	131.6	150.7	160.6	154.8	150.9	152.8	158.4	171.0	167.5	162.0	162.7	170.5	166.7	166.8	161.6
Percentage of Water Served Population (%)	87.9	89.3	90.2	90.8	91.4	93.3	95.0	96.4	93.9	95.6	94.9	95.9	96.8	97.5	98.0
Water Loss (%)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	14.40	6.60	8.90	19.80	16.30

Source: ONEE

Note: Water loss represents water leakage rate in the water piles under the control of ONEE.

(ii) Taourirt

Indicator	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Water Served Population (person)	56,786	59,766	62,868	64,603	66,468	68,991	71,597	74,832	78,614	79,268	82,961	85,659	89,153	93,547	97,292
Maximum Water Supply Volume (m <sup>3</sup> /day)	8,200	9,412	9,879	10,184	11,558	11,053	11,148	11,884	11,232	12,182	12,442	14,170	13,306	14,723	14,584
Average Water Supply Volume (m <sup>3</sup> /day)	6,308	7,240	7,599	7,833	8,891	8,502	8,575	9,141	8,640	9,331	9,590	10,886	10,195	10,195	10,358
Average Water Supply Volume per Person (litre/person/day)	98.8	109.8	111.6	111.4	122.4	113.3	110.7	114.2	104.9	109.3	108.8	119.6	108.4	105.0	103.3
Percentage of Water Served Population (%)	88.9	90.6	92.3	91.9	91.5	92.0	92.4	93.5	95.1	92.9	94.1	94.1	94.8	96.3	97.0
Water Loss (%)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	3.8	4.2	4.8	5.0	8.9	6.1	10.9	12.4

Source: ONEE

Note: Water loss represents water leakage rate in the water piles under the control of ONEE.

(iii) El Aioun

Indicator	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Water Served Population (person)	21,785	22,539	23,717	24,406	25,982	27,022	27,842	29,048	30,359	28,622	29,316	31,907	34,764	35,439	36,339
Maximum Water Supply Volume (m <sup>3</sup> /day)	2,189	2,313	2,474	2,508	2,668	2,611	2,698	3,150	3,629	4,061	4,061	4,234	4,838	4,859	4,780
Average Water Supply Volume (m <sup>3</sup> /day)	1,684	1,779	1,903	1,929	2,052	2,008	2,075	2,423	2,765	3,197	3,110	3,283	3,715	3,974	3,688
Average Water Supply Volume per Person (litre/person/day)	52.7	55.1	58.2	58.2	61.2	59.2	60.4	69.7	78.3	89.7	86.3	90.0	111.6	106.3	97.4
Percentage of Water Served Population (%)	68.2	69.7	72.5	73.7	77.5	79.6	81.1	83.6	86.3	80.3	81.3	87.4	94.1	94.8	96.0
Water Loss (%)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	2.1	2.0	2.0	2.5	2.8	3.4	6.2	8.3

Source: ONEE

Note: Water loss represents water leakage rate in the water piles under the control of ONEE.

(iv) Safi

Indicator	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Water Served Population (person)	268,621	270,770	272,936	275,120	277,321	279,539	281,776	284,750	286,302	288,592	290,901	293,228	295,574	297,939	300,322	302,725
Maximum Water Supply Volume (m <sup>3</sup> /day)	40,433	36,240	36,449	33,790	36,185	44,290	47,815	46,023	42,580	39,134	42,100	36,069	43,065	45,332	41,354	46,596
Average Water Supply Volume (m <sup>3</sup> /day)	18,344	27,553	24,394	25,222	29,608	27,535	28,061	29,642	29,482	30,297	29,513	28,740	29,385	30,228	29,217	32,946
Average Water Supply Volume per Person (litre/person/day)	68.3	101.8	89.4	91.7	106.8	98.5	99.6	104.1	103.0	105.0	101.5	98.0	99.4	101.5	97.3	108.8
Percentage of Water Served Population (%)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	78.0	79.0	80.0	82.0	83.0	85.0	86.0	N.A.	90.0
Water Loss (%)	Nearly 0															

Source: ONEE

Note 1: Water loss represents water leakage rate in the water piles under the control of ONEE.

Note 2: The total water supply capacity of Safi city is 640 litre/second which consists of 540 litre/second of Safi Water Purification Plant and 100 litre/second of Takabroute Pumping Station.

Although water loss in the water pipes under the control of the executing agency was nearly zero in 2011 in Safi, it was relatively high in the other three cities: 16.3% in Oujda, 12.4% in Taourirt, and 8.3% in El Aioun. It is assumed that the water loss in the eastern three cities was higher than that in Safi because the total length of water pipes in the three cities is longer than that in Safi. Meanwhile, the volume of stored water at the dam and reservoir supplied to the water purification plants in Oujda and Safi has been stable throughout the year so far and the availability of water at water sources has not had a negative effect on the project effects.

The water purification plant in Oujda (capacity: 1,050 litre/second) has operated since 2007. Its facility utilization rate was 37.3% in 2001 and the plant still has available capacity. The water purification plant in Safi had its capacity extended from 350 litre/second to 540 litre/second through the provision of an additional capacity of 190 litre/second by the project. The additional part of the water purification plant started its operation in 2002. Its facility utilization rate was 64.7% in 2012, which was in the appropriate range (Table 2).

The reason why the facility utilization rate of the Oujda water treatment plant remains less than 40% is that the quantity of the water intake from the dam has been restricted due to water

leakage in the 8 km section of water conveyance pipe between the second and third pumping stations. Maintenance work on the damaged section was conducted by the executing agency and work was completed in April 2013 (see “3.4.1 Project outputs”).

Table 2: Facility Utilization Rate of Water Purification Plants in Oujda and Safi

Indicator	Unit: %															
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Oujda WPP (Capacity: 1,050 litre/second)	—	—	—	—	—	—	—	—	—	—	32.89	25.39	27.40	33.33	37.30	N.A.
Safi WPP (Capacity: 540 litre/second)	60.70	70.50	67.10	53.40	51.90	47.40	47.40	51.20	51.10	52.00	52.00	50.60	53.80	59.30	54.40	64.70

Source: ONEE

Note: Facility Utilization Rate of Safi WPP from 1997 to 2001 indicates that of the existing WPP (Capacity: 350 litre/second).

### 3.2.2 Qualitative Effects

#### (1) Stable Water Supply

As referred to the above, the percentage of the water served population improved to more than 90% in the target four cities. Furthermore, the water served population, the maximum water supply volume, the average water supply volume, and the average water supply volume per person in the target four cities all improved greatly after project implementation. Before project implementation, there were serious water shortages during peak hours of the day and in the summer season when the water demand was at its highest. However, this situation substantially improved after project implementation. According to RADEEO<sup>6</sup>, a public corporation for water and electricity supply in Oujda, there were water outages on average 10 hours a day during the summer season before project implementation. These outages often caused turbid water as water stayed in the water piles for long hours without flowing. However, these problems were mostly solved after project implementation.

In addition, this project constructed rural water supply facilities with public water taps in 134 communities with an approximate population of 21,000 near Oujda as a part of an additional project scope. Therefore, the project contributed to the improvement in the accessibility of drinking water for rural residents near Oujda in addition to the target four cities.

Thus, it is considered that the project realized a stable water supply in the target four cities.

#### (2) Conservation of Ground Water in the area surrounding Oujda

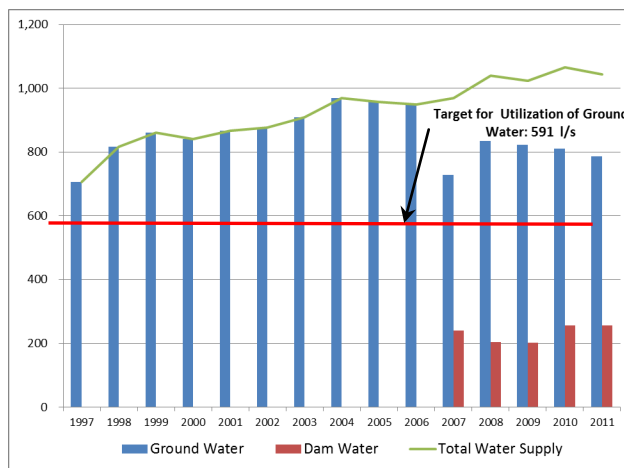
Another objective of this project was to conserve ground water in the area surrounding Oujda by the new construction of water supply facilities that utilize surface water (dam water). Initially, the project assumed that the volume of water supply utilizing ground water would be restricted to 591 litre/second and that the remaining water supply would be substituted by dam water after project implementation. After completion of the Oujda water purification plant in

<sup>6</sup> La Régie Autonome Intercommunale de Distribution d’Eau et d’Electricité d’Oujda.

2007, the volume of ground water that can be utilized for water supply has declined. However, it was 787 litre/second in 2011, which still fell short of the target figure of 591 litre/second (Figure 3).

The main reason for this was that the volume of intake water from the dam was restricted due to the problem in part of the water conveyance pipe (the 8 km section between the second and third pumping stations), as already explained.

The policy on the conservation of ground water has been firmly maintained in Morocco, and the executing agency plans to take the measures necessary for the conservation of ground water in the future, in collaboration with the concerned agencies such as RADEEO, the Agency of the Hydraulic Basin, the Ministry of Energy, Mining, Water and Environment which controls the dams.



Source: ONEE

Note: The above mentioned water supply volume is the sum of water supply volume of Oujda, Taourirt and El Aioun.

Figure 3: Utilization of Ground Water in Oujda, Taourirt and El Aioun

### 3.3 Impact

#### 3.3.1 Intended Impacts

##### Results of the Beneficiary Survey

This ex-post evaluation conducted a semi-structured interview survey<sup>7</sup> concerning the impact of this project with 124 households in the target four cities as well as in rural communities near Oujda<sup>8</sup>.

##### (1) Improvement in People's Living Conditions

The initial target beneficiaries of this project were the residents of Oujda, Taourirt, El Aioun and Safi. Since the residents of the four cities were already provided with water supply services with individual water pipe connections, even before project implementation, there was no change in the type of water supply services before and after project implementation.

<sup>7</sup> The breakdown of interviewed 124 households are: 28 households in Oujda, 10 households in the rural communities near Oujda, 31 households in Taourirt, 26 households in El Aioun, and 29 households in Safi. The above interviewed households were randomly selected at each city and locality.

<sup>8</sup> The rural communities near Oujda were provided the rural water supply facilities by the project as an additional project scope.



Therefore, there was no impact observed on the reduction of water drawing labor in the four cities. However, in rural communities near Oujda, a positive impact on the reduction of water drawing labor was recognized by local residents. In these rural communities, rural water supply facilities with public water taps were provided by the project additionally, and thus the accessibility of drinking water improved in these areas. Regarding the impact of improvements in hygiene and health conditions, 40% of respondents (50 households) recognized that this impact had taken place. In particular, households in the rural communities near Oujda were highly aware of this impact and they began to take baths more frequently after public water taps were provided nearby. Regarding the impact of improvement in convenience of living, 52% of respondents (64 households) recognized this.

### (2) Evaluation of Water Supply Services

Regarding the supplied water volume, 78% of respondents (97 households) answered that there was “no problem at all”. Similarly, those who answered that there was “no problem at all” were: 77% of respondents (95 households) regarding water pressure, 76% of respondents (94 households) regarding water supply service time, and 64% of respondents (79 households) regarding maintenance of water supply facilities. On the other hand, 52% of respondents (64 households) replied that the taste of water was either “bad” or “bad to some extent”. Most of these answers referred to a salty taste. These answers came mainly from the eastern three cities<sup>9</sup>.

Meanwhile, 58% of respondents (72 households) replied the water outages took place during the summer season when the water demand peaked, and 75% of respondents (92 households) answered that the water charge was high. As already mentioned, the problem of long water outages during peak demand times was substantially improved. However, it was observed that some of the target areas still have the problem of water outages at present<sup>10</sup>.

### (3) Satisfaction with the Project

Regarding the satisfaction of beneficiaries with the project, 77% of respondents (96 households) answered that they were “satisfied”. The main comments and requests from the respondents were: (i) improvements in water outages in the summer season, (ii) reduction of the water charge, (iii) improvements in the taste of water. However, it should be noted that the

---

<sup>9</sup> According to the executing agency Orient Regional Direction in Oujda, water quality tests of tap water are conducted on three levels, by the executing agency, the municipal health department, and the Ministry of Health. The water quality of tap water in Taourirt and El Aioun met Moroccan water quality standards. Meanwhile, it was suggested that tap water had been supplied by mixing purified water taken from the dam and ground water, and that tap water in Taourirt contained little more sulfur than the others (although the amount of sulfur was within Moroccan water quality standards). In this regard, the executing agency has been making an effort to promote understanding about water on the part of local authorities and people through sensitization and educational activities. These target local people and schools as well being linked to the results of water quality tests.

<sup>10</sup> While respondents referred to water shortages in the summer season, the executing agency recognized that the current capacity of water supply could fully meet peak water demand in the summer season. However, the executing agency said that a temporary water outages occurred during the civil works.

results of the beneficiary survey were based on the perception of the respondents on the water supply services as a whole. This included water production and transmission services which were a target of this project, as well as water distribution services which were not a target of this project, and which were under the management of water and electricity supply public corporations in Oujda and Safi such as RADEEO and RADEES<sup>11</sup>.

### 3.3.2 Other Impacts

#### (1) Impacts on the Natural Environment

##### a) Water Quality

The water purification plants in Oujda and Safi conduct water quality sampling tests (chemical and biological tests) twice a day in their water quality examination laboratory. Table 3 below shows the water quality data of each of the plants in 2012. The parameters satisfy the national water quality standards of Morocco.

Table 3: Water Quality Data from the Water Purification Plants in Oujda and Safi (2012)

Parameters	Unit	Oujda WPP		Safi WPP		Moroccan Norms	
		Minimum	Maximum	Minimum	Maximum	Recommended Maximum Value	Acceptable Maximum Value
Temperature	°C	10.0	39.5	11.6	28.0	-	-
Turbidity	NTU	0.30	0.51	0.06	0.60	5.0	1.0
pH	pH	7.34	7.70	7.01	7.54	6.5~8.5	9.2
Conductivity	µs/cm	1,020	1,490	938	1,159	1,300	2,700
Aluminum	mg/L	0.1	0.1	0.00	0.15	-	0.2
Ammonium	mg/L	0.02	0.03	0.00	0.013	-	0.5
Chloride	mg/L	112	220	205.9	255.6	300	750
Nitrite	mg/L	0	0	0.00	0.0057	-	0.5
Hardness	mg/L	9.80	11.0	21.2	27.0	30.0	-
Iron	mg/L	0.08	0.08	0.00	0.00	-	0.3
Manganese	mg/L	0.00	0.00	0.00	0.00	-	0.5

Source: ONEE

Note: NTU: Nephelometric Turbidity Unit.

##### b) Sludge

The sludge produced by the Oujda water purification plant is kept in the compound of the plant according to the guidelines. Since intake water from the dam is not polluted, the sludge does not contain any harmful substance. The Safi water purification plant has not conducted any treatment of sludge as very little sludge is produced by the plant. The intake water from Safi reservoir contains very little mud and sand. Currently, a plan for the recycling of sludge is being prepared by the executing agency.

<sup>11</sup> La Régie Autonome Intercommunale de Distribution d'Eau et d'Electricité de Safi.

### c) Results of the Beneficiary Survey on Environmental Impacts

According to the results of the beneficiary survey, 72% of respondents (90 households) answered “No, not at all” or “No, not so much”, regarding negative environmental impacts associated with the implementation of the project. At the same time, 16% of respondents (19 households) replied “Yes, very much” or “Yes, to some extent”. These respondents gave “corrosion of water pipes”, “water leakage” and “pipe explosions” as examples of negative environmental impacts. However, these problems were mostly associated with the water distribution network, and the direct causal relationship between the problems and this project is uncertain. Meanwhile, 42% of respondents who recognized negative environmental impacts of the project also answered that the necessary counter-measures such as repair of damaged water pipes had been taken by the local authorities.

### d) Environmental Monitoring System of ONEE (Water Branch)

During project implementation, environmental monitoring of the area surrounding the project was conducted by the executing agency, ONEE (Water Branch). So far, no negative environmental impacts near the project site have been observed. Since project completion, the Water Quality Control Direction of the head office in Rabat and the Water Quality Examination Laboratories of the Oujda and Safi water purification plants have been responsible for environmental monitoring focusing on water quality management. For the rural water supply facilities in the 134 communities near Oujda which were constructed as an additional project scope, the executing agency did not conduct an Environmental Impact Assessment (EIA) as the size of the project was small.

## (2) Land Acquisition and Resettlement

Initially it was planned that 1,510,000 m<sup>2</sup> of land would be acquired (1,500,000 m<sup>2</sup> in Oujda, Taourirt and El Aioun, and 10,000 m<sup>2</sup> in Safi) for the construction of pumping stations and water purification plants, etc. However, 1,796,707 m<sup>2</sup> of land (1,792,558 m<sup>2</sup> in Oujda, Taourirt and El Aioun, and 4,149 m<sup>2</sup> in Safi) were actually acquired by the project (Table 4). The reason for this increase in area in the eastern three cities was that the project needed the additional land for the construction of the rural water facilities in the 134 communities near Oujda. In Safi, the project initially anticipated that 3,000 m<sup>2</sup> of land would need to be acquired for the expansion of the water purification plant. However, this 3,000 m<sup>2</sup> of land became unnecessary as the new water purification plant was constructed in the same compound as the existing plant. In addition, the cancellation of some project components was another reason for the decrease in the area of acquired land. As a result of all this, the actual area of acquired land in Safi decreased by half. The land acquisition process met the requirements of Moroccan law and regulations. There was no resettlement of people associated with the project.

Table 4: Planned and Actual Land Acquisition

	Plan	Actual
Oujda, Taourirt, El Aioun	1,500,000	1,792,558
Safi	10,000	4,149
Total	1,510,000	1,796,707

Unit: m<sup>2</sup>

Source: ONEE

### (3) Other Impacts

The increase in water volume and the reduction in water outages through the project contributed to a stabilization of water pressure in the water pipes. This led to improvements in water loss and a decrease in the frequency of maintenance for the water distribution system, which eventually improved the efficiency of the water distribution network. Also, the water distribution companies were able to postpone investment plans as the durability of the existing water distribution pipes improved and their product life increased.

In sum, the key operation and effect indicators such as the water served population, the maximum and average water supply volume, and the average water supply volume per person in the target four cities were greatly improved after project implementation. The facility utilization rate of the Oujda water purification plant still has capacity available, and that of the Safi water purification plant was in the appropriate range. Water outages during peak demand were greatly reduced, and a stable water supply was maintained in the target four cities. Meanwhile, the degree of dependency on ground water in Oujda, Taourirt, and El Aioun did not decrease as planned since the utilization of dam water for the water supply did not increase as anticipated. This was due to the problem of the water pipe between Mecraa Hamadi Dam and the Oujda water purification plant. Therefore, the project effect of the conservation of ground water has not materialized so far. However, the project made a positive contribution to improvements in peoples' living conditions in the project target area through improvements in hygiene and health conditions and convenience. No negative impact on the natural environment was observed and no resettlement of people was associated with the project. Thus, the effectiveness with impact of the project is evaluated as moderate.

## 3.4 Efficiency (Rating: ②)

### 3.4.1 Project Outputs

#### (1) Oujda Portion

The planned project outputs of the Oujda Portion were the construction of a water intake facility, water conveyance pipes (3 km), four pumping stations, water piles (124.5 km), a water purification plant (capacity: 1,050 litre/second) and reservoirs (3 units). These were mostly implemented as planned. Also, small-scale rural water supply facilities with public water taps

were constructed as an additional project scope.

There was a problem of water leakage in the 8 km section of the water conveyance pipe between the second and the third pumping stations. The maintenance work for the damaged section was conducted by the executing agency and the work was completed in April 2013<sup>12</sup>.

#### Photographs: Oujda Portion



Mecraa Hamadi Dam



Water Intake Facility



Oujda Water Purification Plant



Pumping Station No. 2



Reservoir



Public Water Tap in Rural Village

#### (2) Safi Portion

The planned project outputs of the Safi Portion were the expansion of the existing water purification plant (additional capacity: 190 litre/second), the rehabilitation of two pumping stations (Takabrote and Ain Thami pumping stations), and the construction of water conveyance pipes (1.9 km). These were implemented as planned except for the rehabilitation of Ain Thami pumping station as this was cancelled. The reason for this cancellation was that there was a problem with the water quality of the deep well at Ain Thami pumping station. The well was closed in 2001, and therefore rehabilitation of the Ain Thami pumping station was no longer necessary. Also, 4.4 km of water conveyance pipes from Takabrote pumping station to the Safi water purification plant was constructed as an additional project scope.

---

<sup>12</sup> The investigation by the executing agency pointed out that damage to the water conveyance pipe was caused by defects of the contractor as cracks in the pipe were made by mixing chloride with concrete. However, the contractor challenged this and the liability issue is pending in court. The aforementioned contractor also provided a service for the other contract package of this project. They utilized the same type of water conveyance pipes which were produced at same period of time as the damaged pipes for other locations. However, no problems occurred in the other package.

### Photographs: Safi Portion



Safi Water Purification Plant



Water Quality Examination Laboratory



Takabrote Pumping Station

### 3.4.2 Project Inputs

#### 3.4.2.1 Project Cost

The actual project cost was 10,693 million yen against 11,999 million yen planned cost; 89% of the planned cost (Table 5). Even including the additional scope of the rural water supply facilities in 134 communities near Oujda, the actual project cost was within the planned cost.

Table 5: Planned and Actual Project Cost

	Plan			Actual		
	FC (Mil. JPY)	LC (1,000 MAD)	Total (Mil. JPY)	FC (Mil. JPY)	LC (1,000 MAD)	Total (Mil. JPY)
1. Construction	3,704	391,400	8,635	984	767,314	10,181
a) Oujda Portion	3,334	366,200	7,948	916	735,978	9,737
b) Safi Portion	370	25,200	687	68	31,336	444
2. Contingency	370	39,100	864	0	0	0
3. Consulting Services	109	10,800	245	106	13,314	266
4. Land Acquisition	0	35,700	450	0	0	0
5. Tax and Duties	0	134,200	1,805	0	20,534	246
Total	4,183	620,300	11,999	1,090	801,162	10,693

Source: JICA appraisal documents and answer to the questionnaire to ONEE.

Note 1: FC: Foreign Currency, LC: Local Currency.

Note 2: Exchange rate used: (Plan) MAD 1 = JPY 12.60 (as of December 1996), (Actual) MAD 1 = JPY 11.99 (average between 1997 and 2011).

#### 3.4.2.2 Project Period

The actual project period was 171 months from December 1997 (signing of the loan agreement) to February 2012 (project completion) against 39 months from February 1997 to April 2000. This was significantly longer than planned, at 438% of the planned project period (Table 6). For reference, the actual project period, excluding the period of the additional scope, was 154 months from December 1997 and September 2010; 395% of planned period. This was 60 months longer than the planned period.

Table 6: Planned and Actual Project Period

	Plan	Actual
1. Signing of Loan Agreement	February 1997	December 1997
2. Oujda Portion	February 1997 – April 2000 (39 months)	June 2002 – September 2010 (99 months)
3. Safi Portion	October 1997 – August 1999 (23 months)	January 2000 – November 2002 (35 months)
4. Additional Scope (Rural Water Supply System in area surrounding Oujda)	–	December 2006 – February 2012 (63 months)
5. Project Completion	April 2000	February 2012

Source: JICA appraisal documents and answers to the questionnaire to ONEE.

The overall delay of the project period was mainly caused by the delay in the Oujda Portion and the additional scope whose reasons are mentioned below. Due to this delay, the expiry date of loan agreement was finally extended to May 20, 2009 after extension procedures were made twice, in 2003 and 2007.

- (1) Delay in signing of the Contract Program<sup>13</sup> between the Moroccan government and the executing agency

At the time of the appraisal in 1997, a new investment program (2000-2004) was under preparation, in which the water supply project in Oujda (Oujda Portion) was included as one large-scale investment project. However, a discussion of the new investment program took a long time, how to modify the water charge system to maintain the financial self-sufficiency of the executing agency being a particular issue. As a result, the schedule for the signing of the Contract Program between the Moroccan government and the executing agency was delayed from 1997 to May 2005.

- (2) Delay in the Special Agreement between RADEEO and the executing agency

Price negotiations for the water charge and administration procedures between RADEEO and the executing agency took a long time. As a result, the special agreement was signed in November 2000.

- (3) Delay in implementation of the Oujda Portion

Due to the delay in signing of the Contract Program and the special agreement mentioned above, the commencement of the Oujda Portion was delayed. This also caused delays in the activities and procedures that followed such as detailed design, the preparation of tender

<sup>13</sup> The Contract Program is an agreement between the executing agency and the Moroccan government on the sharing of responsibility regarding the investment program of the executing agency. For example, the government guarantees rises in the water charge to the executing agency in order to maintain the financial capacity of the executing agency if the latter implements new investments. In other words, without the Contract Program, the executing agency cannot implement the investment program.

documents, the employment of consultants, and so on. In addition, modification of the procurement package and terms of reference also caused a delay in the closing date of tender several times.

(4) Delay due to additional project scope

Initially, the construction period for the rural water supply facilities in the 134 communities near Oujda was estimated at 3 years from 2006 to 2009. However, in fact, it was 5 years until completion in 2012.

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

#### Financial Internal Rate of Return (FIRR)

The FIRR at the appraisal was 5.9% for the Oujda Portion and 13.9% for the Safi Portion. The results of the recalculation of FIRR at the ex-post evaluation were negative for the Oujda Portion and 8.9% for the Safi Portion. The reason for the negative FIRR for the Oujda Portion was that the operation and maintenance cost was higher than the water sales revenue<sup>14</sup>. The FIRR calculation at the appraisal was based on the precondition below:

<Precondition of FIRR calculation at appraisal>

- Cost: Project cost, tax and duties, and operation and maintenance cost
- Benefit: Water sales revenue
- Project life: 40 years after project completion

Although project cost was within the plan, the project period was significantly longer. Therefore the efficiency of the project is fair.

## 3.5 Sustainability (Rating: ③)

### 3.5.1 Institutional Aspects of Operation and Maintenance

The operation and maintenance (O&M) agency of this project was the National Office for Electricity and Drinking Water Supply (ONEE: Office National de l'Electricite et de l'Eau). The ONEE was established in April 2012 by the merger of the National Office for Drinking Water Supply (ONEP: Office National de l'Eau Potable) and the National Office for Electricity Supply (ONE: Office National de l'Electricite). ONEE (Water Branch) (former ONEP) and ONEE (Electricity Branch) (former ONE) were put in charge of the O&M of the water supply business and the electricity supply business respectively.

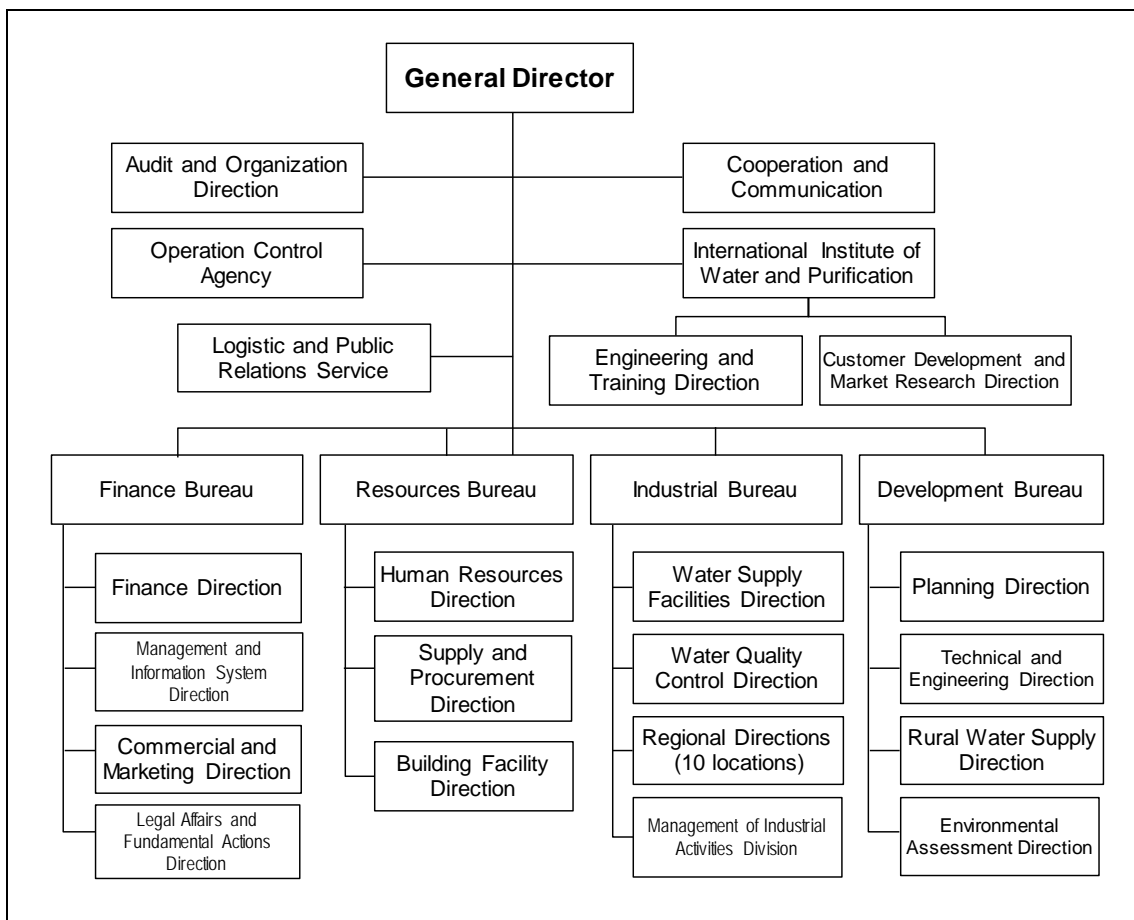
The ONEE (Water Branch) is in charge of the O&M for water purification and the water transmission system (water production and transmission part) in Morocco as well as the water

---

<sup>14</sup> The revenue from water sales refers to the revenue from the wholesale of water to RADEEO and RADEES.



supply system, including water distribution, in small and medium cities in the county. The ONEE (Water Branch) consists of headquarters in Rabat and 10 regional directions (regional offices) nationwide. The total number of employees was 7,512, as of December 2011. The project facilities in Oujda, Taourirt and El Aioun are under the management of the Orient Regional Direction in Oujda (682 employees), while the project facilities in Safi are under the management of the Safi-Youssoufia Joint Office (94 employees) under the Tensift-Marrakech Regional Direction. The organization chart of ONEE (Water Branch) is shown in Figure 4 below.



Source: ONEE

Figure 4: Organization Chart of ONEE (Water Branch)

Principally, there is a demarcation in the drinking water supply services in urban cities in Morocco. In Oujda and Safi, the water production and transmission services, including water intake, water purification, and water transmission to reservoirs are undertaken by ONEE (Water Branch). Meanwhile, the water distribution services from reservoirs to households/water consumers are handled by RADEEO (Oujda) and RADEES (Safi). As far as Taourirt, El Aioun and the 134 communities near Oujda are concerned, ONEE (Water Branch) is responsible for

the entire water supply service from water production to water distribution to end users, including the collection of water charges. The O&M of the Mecraa Hamadi Dam and the Safi reservoir, which were the main water sources for this project, are under the management of the Agency of the Hydraulic Basin, Ministry of Energy, Mining, Water and Environment.

RADEEO is responsible for the O&M of the water distribution services in the city of Oujda as a whole, with a total water pipe length of 1,310 km. The total number of employees in RADEEO is approximately 260 and there are approximately 110,000 water subscribers in their service area. Since 2003, RADEEO has actively expanded its service area to cover the area surrounding the city through continuous annual investments in extension and renewal of the water distribution network.

RADEES is responsible for the O&M of the water distribution services in the city of Safi as a whole, with a total water pipe length of 465 km. The total number of employees in RADEES is approximately 340 and there are approximately 57,000 water subscribers in their service area. RADEES has also continuously invested in the extension of water pipes, and new construction and the upgrading of pumping stations and reservoirs. Recently, RADEES has constructed a new reservoir with 5,000 m<sup>3</sup> of storage capacity, and there are further plans to construct another new reservoir with 3,000 m<sup>3</sup> of storage capacity.

### 3.5.2 Technical Aspects of Operation and Maintenance

The current technical staff of the Orient Regional Direction in Oujda includes six engineers, six technicians, four workers, and another ten staff. At the Safi-Youssoufia Joint Office, one electrical engineer, two technicians, and other five staff are allocated as technical staff. Some O&M works are outsourced when this is necessary due to a shortage of staff. The periodic maintenance works are conducted daily, weekly, monthly and quarterly, according to the annual maintenance plan, and they are practiced based on the maintenance manual.

The ONEE (Water Branch) has promoted training for the improvement of the technical capacity of staff. In 2011, ONEE (Water Branch) organized a total of 21,475 days of training sessions with 5,103 participants. Each Regional Direction (Regional Office) conducts technical training for their staff according to the local annual training program. In addition, ONEE (Water Branch) have been actively involved in a technical training program for water supply engineers from African and Middle Eastern countries such as Burkina Faso, Guinea, Mauritania, Rwanda, and Saudi Arabia. This is a part of south- south cooperation in collaboration with foreign donors.

### 3.5.3 Financial Aspects of Operation and Maintenance<sup>15</sup>

The O&M budgets of the Orient Regional Direction in Oujda and the Tensift- Marrakech Regional Direction have increased year by year (Table 7).

Table 7: Operation and Maintenance Budget of Regional Directorates

Unit: 1,000 Dirham

	2009		2010		2011		2012	
	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual
Oujda, Orient Regional Direction (DR6)	152,634	171,178	170,176	168,218	188,252	196,244	217,415	202,783
Tensift-Marrakesh Regional Direction (DR2)	110,875	138,189	139,703	141,807	140,400	159,220	179,799	147,336

Source: ONEE

According to each regional direction, the necessary O&M budget is allocated every year, and when any additional expense is needed, a special budget is provided on an ad-hoc basis. No problem has been observed in the procurement of spare parts. It is recognized that the O&M budget for the project facilities is appropriately ensured. There are no concerns regarding the O&M budget.

ONEE (Water Branch) is a financially self-sufficient public entity. On the one hand, the water supply business is an infrastructure-intensive business that requires continual investment and renewal of facilities. On the other hand, the water charge is determined with the approval of the government in consideration of profitability and openness to the public<sup>16</sup>. For this reason, the profitability of ONEE (Water Branch) is not high when compared to other sectors. For example, the return on total assets was 0.3-0.5%, the return on sales was 2.1-3.2%, and the total assets turnover was 14-16 during 2009 and 2011. However, the sales and operation revenue has steadily increased every year. At the same time, the expenditure has increased due to increases in energy and employment costs<sup>17</sup>.

The equity to asset ratio was 49-56% in the last three years from 2009 to 2011, maintaining a relatively high level. The current ratio is 108-124%, also maintaining a high level. Therefore, there are no concerns regarding short-term financial security and short-term solvency. The day sales outstanding were around 130 days in the last three years. ONEE (Water Branch) is

<sup>15</sup> ONEE adopted a consolidated account after the merger of ONEP and ONE in April 2012. However, at the time of the ex-post evaluation, the financial statement of ONEE for the fiscal year of 2012, based on the consolidated account, had not yet been formally approved by the board of directors. Therefore, the analysis on the financial capacity of the executing agency was made based on the financial statement of ONEP for the fiscal year of 2011, before the merger.

<sup>16</sup> The ONEE adopted a nationwide unified water charge system, which has not been revised since March 2006. Currently, ONEE is preparing a new investment program which will include a rise in the water charge.

<sup>17</sup> While operation revenue from the water supply business in urban areas is in the black, that of the water supply business in rural areas has a chronic deficit due to low profitability. Overall, however, the operation revenue of ONEE has remained in the black.

expected to maintain and further improve the current level of the day sales outstanding in the future.

Debt, including foreign debt, meanwhile, has been increasing and has reached 17 billion dirham (equivalent to approximately 201.5 billion yen) including 8.7 billion dirham of foreign debt (equivalent to approximately 103.1 billion yen). Financial expenses for the repayment of interests and principals of loans have also been increasing year by year. As the Moroccan dirham was devalued against foreign currencies after 2009, the particular burden of interest payment for Japanese yen and Euro dominated loans grew considerably. This affected the increase in financial expenses in 2010 and 2011: they increased by 1.7 times and 2 times respectively in comparison with 2009. Meanwhile, the debt ratio, which represents the percentage of debt among total assets, had been kept under 50% in the last three years from 2010 to 2012. ONEE (Water Branch) continues to make efforts towards appropriate debt management (Table 8).

Table 8: Financial Data of ONEE (Water Branch)

<b>Profit and Loss</b>				<b>Key Financial Indicators</b>			
Unit: 1,000 Dirham							
<b>Item</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>Item</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>
Sales	4,074,673	4,340,172	4,664,580	Return on total assets (%)	0.5	0.5	0.3
Operation expenditure	3,494,606	3,570,119	3,885,231	Return on sales (%)	3.0	3.2	2.1
Operation revenue	580,067	770,053	779,349	Total assets turnover	16	15	14
Financial expenditure	709,554	1,230,780	1,479,269	Current ratio (%)	124	108	113
Gross profit on sales	391,960	-7,301	168,562	Equity to assets ratio (%)	56	52	49
Special income	-167,233	234,947	34,698	Days sales outstanding (days)	130	127	132
Net profit/loss before tax	224,727	227,646	203,260				
				<b>Item</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>
				Debt ratio (%)	45	47	48

Sour: ONEE

As explained above, although attention should be paid to the future trend of financial expenses, generally there are no concerns regarding the financial aspects of ONEE (Water Branch).

### 3.5.4 Current Status of Operation and Maintenance

In general, the project facilities have been utilized and maintained without problems. During the field survey by the ex-post evaluation team, visits were made to the project facilities in Oujda and Safi including water purification plants, pumping stations, reservoirs, and so on. It was confirmed that they were operated well and kept in a good condition. Regarding the damaged 8 km section of the water conveyance pipe in Oujda, ONEE (Water Branch) had already taken necessary measures by replacing the pipe.

No major problems have been observed in the operation and maintenance system. Therefore, sustainability of the project is high.

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

### **4.1 Conclusion**

The objective of this project was to provide a stable water supply in Oujda, Taourirt and El Aioun in the Eastern Region, and in Safi in the Western Region of Morocco as well as to conserve ground water in the area surrounding Oujda by new construction and an extension of existing water supply facilities.

The project was highly relevant to Morocco's development plan and development needs, as well as to Japan's ODA policy, and therefore its relevance is high. The water served population, the average and maximum water supply volume and the average water supply volume per person were improved. The percentage of water serving the population was enhanced to more than 90% in the four target cities of the project. Also, the long hours of water outage in the summer season when demand for water was the highest in the year were substantially reduced after project implementation. Thus, the first project objective, that is, a stable water supply, was largely achieved. However, the second objective, that is, conservation of ground water in the area surrounding Oujda has not yet been achieved as the quantity of intake water from ground water in Oujda, Taourirt and El Aioun has not met the target even though there was a reduction in the utilization of ground water in the three cities after project implementation. Overall, however, the project positively contributed to the improvement of people's living conditions in the project target area. Thus, its effectiveness is fair.

Although the project cost was within the plan, the project period was longer than planned, and thus project efficiency is fair. Project sustainability is deemed high in the structural, technical and financial aspects, and the operation and maintenance condition of project facilities and equipment is good.

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

### **4.2 Recommendations**

#### **4.2.1 Recommendations to the Executing Agency**

The serious problem of water outages in peak seasons/hours was greatly improved in the target four cities as the percentage of the water served population, the average and maximum water supply volume and the average water supply volume per person were improved due to expansion of water supply capacities. However, this problem has not been totally alleviated as there are still temporary water outages in the summer time. A continuous increase in water demand is expected in the target areas with progress in urbanization and population growth. In this regard, ONEE (Water Branch) in collaboration with RADEEO and RADEES is expected to cope with this issue by improving the efficiency of the water transmission and distribution network, including reducing water loss.

In the Oujda Portion, the quantity of intake water from the dam was restricted due to

damage to the water conveyance pipe. However, this problem was solved in April 2013 by maintenance work on the damaged section. ONEE (Water Branch) is expected to take necessary measures for the conservation of ground water in Oujda, Taourirt and El Aioun in collaboration with the concerned agencies such as RADEEO and the Agency of the Hydraulic Basin, Ministry of Energy, Mining, Water and Environment, which controls the dams.

#### 4.2.2 Recommendations to JICA

None.

#### 4.3 Lessons Learned

The delay in the signing of the Contract Program between the Moroccan government and the executing agency and the delay in the Special Agreement between RADEEO and the executing agency were the reasons for the prolonged project implementation period. If a project requires preconditions such as the signing of contracts and agreements with the Moroccan government as well as with concerned agencies, it will be necessary to estimate a realistic and feasible project implementation schedule after carefully examining the maturity of consensus building among the stakeholders and the expected time frames up to the signing of the contracts and agreements, during the project planning stage.

End

## Comparison of Original and Actual Scope

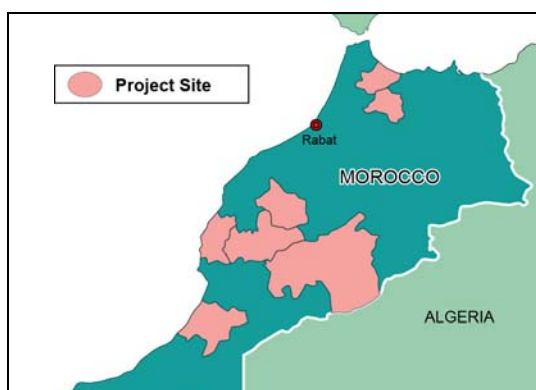
Item	Plan	Actual
<b>1. Project Outputs</b>		
<b><u>Oujda Portion</u></b>		
a) Water Intake Facility	Capacity: 1,050 litre/second	Same as plan
b) Water conveyance pipe	3km (PS1-PS2) Capacity: 1,050 litre/second	Same as plan
c) Pumping Station (PS)	4 units	
d) Water Pipe	Total length: 124.5 km • PS2-PS3: 17.6 km • PS3-PS4: 12.4 km • PS4-Oujda: 58.5 km • Branch pipe to Taourirt: 34 km • Branch pile to El Aioun: 2 km	Mostly same as plan
e) Water Purification Plant (WPP)	Rapid filtration system Capacity: 1,050 litre/second	Same as plan
f) Reservoir	Oujda: 2 units (10,000 m <sup>3</sup> + 4,000 m <sup>3</sup> ) Taourirt: 1 unit (10,000 m <sup>3</sup> )	Same as plan
<Additional Scope> g) Rural Water Supply System	—	Rural water supply system at 134 communities near Oujda (Installation of public water tap and water pipes)
<b><u>Safi Portion</u></b>		
a) Extension of existing WPP	Capacity: 190 litre/second (extension)	Same as plan
b) Rehabilitation of ➤ Takabrote PS ➤ Ain Thami PS	Replacement of pumping machine Replacement of control panel and water hammer prevention device	Same as plan Cancelled
c) Water Pipe	1.9 km (Takabrote PS - RADEES 5,000 m <sup>3</sup> reservoir) Capacity: 350 litre/second	Same as plan
<Additional Scope> d) Water Pipe	-	4.4 km (Takabrote - WPP)
Consulting Services	34 M/M	54 M/M
<b>2. Project Period</b>	February 1997 – April 2000 (39 months)	December 1997 – February 2012 (171 months)
<b>3. Project Cost</b>		
Amount paid in foreign currency	4,183 million yen	1,090 million yen
Amount paid in local currency	7,816 million yen (620.3 million dirham)	9,603 million yen (801 million dirham)
Total	11,999 million yen	10,693 million yen
Japanese ODA loan portion	9,000 million yen	7,588 million yen
Exchange rate	MAD 1 = JPY 12.6 (as of November 1996)	MAD 1 = JPY 11.99 (Average between 2007 and 2011)

## 0. Summary

The Rural Electrification Projects (II) and (III) aimed at the electrification of rural villages through the construction of distribution lines in order to reduce poverty and rectify regional disparities in 10 provinces with high levels of poverty. The relevance of this project is high as it was consistent with the development plan and development needs of Morocco and was also consistent with the key areas of assistance in Japan's ODA policy for Morocco. As for the effectiveness of the project, it was observed that the target figures of peak load and the rural electrification rate were achieved and that sales volume and sales revenue have been steadily increasing. Also, local residents have reported the indirect effects of rural electrification such as improvements in access to information and more hygienic conditions. With regard to the implementation of the project, while the project cost was within the planned amount thanks to efficient designing and competition among contractors, the project period substantially exceeded the plan due to delays in construction activities and the large amount of time required for coordination with the villages through which distribution lines would pass. Therefore, the efficiency of the project is fair. The sustainability of the project is high as there were generally no issues identified in terms of the institutional, technical and financial aspects of the executing agency, nor were there problems in the conditions of the operation and maintenance of the facilities.

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

## 1. Project Description



Project Location



Distribution lines constructed under the project (Essaouira Province)



## 1.1 Background

At the time of project planning, Morocco had a population of 28 million, of which 55% lived in urban and 45% lived in rural areas. The number of people living in poverty was 5.3 million (1998/99) and of these, those in rural areas accounted for 66% (3.5 million) of the total poor. It was often pointed out that the main problems of these people, both in urban and rural areas, were that they did not have basic infrastructural facilities such as a water and electricity supply, or roads, or sufficient access to public services such as education and medical services.

While the electrification rate in urban areas was almost 100%, the rate in rural areas was still at 63% in April 2004. Therefore, the entire country of Morocco faced the challenge of reducing regional disparities and poverty, and a specific challenge of rural development was to raise the electrification rate.

The 'Programme d'Electrification Rurale Globale' (PERG), launched by the Moroccan government in 1995, had as its target, an increase of the electrification rate to 90% in rural areas by 2010. Under this programme, several phases of distribution network development had been undertaken by the Office National de l'Electricité (ONE)<sup>1</sup> and the Rural Electrification Projects (II) (III) were to support some portions of PERG's Phase 3 and the second stage of its Phase 4.

## 1.2 Project Outline

The objective of the project is the electrification of rural villages in 10 provinces with high levels of poverty by expanding the electricity distribution networks, thereby contributing to the reduction of poverty and regional disparities through an improvement of living standards.

Loan Approved Amount / Disbursed Amount	Rural Electrification Project (II) : 7,350 million yen / 7,350 million yen Rural Electrification Project (III) : 5,257 million yen / 4,536 million yen
Exchange of Notes Date/ Loan Agreement Signing Date	Rural Electrification Project (II) : May, 2002 / June, 2002 Rural Electrification Project (III) : November, 2005 / November, 2005
Terms and Conditions	Rural Electrification Project (II): Interest Rate: 2.2%, Repayment Period: 30 years (Grace Period: 10 years), Conditions for Procurement: General Untied Rural Electrification Project (III): Interest Rate: 0.9%, Repayment Period: 20 years (Grace Period: 6 years), Conditions for Procurement: General Untied
Borrower / Executing Agency	Office National de l'Electricite et de l'Eau Potable / Office National de l'Electricite et de l'Eau Potable (Guaranteed by the Government of the Kingdom of Morocco)

<sup>1</sup> ONE merged with the Office National de l'Eau Potable (ONEP) in April 2012 and became the Office National de l'Electricite et de l'Eau Potable (ONEE).

Final Disbursement Date	Rural Electrification Project (II) : December, 2007 Rural Electrification Project (III) : March, 2011
Main Contractor (Over 1 billion yen)	<u>Rural Electrification Project (II)</u> Isotron (Spain) / Ritmaf (Morocco) / Consenergy Consortile (Morocco) / Cegelec (Morocco) <u>Rural Electrification Project (III)</u> Elcotram (Morocco)
Main Consultant (Over 100 million yen)	-
Feasibility Studies, etc.	Government of the Kingdom of Morocco ‘Programme d’Electrification Rurale Globale’ (1995)
Related Projects	Japanese ODA Loan ‘Rural Electrification Project’ (Loan Agreement in 1998) In addition, Agence française de développement (AFD), KfW Bankengruppe (KfW), European Union (EU), Islamic Development Bank (IsDB), Arab Fund for Economic and Social Development (AFESD), Kuwait Fund for Arab Economic Development etc. supported promotion of the overall plan of the Government of Morocco ‘Programme d’Electrification Rurale Globale’.

## 2. Outline of the Evaluation Study

### 2.1 External Evaluator

Keisuke Nishikawa (OPMAC Corporation)<sup>2</sup>

### 2.2 Duration of Evaluation Study

This ex-post evaluation study was conducted with the following schedule:

Duration of the Study: October 2012 – October 2013

Duration of the Field Study: February 9 – March 3, 2013 and May 11 – May 19, 2013

### 2.3 Constraints during the Evaluation Study

While this project was implemented in a total of 10 provinces in rural areas of Morocco, only four provinces could be visited during the survey period. Also, the electricity loss rate and electrical power failure could not be analysed as it was difficult to collect data in the same format from all the provinces concerned.

<sup>2</sup> Joined the evaluation team of OPMAC as a team member from Japan Economic Research Institute Inc.

### 3. Results of the Evaluation (Overall Rating: A<sup>3</sup>)

#### 3.1 Relevance (Rating: ③<sup>4</sup>)

##### 3.1.1 Relevance to the Development Plan of Morocco

###### Consistency with the Overall Policy

At the time of the appraisal of the Rural Electrification Project (II)<sup>5</sup>, the Economic and Social Development Plan (2000-2004), as one of its key challenges, prioritised the enhancement of policies to reduce regional disparities through rural development. In Morocco, no long-term development plan has been formulated since the expiry of this five-year development plan, although development policy was stipulated in the Finance Bills / Finance Acts of the respective years. In the Finance Bill of 2013 (Economic and Financial Report), effective at the time of the ex-post evaluation, it is clearly stated that electrification and water supply services targeting the poor in rural and mountainous areas will be enhanced in accordance with the development objectives in these areas, as set forth in the ‘National Initiative on Human Development’, established in May 2005 by His Majesty King Mohamed VI. Thus, it can be observed that rural electrification has been an important policy challenge as reflected in the fact that rural development policies are maintained at a national level.

###### Consistency with Sector Policy

In order to redress regional disparities, the Moroccan government formulated the ‘Programme d’Electrification Rurale Globale’ (PERG) in 1995 with the aim of bringing the rural electrification rate up to 90% by 2010<sup>6</sup>. The government commenced the construction of distribution networks in rural areas from the following year. PERG was still positioned as an effective programme, even at the time of the ex-post evaluation, and the Executing Agency (ONEE) has continued the electrification of remaining areas by bearing a larger portion of the cost as PERG progresses<sup>7</sup>.

In this way, PERG was effective as a sector level programme both at the times of appraisal and ex-post evaluation. This project, supporting some parts of the programme, can be said to have been relevant to sector policy.

---

<sup>3</sup> A: Highly satisfactory, B: High, C: Partially satisfactory, D: Unsatisfactory.

<sup>4</sup> ③: High, ②: Fair, ①: Low.

<sup>5</sup> As the ‘Rural Electrification Project’ was implemented three times as Japanese ODA projects, the Rural Electrification Project (II) will be referred to as ‘(II)’ and the Rural Electrification Project (III) as ‘(III)’ in this report.

<sup>6</sup> The target rate of rural electrification continued to be revised, becoming ‘98% by 2007’ including the contributions from independent power producers.

<sup>7</sup> The upper limit of the installation cost in the third phase of PERG ((II) is part of this phase) was 14,000 dirham (DH) per household, and that of the fourth phase - second stage ((III) is part of this phase) was 27,000 DH per household. ONEE was spending more for each household (as the cost to be borne by each household was always the same) as PERG progressed. At the time of the ex-post evaluation, these were the areas where the installation cost per household was 27,000 – 80,000 DH. (Note: 1 DH was about 11.7 yen as of July 2013.)

### 3.1.2 Relevance to the Development Needs of Morocco

In 1999, 45% of the entire population of Morocco lived in rural areas, and the rural electrification rate remained at 49% in November 2001, although the rate in urban areas was almost 100%. It was also said that 66% (3.5 million people) of the 5.3 million poor lived in rural areas in 1998/99, and that there was a large rural-urban gap in terms of access to electricity. This was particularly bad among the poor (according to the appraisal report of (II)).

As a result of the implementation of PERG from the second half of the 1990s, the rural electrification rate substantially improved, as shown in Table 1, leading to the reduction of the rural-urban gap in access to electricity. This project also contributed to an increase in the electrification rate<sup>8</sup>.

Table 1: Rural Electrification Rate

Year	Rural Electrification Rate (%)	Consumption of Electricity (Million KWh)
Average 2000 – 06	64.7	15,538
2007	93.0	20,502
2008	95.4	21,638
2009	96.5	22,392
2010	96.8	23,749
2011	97.4	25,634

Source: Financial Act 2013 (Economic and Financial Report)

It was observed that the rural electrification rate reached 97.4% in 2011 and that electricity consumption increased as the electrification rate improved. As the supply of electricity is a basic infrastructural service for society, it is desirable that the areas remaining unelectrified areas be given electricity and that a stable supply is provided for electrified areas, amid the consistent increases in electricity consumption in the country.

Therefore, this project (both (II) and (III)) was relevant to the need for rural electrification and for a stable supply of electricity both at the times of project appraisal and ex-post evaluation.

### 3.1.3 Relevance to Japan's ODA Policy

The provision of assistance to rural development to narrow disparities between urban and rural areas was one of the key areas of Japan's ODA for Morocco at the time of the appraisal of (II) in 2002 and of (III) in 2005 (according to the 'Country data book'). In the Medium-Term Strategy for Overseas Cooperation Operations of the former Japan Bank for International Cooperation (1999-2001 and 2002-2004 editions), regional development to narrow the gap was

---

<sup>8</sup> In detail, (II) was to cover part of PERG's Phase 3 (7 provinces, approximately 1,700 villages and 88,000 households (about 28% of PERG's Phase 3)), and (III) to cover part of PERG's Phase 4-2 (4 provinces, 1,191 villages and approximately 33,000 households (about 14% of PERG's Phase 4-2)).

considered a key assistance area and especially in the context of Morocco, the development of electrification, the water supply, roads, telecommunications, etc in rural areas was the focus of assistance.

Thus, this project, having as its target the reduction of poverty and the narrowing of regional gaps by the electrification of rural villages, was in conformity with the overall ODA policy and the overseas economic cooperation policy for Morocco at the time of project appraisal. The relevance of the project therefore can be concluded to be high.

This project has been highly relevant to Morocco's development plan and development needs, as well as to Japan's ODA policy; therefore its relevance is high.

### 3.2 Effectiveness<sup>9</sup> (Rating: ③)

#### 3.2.1 Quantitative Effects (Operation and Effect Indicators)

##### 3.2.1.1 Peak Load, Rural Electrification Rate, Household Electrification Rate

At the time of project planning, peak load (maximum electricity at the sending end) and the rural electrification rate were expected to increase in (II), and the household electrification rate in the project area was expected to increase, in addition to these two indicators, in (III). The target year for measuring the level of achievement of each indicator was 2009 in (II), one year after completion of the project, and 2011 in (III), two years after completion of the project. The table below shows actual values and achievement levels, obtained at the time of the ex-post evaluation.

[Rural Electrification Project (II)]

Table 2: Peak Load (Maximum Electricity)

Unit: MW

Province	2001	2005	2008	2009		2010	2011	2012
	Base year	Actual value	Actual value	Target value	Actual value	Actual value	Actual value	Actual value
Chefchaouen	7.0	18.5	28.5	11.0	33.2	41.0	43.3	45.6
Taounate	9.0	9.2	17.4	14.0	19.8	22.5	26.7	27.8
Al Haouz	37.5	17.0	29.3	55.0	33.5	38.4	42.4	43.4
Azilal	9.5	19.2	25.4	13.8	29.8	28.4	32.5	34.6
Tiznit	16.0	17.1	23.8	25.0	26.2	28.5	33.1	33.6
Ouarzazate	26.0	18.4	30.0	39.0	39.2	43.8	48.6	48.8
Zagora	5.5	9.6	11.8	8.5	12.0	13.3	13.5	14.8

Source: Data provided by the Executing Agency

<sup>9</sup> Sub-rating for Effectiveness is to be put with consideration of Impact.

Table 3: Rural Electrification Rate

Unit: %

Province	2001	2005	2008	2009		2010	2011	2012
	Base year	Actual value	Actual value	Target value	Actual value	Actual value	Actual value	Actual value
Chefchaouen	29	78	96	87	97	97.3	97.4	97.7
Taounate	39	72	95	88	96	96.2	96.7	97.6
Al Haouz	40	75	93	86	94	94.7	95.8	98.6
Azilal	54	71	84	83	90	92.1	93.4	94.6
Tiznit	49	80	98	88	98.6	98.8	98.8	98.9
Ouarzazate	65	86	96	98	96	96.2	96.6	99.1
Zagora	78	93	96	95	96.6	96.7	96.7	98.3

Source: Data provided by the Executing Agency

The peak load (a total value of peak loads at 60/22 kV substations in each province) generally increased considerably during the 2000s, including during the period of this project. The number of provinces that achieved the target figures in 2009 was six out of seven provinces, and the achievement level was 116% on average<sup>10</sup>.

With regard to the rural electrification rate, PERG finally settled the target of raising the rate to 98% by 2007. The overall rural electrification rate of Morocco in 2007 was actually 93%, increasing at a slower pace compared to the original plan, but it reached over 97% in 2011. The rural electrification rates in each province covered by this project, as indicated in Table 3, reached their target levels in six provinces out of seven by 2009, and increased further to more than 94% in all of the provinces in 2012. This shows that this project has contributed to the overall improvement of electrification rates<sup>11</sup>.

[Rural Electrification Project (III)]

Table 4: Peak Load (Maximum Electricity)

Unit: MW

Province	2003	2005	2008	2009	2010	2011		2012
	Base year	Actual value	Actual value	Actual value	Actual value	Target value	Actual value	Actual value
Chefchaouen	12.5	18.5	28.5	33.2	41.0	18.9	43.3	45.6
El Kelaa des Sraghnas	28.3	33.2	39.4	43.6	45.8	47.4	48.0	48.6
Chichaoua	9.9	15.0	20.8	22.6	24.7	21.7	26.8	28.2
Essaouira	12.4	24.5	26.9	27.8	28.5	40.8	29.3	30.5

Source: Data provided by the Executing Agency

<sup>10</sup> The actual values of the base year (2001) obtained during the project planning were different from the values for 2001 provided by the Executing Agency. Some of the actual values were lower than their base values, but it was not possible to track down the evidence of the values obtained during the planning stage (e.g. The actual value in Al Haouz in 2001 was 11.5 MW, being substantially lower than the value of 37.5 MW shown in the planning report). However, Table 3 shows the base values obtained during the planning period as the basis for judgement.

<sup>11</sup> The proportion of the households electrified in (II) and (III) is 7% of the entire PERG programme.

Table 5: Rural Electrification Rate

Unit: %

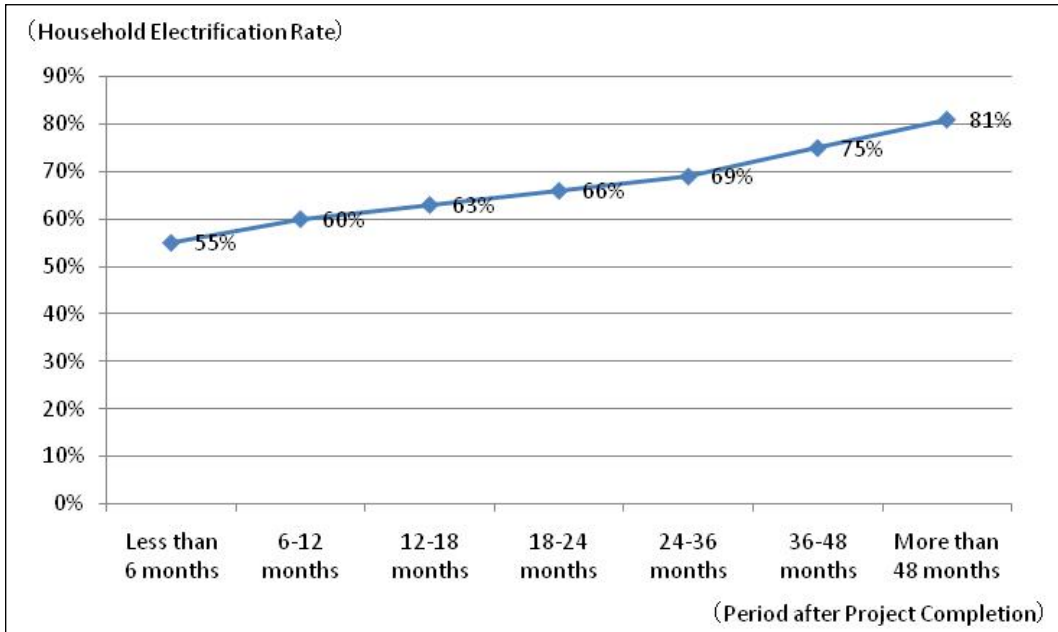
Province	2003	2005	2008	2009	2010	2011		2012
	Base year	Actual value	Actual value	Actual value	Actual value	Target value	Actual value	Actual value
Chefchaouen	41	78	96	97	97.3	97	97.4	97.7
El Kelaa des Sraghnas	48	91	97	97	97.3	98	97.4	98.6
Chichaoua	48	73	89	90	91	96	91.4	97.0
Essaouira	30	61	87	88	88.8	94	88.9	92.3

Source: Data provided by the Executing Agency

The peak load in 2011 in the provinces of (III) shows that while it substantially exceeded the target value in Chefchaouen, it remained at 72% in Essaouira. According to the Executing Agency, while the target value in Essaouira was planned based on the expectation that there would be new industrial facilities during the planning stage, no such projects were actually implemented and this led to lower-than-expected demand for electricity. The four provinces as a whole sufficiently achieved their target in 2011 and 2012 when the actual figures were 114% and 119% of the target value respectively.

With regard to the rural electrification rate, while only one out of four provinces achieved their targets by the target year, the achievement level of the three remaining provinces was high at 95 – 99%, and the number of provinces achieving the target increased to three in 2012. Overall, it can be observed that electrification has progressed well towards the target rates of the entire PERG programme.

No figure for the household electrification rate in the villages in the project area corresponding to the planned target figure could be obtained as the Executing Agency did not have the data either at provincial level or at project area level. However, national level data showing the household electrification rates categorised into several time periods after the electrification of the villages was available, as shown in the figure below. According to the data, the household electrification rate after the distribution lines were constructed was 75% three to four years after completion of the project, and 81% after more than four years. This implies that in the project areas, where more than three and a half years have passed in both projects, an average of over three out of four households is using electricity.



Source: Data provided by the Executing Agency

Figure 1: Rate of Household Electrification after Village Electrification (2012)

### 3.2.1.2 Other Quantitative Effects

In addition to the indicators above, data such as electricity sales volume, sales revenue and the electricity consumption of each household is shown below.

Table 6: Sales Volume and Revenue in Rural Areas in Each Province

Province	Sales Volume (Unit: MWh)					Sales Revenue (Unit: thousand DH)				
	2009	2010	2011	2012	Change 2009~12	2009	2010	2011	2012	Change 2009~12
Chefchaouen	73,182	79,061	102,742	105,548	144%	67,085	75,036	99,128	100,952	150%
Taounate	53,510	61,658	66,021	70,549	132%	49,844	58,115	62,164	66,441	133%
Al Haouz	66,490	80,408	89,460	99,245	149%	65,566	80,629	89,588	97,927	149%
Azilal	44,429	51,638	58,750	65,918	148%	41,821	49,256	56,155	63,238	151%
Tiznit	42,094	45,681	51,304	55,578	132%	38,432	42,967	48,635	53,025	138%
Ouarzazate	52,270	58,496	63,999	70,236	134%	48,846	54,968	60,022	66,206	136%
Zagora	24,142	30,332	33,823	36,588	152%	21,746	28,684	31,963	34,636	159%
El Kelaa des Sraghnas	69,744	79,796	88,173	99,117	142%	65,860	75,335	85,127	95,253	145%
Chichaoua	23,017	32,505	39,208	43,147	187%	19,845	31,628	38,552	42,491	214%
Essaouira	25,062	20,856	33,590	39,502	158%	25,667	18,945	34,232	40,212	157%
Total	473,940	540,431	627,070	685,428	145%	444,712	515,563	605,566	660,381	148%

Source: Data provided by the Executing Agency

As the rural electrification rate and household electrification rate improved, electricity sales volume and revenue also went up in all the provinces covered by this project, as shown in Table



6. The sales volume and revenue actually went up by 45% and 48% respectively from 2009 to 2012. These increases were not just due to an increase in the electrification rate but were also greatly influenced by the electricity consumption of each household in rural areas as more electric appliances were used for a longer time and more frequently. Specifically, electricity consumption increased by an average of 25% between 2009 and 2012, ranging from 12% to 53% in all the provinces covered under this project.

Table 7: Monthly Electricity Consumption per Household in Rural Areas

Unit: KWh

Province	2009	2010	2011	2012	Change 2009~12
Chefchaouen	60.8	62.7	78.8	78.3	129%
Taouinate	52.7	55.2	57.3	58.9	112%
Al Haouz	63.5	72.3	75.9	80.2	126%
Azilal	66.6	69.1	72.1	76.9	115%
Tiznit	53.5	55.5	59.8	63.1	118%
Ouarzazate	73.5	78.7	83.4	87.9	120%
Zagora	74.0	89.6	97.0	100.7	136%
El Kelaa des Sraghnas	77.3	84.2	88.4	95.5	124%
Chichaoua	44.8	57.9	65.8	68.4	153%
Essaouira	49.9	37.8	55.2	63.4	127%
Average of 10 Provinces	61.66	66.3	73.37	77.33	125%

Source: Data provided by the Executing Agency

Although a rural electrification programme had been implemented before PERG, it was not fully functioning in connecting rural areas to the distribution network. Rural electrification progressed through the implementation of PERG and this formed a base for improving the living conditions of rural areas and for rectifying rural-urban disparities. PERG is characteristic in that it requests beneficiaries to bear part of the cost of developing distribution networks, and it can be said that this cost-sharing mechanism has contributed to the improvement of the rural electrification rate.

With regard to the defrayment of the construction costs of distribution networks, communes covered the burden of 2,085 DH per household, while each connecting household was to bear 2,500 DH. The remaining amount was covered by the Executing Agency (ONEE). This finance framework maintained the cost borne by communes and households at the same level throughout the country regardless of the locations of villages. It also enabled the Executing Agency to reduce their need to finance through the amount covered by the beneficiaries. In addition, in order to promote the electrification of households, a mechanism was introduced where it was possible for households to pay the cost of electrification in instalments<sup>12</sup>. During project implementation, the Executing Agency also collaborated with the communes in each

<sup>12</sup> In addition to this arrangement, individual connections from the distribution lines in villages needed to be separately financed by each household (2,000 – 6,000 DH, depending on the sizes of houses).

project area so that the parties concerned with the construction of medium and low voltage distribution lines would always be coordinated and involved in the scheduled implementation of the plan.

### 3.2.2 Qualitative Effects

At the time of project planning, the following qualitative effects were expected: an improvement in the living environment (increase in opportunities to access information, increase in night-time activities, improvement in hygienic conditions, reduction of labour, etc.); poverty reduction in rural areas; an elimination of rural-urban disparities. These effects will be analysed in the following 'Impact' section as they were regarded as impacts of the project in the ex-post evaluation survey.

Improved safety during the night as well as a higher level of satisfaction on the part of residents can be considered to be other qualitative effects of the project. A beneficiary survey (as described hereinafter) revealed that the following points were highly regarded by residents. As for the improvement in safety, 43% replied that safety had 'improved' while the rest of the respondents said that there was 'no change'. A majority of women expressed the view that night-time safety had improved. This implies that the streetlights installed along with the project had played a certain role in improving safety. Regarding the level of satisfaction with electricity supply services, there were favourable responses on electrification and a stable electricity supply and 83% of the respondents were found to be 'satisfied'.

## 3.3 Impact

### 3.3.1 Intended Impacts

In this section, the items described in '3.2.2 Qualitative Effects' will be analysed as impacts of this project, both those expected and those unexpected at the time of planning. As no surveys on the social and economic impacts of PERG had been conducted since 2003, and no data on provincial poverty level rankings after 2007 was available, in this ex-post evaluation survey, these impacts were measured through a beneficiary survey in the villages where electrification through the project had taken place<sup>13</sup>.

---

<sup>13</sup> The relatively large provinces of Tiznit and Ouarzazate from (II), and Essaouira Province from (III), and Chefchaouen Province where both (II) and (III) were implemented, were selected for the beneficiary survey. In these provinces, interviews were conducted with 103 rural residents.

Table 8: Key Results of the Beneficiary Survey (on the Living Environment)

Impact	Key Result	Main Comments / Remarks
Increase in opportunities to access information	Greatly Improved: 69% Improved: 28%	Many respondents said that they are now able to watch television and listen to the radio. A number of satellite dishes were observed during the site visit.
Increase in night-time activities	Increased: 45% No change: 52%	More can now be done inside the house with the availability of lights, but other than that, no particular community-related activities have been created. Therefore, mixed responses are thought to have been received.
Improvement in hygienic conditions	Improved: 63% No change: 37%	Beneficiaries who responded that hygienic conditions improved provided the examples that a water supply direct to each house had been made possible with electricity and that the hygienic conditions for food were now better using refrigerators.
Reduction of household work	Greatly reduced: 26% Reduced a little: 18% No change: 54%	While the positive factors are that there is no more need to draw water and that refrigerators can now be used, some respondents said that the overall amount labour had not decreased as it was now possible to work even after dark.

Source: Beneficiary Survey

Changes in the living environment were found to be highly appreciated. Improvements in access to information, and improvements in hygienic conditions tended to be regarded in a positive way. It can be said that a stable supply of electricity has led to a widespread use of televisions in each house, and women in particular, who normally have a lot of work inside the house, can now obtain a wealth of information. As for hygienic improvements, more food items are now hygienically kept thanks to the availability of refrigerators after electrification.



Photo 1: Refrigerator at a café in a village electrified in the project (Ouarzazate Province)

This was considered to be the main factor among the positive answers. While there were mixed answers on the increase in night-time activities and the reduction of household work, few stated that they had become worse. Therefore, it can be presumed that the project has generated some positive effects.

On the other hand, respondents were not as positive in their views on the improvement of their living environment when it came to broader questions on poverty reduction in rural areas and also on regional disparities. On the changes in income, only 21% responded that their income had increased after electrification. The remaining 79% reported no changes. Also, on the improvement of poverty levels, while 17% saw some improvements, 66% felt that there had been no change. The remaining 17% were unsure. Concerning the question of rural-urban disparities, only 13% answered that they were being redressed; 69% found no change and the remaining 18% were not sure. In the site surveys in these four provinces, an example of the

project effects was observed in that business hours could be extended, even after dark, in the centre of communes where there were some shops. However, although this project reached out to mountainous remote settlements, where some changes in the living environment were brought about, there were no examples of new commercial activities and no additional opportunities for increases in income and/or correction of regional disparities were found. One of the main sources of cash income for rural residents is the labour migration of men to urban areas, and this did not change, even after the implementation of the project. This project had the aspect of social infrastructure development which contributes to the improvement of villagers' living environment, rather than inducing more economic activities in rural areas.

### 3.3.2 Other Impacts

#### 3.3.2.1 Impacts on the Natural Environment

At the time of planning, no serious environmental impacts were expected. The project did not fall under the category of projects in a large sector, it had no characteristics that were likely to give a negative influence on the environment, nor was it in that kind of region. In accordance with the domestic legislation of Morocco, no environment impact assessment was required for the construction of distribution lines. Also, no negative impact on the natural environment was foreseen as this project did not involve any deforestation and the cutting of trees would be minimised.

No respondents pointed out any negative environmental effects in the beneficiary survey and, according to information from the ONEE officers in each province visited during the site survey, no problematic environmental impacts occurred either during or after construction. No such impacts were observed when the evaluator visited the project sites in person in some of the provinces. Therefore, it can be concluded that no negative impacts on the natural environment were caused during implementation nor have any been observed, even after completion of the project.

#### 3.3.2.2 Land Acquisition and Resettlement

At the time of planning of this project, no land acquisition or resettlement of residents were planned as, basically, government land was to be used for the installation of poles and other facilities.

In the beneficiary survey, 98% of the respondents replied that there were no cases of land acquisition. The remaining 2% provided the information that some of the residents in villages that were not to receive electrification under this project had asked for some compensation for their communes for the installation of transmission and distribution lines passing through their villages, as they were not the direct beneficiaries of the project. These villages eventually received electrification through other projects of PERG, and no land acquisition issues occurred after all. Also, no residents needed to be relocated due to this project.

Generally, some sections of land inside villages had to be used to install poles and transformers, but the installation was mostly welcomed by the beneficiaries. As the number of villages covered under the project was large, there were some cases, such as in several villages in Taounate, where more time was required for coordination among villagers regarding the location of village distribution lines. However, it was confirmed that no land acquisition related to this project was executed.

This project has largely achieved its objectives; therefore its effectiveness is high.

### 3.4 Efficiency (Rating: ②)

#### 3.4.1 Project Outputs

In this project, distribution lines were developed in rural areas of Morocco with a higher level of poverty. A total of 10 provinces, seven in (II) and four in (III), were covered by the project (one province was included in both projects). The final outputs and the original plans are compared in the table below.

Table 9: Comparison of Original and Actual Outputs

Component	Original		Actual	
	(II)	(III)	(II)	(III)
Construction of medium-voltage (22 kV) distribution lines	Approx. 1,832 km	Approx. 1,300 km	1,684 km	1,118 km
Construction of low-voltage (220/380 kV) distribution lines	Approx. 3,675 km	Approx. 2,550 km	4,329 km	2,657 km
Installation of transformers	Approx. 840	Approx. 580	845	556
Number of villages covered	1,717	1,189	1,706	1,166
Number of households covered	87,103	33,380	86,428	32,803

Source: Project Completion Report

Note: (II): The seven provinces of Chefchaouen, Taounate, Al Haouz, Azilal, Tiznit, Ouarzazate and Zagora

(III): The four provinces of Chefchaouen, El Kelaa des Sraghnas, Chichaoua and Essaouira

\* While Chefchaouen is in both (II) and (III), different villages were covered in respective phases.

This project, taking into account lessons learned from similar projects in the past, had the possibility of changing project areas from the original plan. As a result of close work with communes in the detailed design of the provincial distribution networks, 11 villages and 675 households in (II) as well as an additional 23 villages and 577 households were excluded from the project scopes<sup>14</sup>. However, as these villages were eventually covered by other PERG projects and as electrification itself has been achieved in line with the plan, no problems have arisen overall.

<sup>14</sup> The three villages in Taounate Province, as described in '3.4.2.2 Project Period', that were initially against the installation of distribution lines are included here. It can be judged that there were no problems in producing the 'project outputs' as measures to avoid further delays in the project were taken while maintaining the initial design of the network.

### 3.4.2 Project Inputs

#### 3.4.2.1 Project Cost

In PERG, a basket system was employed to manage the both the fund of the Executing Agency itself and funds from other donors, including the Japanese ODA loan in one account. As a result, it was not possible to clarify the amount spent as the ‘foreign currency portion’ or the ‘local currency portion’ as had been planned during the design phase. The Japanese ODA loan was fully utilised as it had lower interest rates than other funding sources, leading to a lower level of financing directly from the executing agency through borrowings from commercial banks.

The planned and actual project costs are compared in the table below.

Table 10: Comparison of Original and Actual Project Cost

Unit: million yen

	(II)		(III)	
	Original	Actual	Original	Actual
Japanese ODA loan provided	7,350	7,350	5,257	4,536
Own funding by Morocco	3,606	1,590	1,768	600
Total	10,956	8,940	7,025	5,136

Source: Project Completion Report

The total costs were within the planned amount in both projects as efforts to reduce project cost were made with an efficient detailed design of the distribution lines and the creation of competition among contractors in the bidding process ((II) resulted in 82% of the planned amount, and 73% in (III)). As the Japanese ODA loan, with lower interest rates, was fully utilised, it can be observed that the proportion of the executing agency’s own funding turned out to be substantially smaller than the plan.

#### 3.4.2.2 Project Period

The project periods exceeded the plans in both projects. The planned and actual periods from the time of the loan agreement to project completion (excluding the one-year inspection periods) are shown below.

Table 11: Comparison of Original and Actual Project Periods

	Original	Actual	Comparison with the Original Plan
Rural Electrification Project (II)	June, 2002 – August, 2005 (39 months)	June, 2002 – September, 2008 (76 months)	195%
Rural Electrification Project (III)	November, 2005 – September, 2007 (23 months)	November, 2005 – November 2009 (49 months)	213%

Source: Appraisal Report, Project Completion Report and Interviews with the Executing Agency

The project period of (II) showed a substantial delay due to the slow progress of the contractor's construction and to the opposition of some villages to the installation of distribution lines that would pass through their villages (195% of the planned period). It took a long time to coordinate with the three villages in Taounate that were opposed to the installation of distribution lines. These villages were excluded from the scope of the Japanese ODA loan project and the Executing Agency dealt with the villages with their own funds. Therefore, the Japanese ODA loan project was completed in September 2008, while the actual coordination and construction with the Executing Agency's own funds continued until January 2012. The development of distribution lines in other project areas, apart from these villages, had been completed by 2007.

Major factors for the delay in (III) were the slow progress of construction activities by contractors, and longer-than-planned time for coordination with villages on the installation of distribution lines. As a result, the project took 49 months until November, 2009, which was 213% of the planned project period.

Although a number of villages needed to be covered, the periods of both projects were over 150% of the plan. Therefore, the efficiency of the project period is low.

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

The Economic Internal Rate of Return (EIRR)<sup>15</sup> calculated by the Executing Agency at the time of planning of this project was 12.2% for (II) and 8.0% for (III). Recalculation of the rate was attempted in this ex-post evaluation survey, but a direct comparison was difficult as the detailed calculation methods used during the planning stage could not be obtained and the assumptions for calculation were different. ONEE calculated EIRR of PERG in December 2012, by using actual data for the entire PERG up to 2012 and projected figures for 2013 – 2016. The result was 7.6%. The assumptions used in this calculation were 'Project life: 30 years; Cost: project cost, household connection cost; Benefit: increased revenue, consumers' surplus and tax revenue'.

Although the project cost was within the plan, the project period exceeded the plan; therefore efficiency of the project is fair.

## 3.5 Sustainability (Rating: ③)

### 3.5.1 Institutional Aspects of Operation and Maintenance

Operation and maintenance (hereinafter referred to as O&M) of the electricity distribution facilities constructed in this project is taken care of by the Distribution Offices of the Electricity Branch of the Office National de l'Electricite et de l'Eau Potable (ONEE), located in each

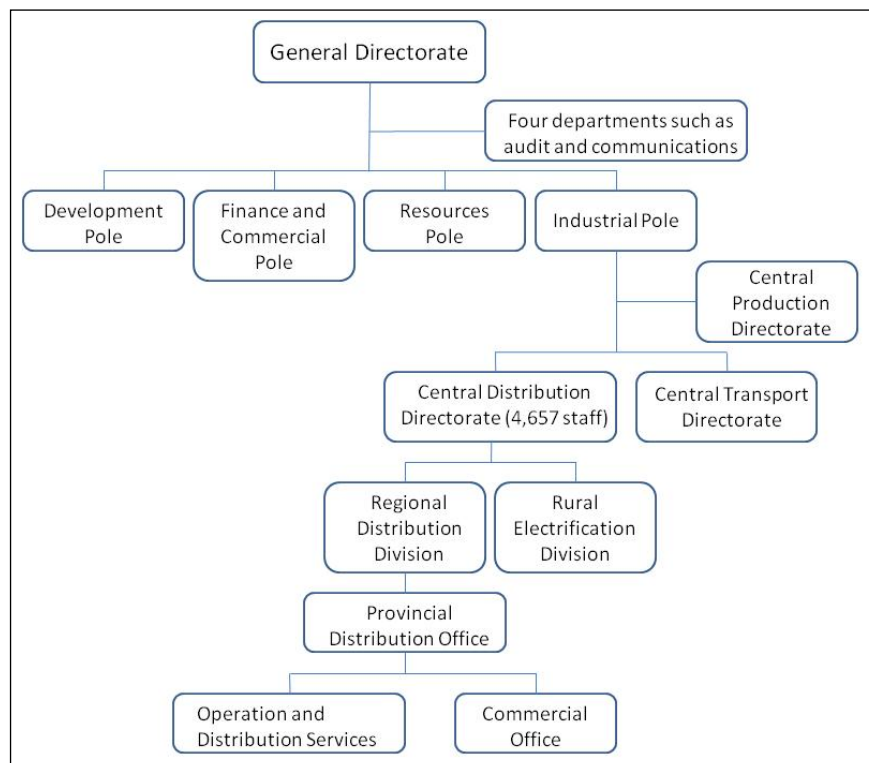
---

<sup>15</sup> Financial Internal Rate of Return (FIRR) was not available/calculated in PERG.

province.

ONEE Electricity Branch had about 8,680 staff members as of 2012. It has four poles and the Central Distribution Directorate with 4,657 members is positioned under the Industrial Pole. The Central Distribution Directorate has 10 Regional Distribution Divisions, which supervise provincial Distribution Offices. The distribution offices located in each province have a number of Commercial Offices and also Operation and Distribution Services which are in charge of the O&M of distribution lines. The provincial Distribution Offices formulate periodical inspection schedules and the condition of the lines is checked once every several months. If any problems are discovered at the time of inspection, it is the responsibility of provincial offices to deal with the problems.

As stated above, the Office National de l'Electricité (ONE) merged with the Office National de l'Eau Potable (ONEP) in April 2012 and became the Office National de l'Electricité et de l'Eau Potable (ONEE). However, the structure for the O&M of rural distribution networks has not been changed.



Source: Information supplied by ONEE

Figure 2: Organisation Chart of ONEE (simplified for this report)

With regard to the collection of electricity charges, a prepaid card payment system was introduced in the project area. No meter reading was required in remote areas and electricity users (each household) recharged the amount they required at card centres located in each area.



The introduction of this system did not increase the burden of meter reading on ONEE staff but it did guarantee the secure collection of electricity charges.

### 3.5.2 Technical Aspects of Operation and Maintenance

As it had been undertaking O&M activities on distribution lines in the country even before the project, ONEE was considered to have a high enough level of capacity and a sufficient number of well-experienced engineers to implement rural electrification.

At the time of the ex-post evaluation, the Operation and Distribution Service Offices under the Distribution Office located in each province were responsible for the O&M of distribution lines. Some of the repair work may be contracted out to the private sector, but ONEE itself also conducts regular inspections every several months by forming several teams (5 – 10 engineers in each team). According to the provincial ONEE offices visited, the technical level of the O&M staff was sufficient. There were no issues identified in terms of their O&M skills and electricity had been stably supplied almost all the time. The supply was maintained through the repair of lines when there were any troubles.

The Executing Agency also commented that training activities such as a two-month course on maintenance were regularly conducted at the training unit of the ONEE Electricity Branch main office, so that the maintenance skills of staff could be improved. ONEE has six kinds of O&M manuals, including one on the maintenance of the connecting units between high-voltage, medium-voltage and low-voltage lines and also one on the maintenance of medium-voltage and low-voltage networks. These are utilised in the training courses.

### 3.5.3 Financial Aspects of Operation and Maintenance

ONEE has operated on a stand-alone basis without any direct subsidies from the government, and it is required to be financially independent. As for the financial conditions of ONEE, it recorded a surplus in 1998 and 1999, but a surge in fuel prices, an increase in electricity purchases from independent power producers (IPP) and an increase in reserves for pensions all contributed to an overall deficit until 2002. 2003 saw a recovery to surplus thanks to an increased precipitation leading to an increase in the generation of hydropower and a decline in the purchasing prices from IPP. It was expected during the planning of (III) that the financial condition would be sound from 2005, after a small deficit in 2004.



Photo 2: Pre-paid processing unit at a card centre (Tiznit Province)

According to the financial details for the 2000s (income statements, balance sheets and cash flow statements) analysed in the ex-post evaluation survey, it was found that the final balance had remained in deficit since 2004.

Table 12: Financial Conditions of ONEE Electricity Branch (Income Statement)

Unit: million DH

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Total sales	10,628	12,080	12,339	12,442	14,478	15,436	16,955	18,887	20,561	21,522
Total operating expenses	12,372	12,850	11,741	11,843	14,547	15,632	16,206	23,097	20,441	20,492
Gross margin	-1,744	-770	598	599	-68	-196	748	-4,210	120	1,030
Financial income	325	365	289	344	497	380	587	820	887	896
Financial expenses	980	902	915	1,042	823	1,039	1,380	1,550	1,832	1,894
Financial results	-655	-537	-626	-698	-326	-658	-793	-730	-945	-998
Current balance	-2,399	-1,307	-29	-98	-394	-855	-45	-4,940	-825	32
Non-current balance	151	368	131	94	196	-832	-88	-116	-280	-422
Net profit before tax	-2,248	-939	102	-5	-199	-1,686	-133	-5,056	-1,105	-391
Net profit after tax	-2,277	-970	69	-39	-241	-1,734	-182	-5,112	-1,164	-452

Source: Data provided by ONEE

The amount of loan interest, included in the financial expenses, has been increasing and it is expected that the payment of interest for loans, including the Japanese ODA loan, will increase further. This will act as a financially negative factor. However, no serious problems can be seen in their repayment ability as the major reason for losses has been depreciation and the cash flow has generally been positive. Depreciation has been increasing as capital investment continued, but sales revenue has also been increasing, backed by the growing number of electricity users and also with a rise in electricity charges in 2006, both of which are expected to continue. Also, while the capital adequacy ratio of ONEE cannot be said to be high, no serious financial problems are found as the 'fixed assets to fixed liability ratio', which measures long-term financial stability, has stayed at a stable level just below 100%.

The electricity tariff (Table 13) was raised by 7% in 2006, and since then it has been kept at the same level, even though the consumer price index recorded a 12.3% increase between 2006 and 2013 (Ministry of Economy and Finance), indicating that it was at a low level.

Table 13: Electricity Tariff for Households (at the time of the ex-post evaluation)

Monthly consumption	Tariff per kWh
0~100 kWh	0.9010 DH
101~200 kWh	0.9689 DH
201~500 kWh	1.0541 DH
More than 500 kWh	1.4407 DH

Source: Information provided by ONEE

Note: The most recent tariff increase was in 2006 (7% increase)

While the above shows the total financial condition of ONEE, financial data and provincial budgets for O&M at distribution offices were not available as the data could not be separated. Both the headquarters and provincial offices commented that the budget has been sustainable, and it is expected that an increased O&M budget will be necessary now that the distribution network has become extended and is wider. Therefore it will be increasingly important to continue to secure a sufficient budget for this purpose in a stable manner.

#### 3.5.4 Current Status of Operation and Maintenance

In the ex-post evaluation, site surveys were conducted in four provinces out of ten to see the O&M conditions of distribution lines. There were no distribution lines which were found to be broken or without a supply of electricity. In order to maintain a stable electricity supply, provincial offices formulate annual maintenance plans and management officials meet up once a month to check the status of the electricity supply and O&M conditions to see if there are any problems or issues of O&M activities.

However, in rural areas where accessibility is not so easy, storms, particularly in the winter season, sometimes cut electricity lines and stop the supply of electricity. Under such weather conditions, roads cannot be used and the blacked out villages, which do not have easy accessibility, cannot get electricity supplied until the road conditions improve. Delays in repairs due to bad physical access are not related to the appropriateness of ONEE responses, but, rather, this is related to the issue of road infrastructure. ONEE appears to be doing their best under such constraints.

Regarding the services performed by ONEE, including O&M activities, 83% of the respondents in the beneficiary survey said they were satisfied, as described in '3.2.2 Qualitative Effects'.

No major problems have been observed in the operation and maintenance system, therefore the sustainability of the project effect is high.

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

### **4.1 Conclusion**

The Rural Electrification Project (II) and (III) were projects that aimed at the electrification of rural villages through the construction of distribution lines in order to reduce poverty and rectify regional disparities in 10 provinces with high levels of poverty. The relevance of this project is high as it has been consistent with the development plan and development needs of Morocco. It was also consistent with the key areas of assistance in Japan's ODA policy for Morocco. As for the effectiveness of the project, it was observed that the target figures of peak load and the rural electrification rate were achieved and that the sales volume and the sales

revenue have steadily increased. Also, local residents spoke of the indirect effects of improvements in access to information and more hygienic conditions through rural electrification. With regard to the implementation of the project, while the project cost was within the planned amount due to efficient design and competition among contractors, the project period substantially exceeded the plan due to delays in construction activities and a large amount of time required for coordination with the villages through which distribution lines would pass. Therefore, efficiency of the project is fair. The sustainability of the project is high as there were generally no issues identified in terms of the institutional, technical and financial aspects of the executing agency nor were there problems with the conditions of the operation and maintenance of the facilities.

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

## **4.2 Recommendations**

### **4.2.1 Recommendations to the Executing Agency**

When problems occur with distribution lines during bad weather, ONEE cannot always take remedial actions by responding immediately due to the poor condition of access roads in mountainous areas. This is not an issue that is faced only by ONEE and it is important to work with other government ministries, and also with local authorities, to find a way to conduct O&M activities in areas vulnerable to bad weather conditions. It is hoped that a stable electricity supply will be maintained in all villages by enhancing an optimal collaborative structure.

### **4.2.2 Recommendations to JICA**

No recommendations.

## **4.3 Lessons Learned**

### **4.3.1 Cooperation with Local Authorities and the Setting of a Sufficient Project Period**

This project was implemented by the Executing Agency itself including the procurement of equipment and the supervision of the construction process as well as the work with local communes and villages and a number of contractors. As there were a lot of sub-projects to the project, it was necessary for the smooth implementation of the project that the Executing Agency collaborated with communes in coordinating the persons / parties concerned. However, there were some cases where contractors could not carry out construction activities in accordance with the plan and where more time was required for coordination with those residents opposed to the installation of electricity poles. Therefore, it may have been advisable to set a sufficient project period during the planning stage.

### **4.3.2 Introduction of a Prepaid Card System**

It is now always possible to collect electricity charges in the project area where a prepaid

card system has been introduced, and this system has been effective as a means of reducing the burden on the Executing Agency of collecting charges. It has also improved the collection rate in rural areas. This system could be applied to similar projects.

#### 4.3.3 Introduction of Cost-sharing System for Electrification

In order to promote the electrification of each household, the cost borne by communes and households for the construction of distribution lines was maintained at the same level across the country. The remaining cost was entirely covered by the Executing Agency. This system has enabled both an equalisation of the contribution of each rural household and a reduction in the financial burden on the Executing Agency, while maintaining the public nature of the project. This cost-sharing method for electrification is effective in promoting rural electrification and it would be useful to examine the possibilities of introducing this method when similar projects are planned and implemented.

End

### Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
(1) Output		
[Rural Electrification Project (II)]		
• Construction of medium-voltage distribution lines (22 kV)	Approx. 1,832 km	1,684 km
• Construction of low-voltage distribution lines (220/380 V)	Approx. 3,675 km	4,329 km
• Installation of transformers	Approx. 840	845
[Rural Electrification Project (III)]		
• Construction of medium-voltage distribution lines (22 kV)	Approx. 1,300 km	1,118 km
• Construction of low-voltage distribution lines (220/380 V)	Approx. 2,550 km	2,657 km
• Installation of transformers	Approx. 580	556
(2) Project Period		
[Rural Electrification Project (II)]	June 2002 – August 2005 (39 months)	June 2002 -September 2008 (76 months)
[Rural Electrification Project (III)]	November 2005 – September 2007 (23 months)	November 2005 – November 2009 (49 months)
(3) Project Cost		
[Rural Electrification Project (II)]		
Amount paid in foreign currency	5,522 million yen	Not available
Amount paid in local currency	5,434 million yen (538 million DH)	Not available
Total	10,956 million yen	8,940 million yen
Japanese ODA loan portion	7,350 million yen	7,350 million yen
Exchange rate	1 DH = 10.1 yen (as of November 2001)	
[Rural Electrification Project (III)]		
Amount paid in foreign currency	2,997 million yen	Not available
Amount paid in local currency	4,028 million yen (333 million DH)	Not available
Total	7,025 million yen	5,136 million yen
Japanese ODA loan portion	5,257 million yen	4,536 million yen
Exchange rate	1 DH = 12.1 yen (as of September 2004)	