

No.

**Ex-Post Monitoring Report of Japanese ODA Loan
Projects 2010: Package III
(Jamaica, Ecuador, Morocco, China)**

December 2011

**JAPAN INTERNATIONAL COOPERATION AGENCY
INGEROSEC CORPORATION**

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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 shall be enhanced.

This volume shows the results of the ex-post monitoring for ODA Loan projects that were mainly completed seven years ago and was given ex-post evaluation five years ago. The ex-post monitoring was entrusted to external evaluators to review the projects' effectiveness, impact, and sustainability, to follow up the recommendations made in the ex-post evaluation, and to make further recommendations for future sustainability.

The lessons and recommendations drawn from these monitorings will be shared with JICA's stakeholders in order to apply to the planning and implementation of similar ODA projects in the future.

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

December 2011

Masato Watanabe

Vice President

Japan International Cooperation Agency (JICA)

Disclaimer

This volume of monitorings, the English translation of the original Japanese version, shows the results of objective ex-post monitorings 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 or 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.

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Ex-Post Monitoring of Completed ODA Loan Project


Jamaica

North Coast Development Project


External Evaluators: Tomoko Matsushita and Masahiro Yoshizawa

INGEROSEC Corporation

1. Project Description



Wastewater Stabilization Pond



Water Purification Facility

Project Location Map



Northern Coastal Highway



Flood Drainage Facility



Pier at Ocho Rios Port

1.1 Project Objective

The objective of this project is to develop and improve infrastructure such as water supply and sewerage, roads, drainage channels, and ports with a focus on regions of Montego Bay, Ocho Rios, and Negril and other areas which comprise Jamaica's major tourist spots. By doing so it aims to both increase the number of tourists and handle issues arising from this increase, thereby contributing to advancing the economic activities of the region and improving the living environment of its residents.

1.2 Outline of the Loan Agreement

Approved Amount/Disbursed Amount	8,606 million yen / 8,599 million yen
Loan Agreement Signing Date/Final Disbursement Date	October 1991 / March 2002
Ex-post Evaluation	2005
Executing Agencies	National Water Commission : NWC National Works Agency : NWA Port Authority of Jamaica : PAJ
Main Contractor	BOSUNG ENGINEERING AND CONSTRUCTION

	COMPANY LTD. (Korea) / Rizzani De Eccher (Italy) • CANTIERI COSTRUZIONI CEMENTO SPA (Jamaica)(JV) / SOGEA-SATOM (France) • COOPER & ASSOCIATES LTD. (Jamaica)(JV) / KIER INTERNATIONAL LTD. (U.K.)
Main Consultant	DHV International (U.K.) (Netherland), Stanley Consultants (U.S.), Daito Corporation (Japan), EMILE ELIAS AND COMPANY LIMITED (Republic of Trinidad and Tobago) / N.H. INTERNATIONAL LIMITED (U.K.)

1.3 Background of Ex-post Monitoring

The tourism industry was the most important industry in Jamaica in 1987, accounting for approximately 40% of the foreign currency revenue of the country. Jamaica's main tourist spots such as Montego Bay, Ocho Rios and Negril are all located in the northern part of the country. While accommodation facilities such as hotels have been steadily developed, the level of available infrastructure such as roads and water supply and sewerage systems in the area concerned was so low that it was considered to be a major threat to the continuous growth of the tourism industry. Due to such a situation, Special Assistance for Project Formation (SAPROF) study was conducted in 1990, selecting the following five sub-projects from the viewpoint of tourism promotion and tourism resources protection in the northern area.

- (1) Montego Bay Sewerage Project
- (2) Lucea/Negril Water Supply Project
- (3) Northern Coastal Highway Improvement Project
- (4) Montego Bay Drainage and Flood Control Project
- (5) Ocho Rios Port Expansion Project

Overall effects were generated in these sub-projects, such as an increase in the number of tourists and promotion of employment. However, the following were pointed out for each of the sub-projects through the ex-post evaluation:

- Regarding the Montego Bay Sewerage Project, urgent measures are required to ensure that the effluent standards will be achieved because the situation is not satisfactory yet. It is also necessary to promote educational activities such as familiarizing the community with the water rate system.
- Regarding the Lucea/Negril Water Supply Project, it is necessary to take measures to decrease the non-revenue water rate.
- Regarding the Northern Coastal Highway Improvement Project and the Montego Bay Drainage and Flood Control Project, it is necessary to take measures to strengthen the financial base of the NWA, the executing agency.

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

2. Outline of the Monitoring Study

2.1 Duration of Monitoring Study

Duration of the Study: March 2011 – October 2011

Duration of the Field Study: May 28th 2011 – 14th June, 2011

2.2 Constraints during the Monitoring Study

We distributed questionnaires to NWC, NWA and PAJ and requested them to provide materials. However, we did not get any answers from NWA and PAJ. For the missing information, we referred to the survey which was precedingly conducted (hereinafter referred to as the preceding survey).

3. Monitoring Results

3.1 Effectiveness

3.1.1 Quantitative Effects

(1) Results from Operation and Effect Indicators

The status of the effects produced by the sub-projects after the ex-post evaluation was analyzed by the operational effect indexes at the time of the ex-post evaluation. The analysis results are as shown below:

1) Montego Bay Sewerage Project: Sewage Treatment Volume, Facility Utilization Rate, Population with Sewage Treatment System, Sewage Diffusion Rate, Concentration of BOD (Biochemical Oxygen Demand) and Concentration of SS (Suspended Solids)

No damage to the present facilities was observed and none of the functions of the facilities had been lost. Thus, problems such as drastic decline in the sewage treatment volume and etc. have not emerged.



Photo 1 Treatment Facility
(Sewage Inlet)



Photo 2 Treatment Facility
(Settling Pond for Treatment)

As shown in Figure 1, since the maximum sewage treatment volume is 19,110 t/day (2008) and the facility capacity is 45,500 t/day (facility utilization rate¹: approximately 42%), there is ample spare treatment capacity.

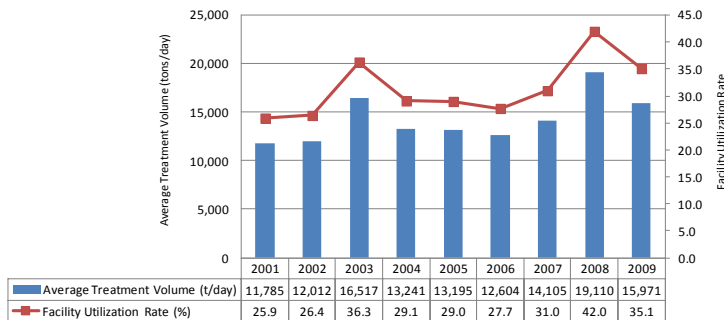


Figure 1 Sewage Treatment Volume and Facility Utilization Rate (Sources: Ex-Post Evaluation Report and Preceding Survey)

As shown in Figure 2, the changes in the concentrations of BOD and SS show that they have not fallen below the 20mg/l effluent standard. In particular, the concentration of SS reached a rather high level but it has recently declined.

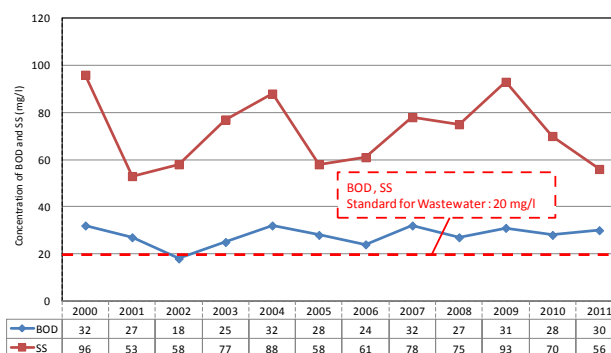


Figure 2 Changes in BOD and SS (Source: NWC materials)

Since the sewage is basically treated by natural purification process with microorganisms such as algae in a huge pond, treatment largely relies on natural conditions such as the weather. Thus, it is highly probable that the concentration of BOD and SS becomes unstable.

2) Lucea/Negril Water Supply Project: Status of Facility Utilization, Population Served by Water Supply, Water Supply Diffusion Rate and Non-revenue Water Rate

No damage to the present facilities was observed and none of the functions of the facilities had been lost. Thus, problems such as drastic decline in the water supply volume and etc. have not emerged.



Photo 3 Logwood Water Purification Plant



Photo 4 Great River Water Purification Plant

¹ Facility Utilization Rate (Average)=(Average Daily Water Supply Volume)/(Facility Capacity)×100

As shown in Table 1, the facility utilization rate is 72% at the Logwood Water Purification Plant and 68% at the Great River Water Purification Plant, thus they are running at around 70% of the facility capacity. The coverage of

Table 1 Results of Water Supply Project (2010)

Item	Logwood Water Treatment Plant (Located in Hanover Parish to which Lucea District belongs)	Great River Water Treatment Plant (Located in Saint James Parish to which Montego Bay District belongs)
Population Served by Water Supply	57,285	129,130
Facility Utilization Rate	72.11%	68.31%
Water Supply Diffusion Rate	68.53%	55.90%
Non-revenue Water Rate	45.57%	67.87%

(Source: Responses from NWC)

the water supply system is 69% at the Logwood Water Purification Plant and 56% at the Great River Water Purification Plant, thus covering about 50% of the population. This means that the water supply system is not widespread.

The non-revenue water rate ranges from 45 to 70%. The non-revenue water rate in the area of the Great River Water Purification Plant is nearly 70%, showing that there has been no improvement since when the rate was 57% at the time of the ex-post evaluation in 2005.

We speculated on the causes of the high non-revenue water rate

from the view point of demographic changes in the three parishes in the western area, of which the two water purification plants are in charge. As shown in Figure 3, the population of the three parishes in the western area has increased slightly. Since the population served by the water supply is deemed to increase in proportion to population growth, the population served by the water supply from the Great River Water Purification Plant is assumed to be increasing. The population served by the water supply from the Great River Water Purification Plant is 2.3 times greater than that of the Logwood Water Purification Plant. Thus, it is thought that not only have non-payers of water rates increased, but that water leakage and water stealing have also increased due to the extensive water supply network.

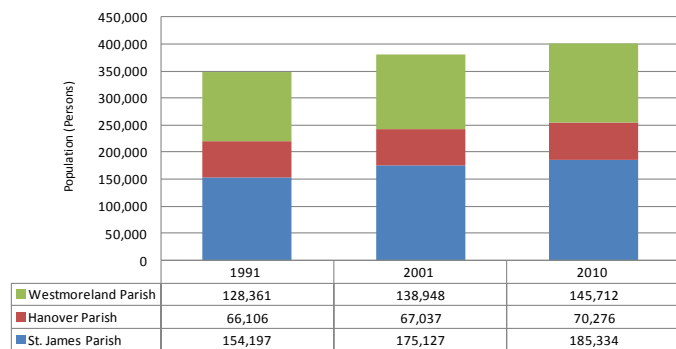


Figure 3 Demographic Changes in 3 Parishes in the West (Sources: Ex-post Evaluation and Statistical Institute of Jamaica)

Table 2 Structure of Water Rate (2004 and 2009)

Type of Customer	Monthly Usage	Monthly Fee /1,000 gallons (Jamaican Dollar)		Increase Rate ([2]/[1])
		[1] 2004	[2] 2009	
Ordinary Households	Up to 3,000 gallons	108.39	225.74	2.08
	Up to 6,000 gallons	191.98	397.98	2.07
	Up to 9,000 gallons	206.31	429.7	2.08
	Up to 12,000 gallons	263.33	548.46	2.08
	Up to 20,000 gallons	327.96	683.06	2.08
	Over 20,000 gallons	422.14	879.23	2.08
Companies	Flat Rate	406.43	846.49	2.08
Condominiums	Flat Rate	201.61	419.91	2.08
Schools	Flat Rate	162.58	338.6	2.08

(Source: Responses from NWC)

According to the structure of water rate, the rates doubled from 2004 to 2009. Because the non-revenue water rate is still high at 46% at the Logwood Water purification plant and 68% at the Great River Water purification plant, the water rates are assumed to have been increased to compensate for this. However, attention should be continuously paid to the changes in the water rates as they may not only prevent the extension of water supply system but also cause an increase in the non-revenue water rate.

3) Northern Coastal Highway Improvement Project: Average Traffic Volume and Required Driving Time Between Negril and Montego Bay (approximately 71km)

According to the results of the preceding survey (see Figure 4), the traffic volume at all the survey spots in Negril, Reading and Montego Bay has increased.

The current traffic volume was estimated to be approximately 14,000 vehicles per day². From this estimate and the results from

Reading in 2007, the traffic volume is thought to be 10,000 vehicles per day even today. The Four-lane section of the starting point from 2.6 km in Montego Bay City has been expanded (see Photo 5) and the traffic volume is expected to increase.

The required driving time from Negril to Montego Bay was about one hour, the same as at the time of the preceding survey, and it was possible to drive at the legal speed at 50km/h (in the city) and 80km/h (between cities). Regarding the road surface condition, some cracks, potholes and exfoliation (see Photo 7 to 9) were observed in the pavement of the road and the shoulder but most had been repaired.

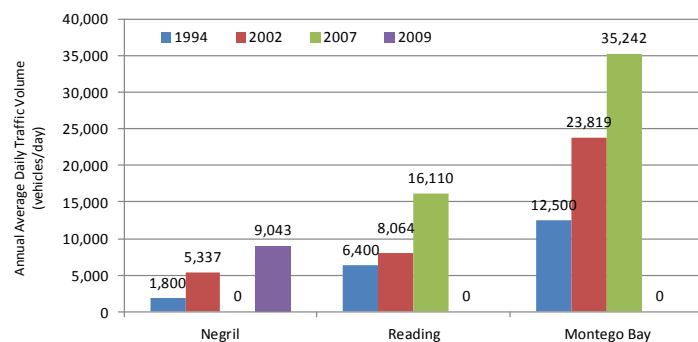


Figure 4 Changes in Annual Average Daily Traffic Volume (Source: Preceding Survey)



Photo 5 Four-Lane Road (Montego Bay)



Photo 6 General Condition of Road

² In order to grasp the present traffic volume, the traffic volume of one side of the road (Montego Bay to Negril) was measured for 10 minutes (around 13:00, June 2) while driving along the road concerned (between Negril and Reading) during the field survey; the volume was 109 vehicles/10minutes. From that figure and taking the traffic volume on both sides as 218 vehicles/10 minutes, the traffic volume per hour (60 minutes) was estimated at approximately 1,300 vehicles/hour; and assuming a day-to-night ratio of 1.1 from the traffic conditions in the area concerned, the traffic volume was estimated at approximately 14,000 vehicles per day (1,300 vehicles/hour × 12 hours ÷ 1.1).



Photo 7 Road Damage
(Pothole)



Photo 8 Road Damage
(Damage to Road Shoulder)



Photo 9 Road Repairs

4) Ocho Rios Port Expansion Project: Number of Cruise Ship Passengers and Number of Port Calls by Cruise Ships

The number of cruise ships which call at Ocho Rios Port has been decreasing since 2006 and the number of cruise ship passengers has also decreased consequently. Since the same trend was also observed at Montego Bay Port, tourism by cruise ships has been on the decreasing trend.

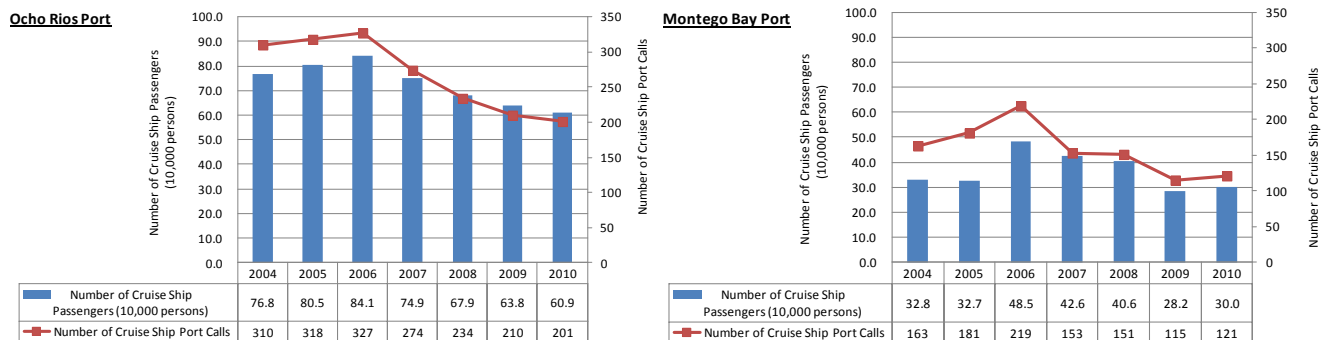


Figure 5 Number of Cruise Ship Passengers and Port Calls by Cruise Ships
(Source: Annual Travel Statistics 2007-2010, JAMAICA TOURIST BOARD)

On the other hand, the Falmouth Port opened in February 2011 as a joint venture between the PAJ and Royal Caribbean Cruises Ltd. The overview of the facility usage at the Falmouth Port is that the port received 182,000 cruise passengers between February and June 2011 (the Ocho Rios Port: 244,000 passengers, the Montego Bay Port: 136,000 passengers) and 48 cruise ships called at the port (the Ocho Rios Port: 92 ships, the Montego Bay Port: 60 ships). This indicates that the Falmouth Port received more cruise passengers than the Montego Bay Port. Falmouth Port is expected to play a role in tourism promotion in the northern region of Jamaica as large cruise ships can be anchored at the port and tourist facilities around the port have been well developed.

5) Entire Area Concerned: Changes in Number of Tourists

Regarding the changes in the number of tourists as shown in Figure 6, the number of cruise ship passengers has declined since 2006. However, the number of stayers in Ocho Rios, Montego Bay and Negril is increasing as shown in Figure 7. As shown in Figure 8, the number of travelers to Jamaica is slightly declining since 2006 in accordance with the decline in cruise ship passengers, while the number of non-cruise ship passengers who are considered to be arriving at the international airport in Kingston and Montego Bay is increasing.

When the traffic trend was observed during the field survey, there were many buses transporting passengers from the ships anchored in Montego Bay Port, Ocho Rios Port and Falmouth Port and passengers from the international airport in Montego Bay to Montego Bay District and Negril District. Tourists from Kingston are also thought to come to the area concerned. The increasing trend in the traffic volume as shown in Figure 4 seems to have partly resulted from such transportation of passengers.

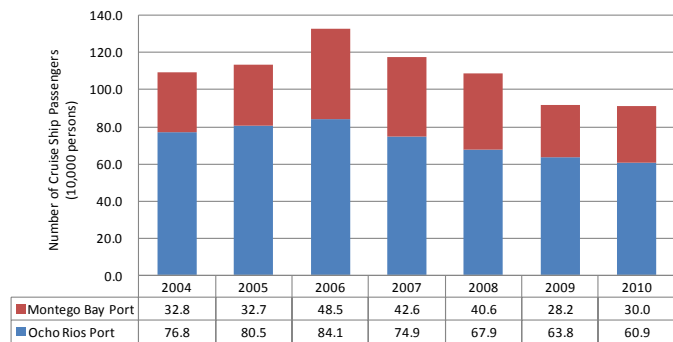


Figure 6 Changes in Number of Cruise Ship Passengers (Source: Annual Travel Statistics 2007-2010, JAMAICA TOURIST BOARD)

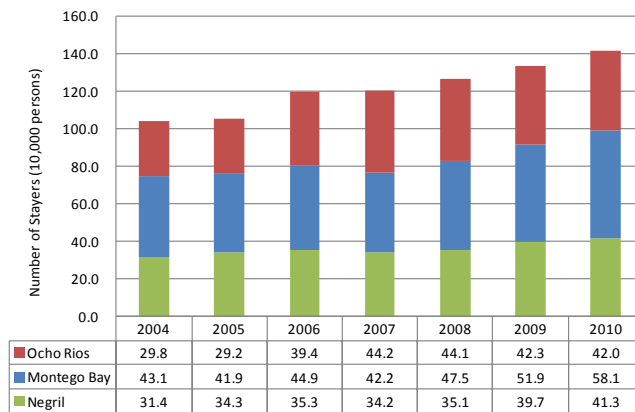


Figure 7 Changes in Number of Stayers in the Area (Source: Annual Travel Statistics 2007-2010, JAMAICA TOURIST BOARD)

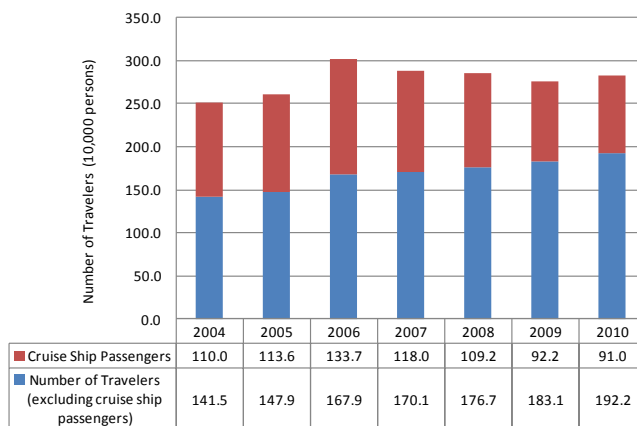


Figure 8 Changes in Number of Travelers to Jamaica (Source: Annual Travel Statistics 2007-2010, JAMAICA TOURIST BOARD)

(2) Results of Calculations of Internal Rate of Return (IRR)

Neither the Financial Internal Rate of Return (FIRR) nor Economic Internal Rate of Return (EIRR) was calculated, because there were no data available.

3.1.2 Qualitative Effects

<Montego Bay Drainage and Flood Control Project: Flood Damage>

No major damage to the facilities as a whole was observed and none of the functions of the facilities had been lost. The top of the facilities was effectively utilized, for instance, as parking lots, by constructing some sections in a box culvert structure, and they were also used as drain ditches for rainwater in the neighboring area of the facilities. Looking at the conditions in Montego Bay City, no prominent flood damage was observed, indicating that no major flood had occurred due to these facilities.

Regarding the condition of the facilities, it was observed that a lot of garbage had been dumped in the facilities. This may lead to accumulating garbage in the culverts and then clogging the inlets of the culverts if the water flow volume increases when it rains. In that case the water-flow cross-section of the culverts may not be secured and thus the original capacity may not be ensured.



Photo 10 Roadside Hotel and Transport by Bus



Photo 11 Utilization of Top of Facilities (as Parking Lot)



Photo 12 Upper Stream Inlet on Mountainside



Photo 13 Conditions of Culvert Inlet Before and After Rainfall

In conclusion, in terms of effectiveness, the number of cruise ship passengers is declining

but the number of tourists in the area concerned is increasing. The tourism trend should be paid attention as it is related to use of both roads and the port facilities. Regarding the sewerage project, attention should be paid to nonconformity with the effluent standards and lack of improvement in the non-revenue water rate.

3.2 Impact

3.2.1 Intended Impacts

1) Foreign Currency Revenue from Tourism

The foreign currency revenue from tourism in the area concerned was estimated from the changes in the foreign currency revenue of Jamaica³, as there were no data available regarding the foreign currency revenue from tourism in the area. As shown in Figure 9, the foreign currency revenue of Jamaica has remained roughly flat at between US\$1.8 and 2.0 billion

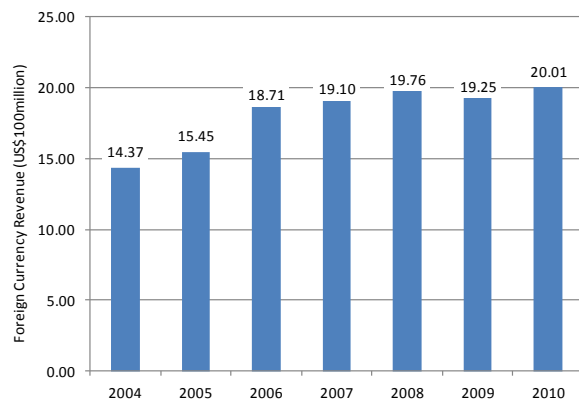


Figure 9 Changes in Foreign Currency Revenue of Jamaica (Source: Annual Travel Statistics 2007-2010, JAMAICA TOURIST BOARD)

since 2006. As shown in Figure 8, this is considered to have partly resulted from a slight decrease in the number of tourists, showing no significant change, and a change in the tourism pattern from long stay to short stay.

While the number of stayers in the area concerned is increasing, the area's foreign currency revenue from tourism is assumed to be flat or slightly increasing due to the declining number of cruise ship passengers and leveling-off of the foreign currency revenue of Jamaica as a country.

2) Changes in Number of Tourism-related Employees

Since the area is largely supported by the tourism industry, the employment trends in accommodation facilities, which are the center of tourism-related industries, can be regarded as an index of the trends in tourism-related employees. Looking at the employment trends in the accommodation facilities, as shown in Figure 10, employment has slightly increased in each district. As shown in Figure 11, this is considered to have partly resulted from the stable situation with no major changes in the number of accommodation facilities in the area concerned and the slight increase in the number of tourists (the number of stayers) in the area

³ According to the Annual Travel Statistics, Jamaica's foreign currency revenue comes from visitors for pleasure or business purposes.

as shown in Figure 7.

Thus, it is assumed that there have been no major changes in tourism-related employment trends in the area.

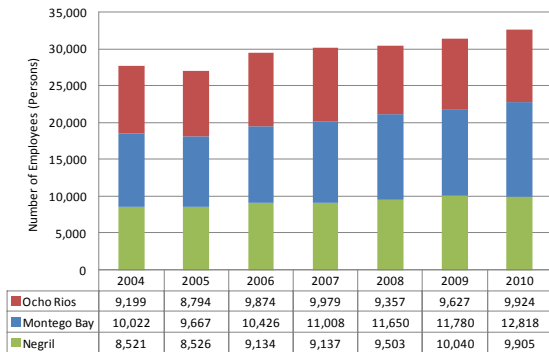


Figure 11 Changes in Number of Hotels in the Area Concerned (Source: Annual Travel Statistics 2007-2010, JAMAICA TOURIST BOARD)

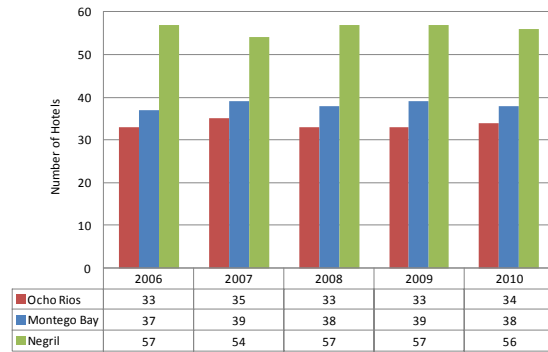


Figure 10 Changes in the Number of Employees in Accommodation Facilities in the Area Concerned (Source: Annual Travel Statistics 2007-2010, JAMAICA TOURIST BOARD)

3.2.2 Other Impacts

No other positive or negative impact has been confirmed.

In conclusion, the area's foreign currency revenue from tourism is assumed to be flat or slightly increasing in line with the changes in the tourism pattern. In addition, there have been no major changes in tourism-related employment trends. Since the tourism industry is an important industry in the area, attention should be continuously paid to trends in the tourism-related indexes.



Photo 14 Roadside Hotel

3.3 Sustainability

3.3.1 Structural Aspects of Operation and Maintenance

1) NWC (Target project: Montego Bay Sewerage Project, Lucea/Negril Water Supply Project)

There have been no changes in the system from the time of the ex-post evaluation, with the facilities managed through the East and West Branch Offices respectively; the area concerned is under the jurisdiction of the West Branch Office. According to the NWC, the necessary personnel for maintenance have been secured. Therefore, it is considered that there have been no major changes in the organizational structure from the time of the ex-post evaluation. In addition, although the concrete figures for personnel, such as the number of technical staff, are not known, judging from the existence of no major damage to the facilities such as pumps, sufficient personnel for maintenance is considered to be secured.

2) NWA (Target project: Northern Coastal Highway Improvement Project, Montego Bay Drainage and Flood Control Project)

There have been no major changes in the system from the time of the ex-post evaluation, with the facilities managed through the four branch offices (North East, Central, West and Metropolitan) under the Directorate of Regional Implementation; the area concerned is under the jurisdiction of the West Branch Office. Regarding the cleaning of the roads, the National Solid Waste Management Authority (NSWMA) takes care of vegetation removal and garbage cleaning along the roads.

3) PAJ (Target project: Ocho Rios Port Expansion Project)

Lannaman & Morris Shipping Limited (hereinafter referred to as L&M Ltd.) is in charge of terminal management (including small-scale maintenance work) and PAJ is in charge of large-scale maintenance work.

The ports under the jurisdiction of PAJ include Kingston Port, Ocho Rios Port and Montego Bay Port. In addition, Falmouth port was opened in 2011.

Falmouth Port as a whole has been developed as a commercial area and the entire area is managed by PAJ and Royal Caribbean Cruises International. Falmouth Port practices a different type of operation and maintenance system from Ocho Rios Port; operation and maintenance of the entire area of Falmouth Port are taken care of jointly with the private sector, while only the terminal operation of Ocho Rios Port is consigned to the private sector.

3.3.2 Technical Aspects of Operation and Maintenance

1) NWC

NWC has an operation manual on customer service and its main contents deal with customer care, such as how to deal with customers at the time of fee collection and how to deal with customers at the time of reconnection. Regarding the maintenance manual, a manual on equipment and facilities is available at the plants and maintenance offices. This manual also includes measures to deal with failures. In addition, maintenance-related training courses, such as a training course on the electric motor control system, are also available.

Regarding the effluent quality, the effluent standard has not been met and technical countermeasures have not been taken. The purifying method at this plant is natural purification by algae and aquatic plants. It is considered that it may be possible to improve the effluent quality if growth of the algae and aquatic plants is taken care of.

2) NWA

Regarding the roads, looking at the repaired sections at the site, there seems no problems with the repair techniques from the viewpoints of materials used for the repairs and the

condition after repair.

It was pointed out at the ex-post evaluation that there were bumps between the main roads and access roads for the bridges. In response to it, repair work to eliminate the difference in level is being carried out by repaving roads and earthwork reinforcement.

In conclusion, the condition of the repaired road surface and the repair work to eliminate bumps between access roads and the bridges demonstrate that the NWA has the necessary technical capabilities to handle relatively large-scale repair work.

3) PAJ

As at the time of the ex-post evaluation, L&M Ltd. was in charge of operation and maintenance. L&M Ltd. is engaged in distribution-related operation and management, such as ship owner's agency, cargo handling, warehouse management and distribution management besides port and terminal management. It is mainly in charge of distribution-related port management at Kingston Port and passenger ship-related operation and management at Ocho Rios Port and Montego Bay Port.

A field survey showed that there were no problems in daily maintenance as there was no major damage to the piers, terminal facilities, etc., though some electric lamps were broken. However, concrete exfoliation by brine damage was observed on the piers. When large-scale inspection and repair work like this kind are required, the facility conditions shall be reported to PAJ and PAJ take charge of inspection and repair/maintenance work.

3.3.3 Financial Aspects of Operation and Maintenance

1) NWC

The annual changes in sales and profits are as shown in Figure 12. Although sales are on the increase, operating expenses are also increasing in tandem with sales, but at a higher rate than the sales. As a result, profits show a declining trend.

As shown in Figure 13, the current ratio was over 100% until 2007 but it has tended to be below 100% since 2008 as the current liabilities have increased since 2004. Since the assets exceeded the liabilities until 2007 when the current ratio was over 100%, the liabilities could be covered even if there was no profit. However, profits could not be expected since 2008 as the liabilities continuously exceeded the assets. Therefore, the financial standing looks deteriorating.

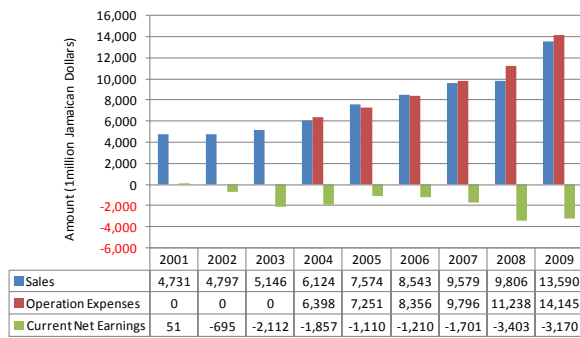


Figure 12 Changes in Profits of NWC
(Sources: Ex-post Evaluation Report
and Preceding Survey)

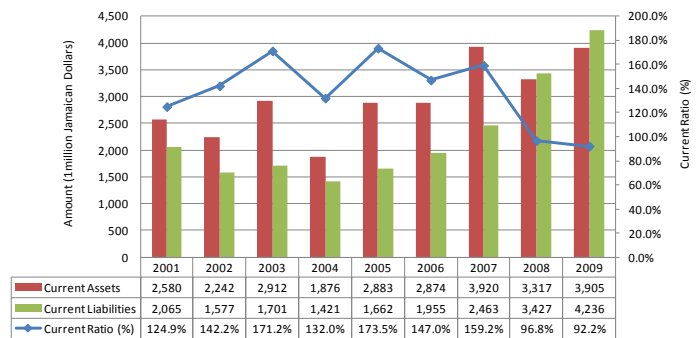


Figure 13 Changes in Current Ratio of NWC
(Sources: Ex-post Evaluation Report
and Preceding Survey)

2) NWA

As shown in Figure 14, sales hover at around 200 million to 600 million Jamaican dollars. However, the deficit also hovers at around 200 million to 600 million Jamaican dollars, thus the trend is not toward eliminating the deficit. The revenue and expenditure are balanced by subsidies provided by the government.

Although the current assets and liabilities are increasing as shown in Figure 15, the current assets exceed the current liabilities. Thus, a current ratio of over 100% is secured but it is declining, indicating that financial standing is deteriorating. Given the changing balance, no quick financial improvement is expected and reliance on the subsidies from the government is assumed to continue. Judging from the above-mentioned situation, the change to a self-supporting financial situation has not been achieved.

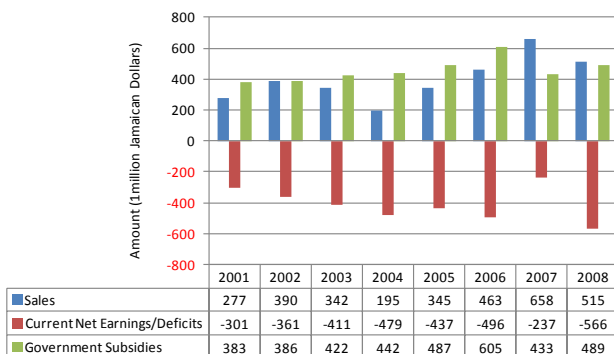


Figure 14 Changes in Profits of NWA
(Sources: Ex-post Evaluation Report
and Preceding Survey)

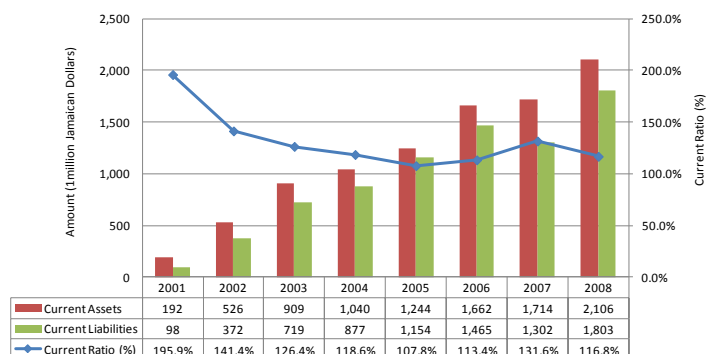


Figure 15 Changes in Current Ratio of NWA
(Sources: Ex-post Evaluation Report
and Preceding Survey)

3) PAJ

As shown in Figure 16, although sales increased from 2001 to 2007, they have hovered at around 12,000 million Jamaican dollars since 2008. Profits were around 1,700 million Jamaican dollars at most until 2008, increasing to 4,808 million Jamaican dollars in 2009.

As shown in Figure 17, current assets have increased. However, current liabilities showed a

decreasing trend in 2007. The liabilities exceeded the assets until 2008 but the assets exceeded the liabilities in 2009. As a result, since the current ratio was well over 100% in 2009, the liabilities could be covered.

As shown in Figure 18, the total assets are increasing. However, as capital remains at approximately 5,000 to 10,000 million Jamaican dollars without any major change, the capital ratio is declining. As a result, it may be necessary to rely on the liabilities when new funding is required for such as capital investment.

In conclusion, it is considered that there is no major concern about short-term financing unless large-scale capital investment is required.

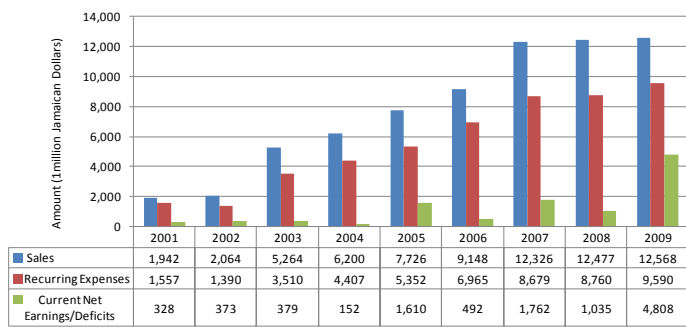


Figure 16 Changes in Profits of PAJ
(Sources: Ex-post Evaluation Report, Preceding Survey and Annual Report 2009)

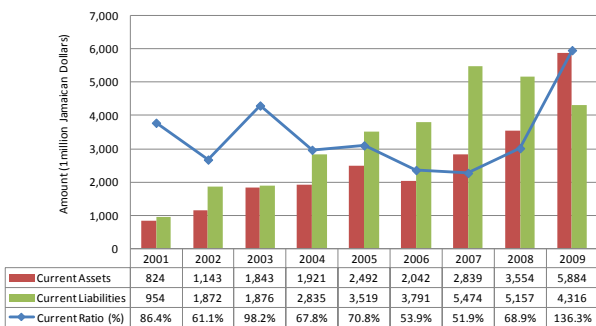


Figure 17 Changes in Current ratio of PAJ
(Sources: Ex-post Evaluation Report, Preceding Survey and Annual Report 2009)

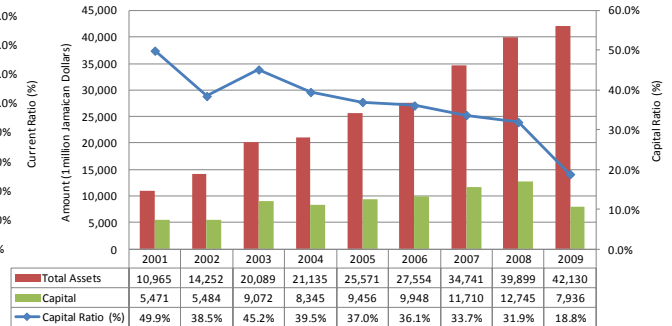


Figure 18 Changes in Capital Ratio of PAJ
(Sources: Ex-post Evaluation Report, Preceding Survey and Annual Report 2009)

3.3.4 Current Status of Operation and Maintenance

1) NWC

The water supply facilities are cleaned on a regular basis.

Regarding the sewage treatment facility (wastewater stabilization pond),



Photo 15 Maintenance of Water Supply Facility

accumulated garbage in the pond is cleaned up on a regular basis. While nearly ten years have passed since the completion of the wastewater stabilization pond, the sludge which had accumulated since then had not been removed. We were informed that the NWC planned to

conduct an investigation on removal of the sludge, and was preparing and studying execution of the removal work.

Regarding the high concentrations of BOD and SS, a field survey showed that algae and aquatic plants were not growing in abundance.

Since inhabitation by these plants and microorganisms is deemed to reduce concentrations of BOD and SS, growth of plants and microorganisms should be taken into account from the viewpoint of maintenance. Neither special techniques nor costly investment is required for growth of plants and microorganisms, thus it is considered that a local agency is able to handle it. As nearly ten years have passed since the completion of the wastewater stabilization pond, a lot of sludge is assumed to have settled at the bottom of the pond. If a lot of wastewater flows into the facility due to heavy rainfall, the settled sludge may swirl up and be discharged into the river at an early stage. Since this may cause an increase in the concentration of SS, the sludge should be removed at certain intervals of period. This sludge removal is large-scale maintenance work and should be generally conducted in approximately ten-year cycles. As ten years have passed since this facility started operation, it is about time to remove the sludge. We were informed that there was a plan to remove the sludge in the near future.



Photo 16 Cleaning of Wastewater Stabilization Pond

2) NWA

Potholes were observed in some sections of the roads (pavement) but there was little major damage such as to impair trafficability and repairs had been carried out. Regarding routine maintenance work such as road cleaning, vegetation removal and garbage cleaning were taken care of by NSWMA. Regarding the problem that the roads and the bridges connecting the areas were not on the same level, reinforcement work had been already carried out for 6 bridges in order to eliminate the height difference using the geotextile method (earthwork reinforcement). Thus, it is considered that the trafficability and safety of the roads have been secured and the necessary technical capabilities and implementation abilities were available for adequate maintenance.



Photo 17 Road Cleaning



Photo 18 Road after Reinforcement

Regarding the drainage and flood control project, while facility cleaning was conducted on

a regular basis, it was observed that a lot of garbage remained in the facilities as the residents along the river threw garbage into the facilities.

3) PAJ

There was no major damage to the piers, terminal facilities or parking lots and they were fully functional. Corrosion protection treatment had been applied to the water supply pipes to anchored ships but some damage to the incidental facilities, such as breakage of some electric lamps, was observed.

Since nearly ten years have passed since the completion of the facilities, some concrete exfoliation due to brine damage, etc. was observed. We were informed that it was planned to carry out an investigation of the piles supporting the piers and study the possibility of performing maintenance based on the results of the investigation. As nearly 10 years have passed and the piles are located under the sea, erosion by seawater is a concern. It is desirable that PAJ will carry out the investigation and study and implement a maintenance plan.



Photo 19 Concrete Exfoliation



Photo 20
Broken Electric
Lamp



Photo 21 Piles

In conclusion, in terms of sustainability, while nearly 10 years have passed since the completion of the facilities, no major damage to the facilities or equipment was observed, and the functions and performance level of the facilities were well maintained.

3.4 Others

Regarding the recommendations at the time of the ex-post evaluation, the status of the follow-up activities for the sub-projects is as described below.

(1) NWC/Montego Bay Sewerage Project: Effluent Standards of Treated Effluent

Regarding the effluent quality, as a result of confirmation of implementation of an investigation into the causes as well as formulation and implementation of countermeasures, it was found that nothing had been done. In addition, meeting of technical study committee

concerning the improvement of effluent quality had not been held.

It was found through hearings with the NWC that they did not consider nonconformity with the effluent standards as an urgent issue because they viewed the effluent standards as merely a target. This is why the above-mentioned countermeasures had not been taken.

Since the purifying method at this plant is natural purification by algae and aquatic plants, treatment largely relies on natural conditions such as the weather. Thus, it is considered that it may be possible to improve the effluent quality if growth of algae and aquatic plants is well taken care of as a maintenance method.

(2) NWC/Montego Bay Sewerage Project: Educational Activities about Sewerage Project

Measures to improve the non-revenue water rate of the water supply system were implemented through the “North Western Parishes (NWPP) Water Supply Service Improvement Project 2007-2010” conducted by NWC and educational activities. These activities are deemed to lead to improved collection of sewerage charges as the sewerage charges are linked with the amount of water supply used. It is also important to implement measures which are linked to the water supply measures because the sewerage charges are put on the same amount of the used amount of water supply, since it is regarded that 100% of the used amount of water is discharged. As a method of collecting fees, eventual cooperation with the police on non-payers was considered through the “North Western Parishes (NWPP) Water Supply Service Improvement Project 2007-2010” in an attempt to improve the fee collection rate.

(3) NWC / Lucea / Negril Water Supply Project: Countermeasures for Non-revenue Water Rate Improvement

Measures for non-revenue water rate improvement were implemented through the “North Western Parishes (NWPP) Water Supply Service Improvement Project 2007-2010”: for instance, collection of water rates is prioritized by checking non-payers in customer management. According to the NWC, educational activities about water rates are also conducted at schools as public relations activities. In this way, activities for non-revenue water rate improvement are being conducted.

(4) NWA/ Northern Coastal Highway Improvement Project and Montego Bay Drainage and Flood Control Project:

To promote financial independence, the following items 1) – 3) were recommended at the time of the preceding survey:

1) Consignment of road maintenance work to local governments along the road

Regarding maintenance, while the NSWMA takes responsibility for cleaning the road, it is not known if the local governments along the road are involved in road maintenance.

2) Enhancement of tourist road functions and improvement of public transportation

Between Negril and Montego Bay, more private minibuses for tourists were observed than public transportation services (buses). It is considered that these buses are running between the international airport and port in Montego Bay and tourist spots in Lucea and Negril, and between Ocho Rios Port or Falmouth Port and Montego Bay, Lucea and Negril.

3) Preventive measures against illegal occupation around picturesque places

As a result of a field survey, no noticeable illegal occupation was observed along the coastal road. No particular measures had been taken.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project aims to promote the northern area of Jamaica with a focus on the tourism industry which is the main local industry. In general, as a support project for tourism promotion, improvement of the transportation infrastructure such as road improvement is implemented for the enhancement of the transportation for tourists. In this project, improvement of Ocho Rios Port was important as a foothold improvement to receive many tourists by large cruise ships. In addition, the driving time between Ocho Rios, Montego Bay, Lucea and Negril, which are tourist strongholds, was shortened by improvement of the coastal road. This led to strengthening of cooperation and connecting functions with the port facilities which are the bases to receive tourists. On the other hand, this project also covers the water supply and sewerage sub-projects as well as drainage and flood control sub-project, besides the sub-projects which directly contribute to tourism promotion. Considering the relationship between tourism promotion and the water supply and sewerage sub-projects as well as the drainage and flood control sub-project, these sub-projects are important to improve the water supply and sewerage systems of the cities, and the implementation of flood countermeasures will not only improve the city functions of Montego Bay City but also improve the image of the tourists in Montego Bay City concerning the hygienic and living environment of the city. Collaboration on these sub-projects supports the tourism industry of the area concerned.

From the results of past surveys, the number of tourists in the area concerned is considered to be declining as the number of cruise ship passengers is declining. Such tourism trends are largely affected by the economic conditions. In consideration of the recent global economic

conditions, such a declining trend probably can be unavoidable. Even in such economic conditions, however, the slow decline as shown in Figure 7 is due to the high potentiality of tourism in the area, and it is considered to be contribution by the above-mentioned improvement in accessibility to tourism facilities and the urban environment. If the economic situation improves in the future, the number of tourists is expected to increase. Thus, in order to receive more tourists and maintain an attractive tourist city, it is important to maintain sustainability of the functions of these facilities.

The other points about the sub-projects are summarized as below.

- As a result of confirmation of the operation and condition of the water supply and sewage facilities, flood control facilities, roads and port facilities related to this project, it was found that there was no major damage to the facilities or equipment and the functions and performance level of the facilities were well maintained, though nearly ten years have passed since the completion of the facilities.
- Regarding the sewerage project, the effluent standards for BOD and SS concentrations specified in the environmental standards have not been met yet and measures should be reviewed in accordance with the purifying method of the improved facility.
- Regarding the water supply project, the non-revenue water rate is still high. The coverage of the water supply system hovers at around 50 – 60% (see Table 1 for reference), which is not high. Efforts should be made continuously to improve the non-revenue water rate and expand the water supply and sewerage networks.

4.2 Recommendations

As nearly ten years have passed since the completion of the facilities, due inspection and maintenance should be performed in order not only to maintain the functions of the facilities but also to ensure their long service life.

1) NWC

- Regarding the water supply project, measures should be continuously taken to improve the non-revenue water rate. In addition to measures and policies such as stricter measures for collection of the water rates, it is also important to take measures against water leakages, and to take measures to prevent expansion of water stealing along with an increase in the population served by the water supply. Measures should be reviewed for not only reducing the non-revenue water rate but also expanding the water supply network. While the water rates doubled from 2004 to 2009, attention should be paid to avoid being trapped in a vicious circle in which such water rate reviews worsen the non-revenue water rate.
- Regarding the sewerage project, measures should be continuously studied to ensure that

the concentrations of BOD and SS meet the effluent standards. Efforts should be made to improve the numerical values by controlling growth of aquatic plants according to the purifying method of the facility and also by removal of the settled sludge.

2) NWA

- Regarding the highway project, not only regular inspection and maintenance but also road and traffic control in accordance with the traffic conditions based on an understanding of the type and volume of passing vehicles should be conducted. The pavement may deteriorate quickly due to the increase in volume of heavy-duty vehicle traffic such as motor coaches which are a transportation characteristic of the tourist spots and heavy-duty freight vehicles for transporting cargo from the ports. The increase in traffic volume may cause new problems such as increased accidents and worsening of traffic jams.
- Regarding the drainage and flood control facilities, efforts should be made not only to reduce garbage dumping through educational activities for the residents but also to clean the facilities on a regular basis. A lot of garbage thrown into the facilities probably by residents along the river was observed. The discarded garbage may narrow or clog the cross-sectional flow area, preventing the facilities from serving their original functions.

3) PAJ

- Regarding the port facilities, as nearly ten years have passed since the completion of the facilities, inspection of the piles supporting the facilities as well as the maritime facilities itself should be conducted to grasp the condition of the facilities. The concrete or other building materials may deteriorate quickly due to brine damage.
- It is expected that PAJ utilizes these ports appropriately in accordance with their hinterlands and functions. Not only Ocho Rios Port but also Montego Bay Port and the new Falmouth Port are located in the area concerned. Large cruise ships are able to call at these ports and they are important facilities as tourist transport bases. Ocho Rios Port is located slightly to the east and thus is in a disadvantageous position for access to Montego Bay and Negril which are located on the west side, compared with Montego Bay Port and Falmouth Port. Since there are tourist attractions centering around the Blue Mountains on the west side, we hope that the three ports will serve their functions effectively, including Ocho Rios Port as a base for tourism on the east side.

4.3 Lessons Learned

None

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1. Project Outputs		
1) Montego Bay Sewerage Project	Construction of drainage pipeline: 7.9km in total Installation of pump facilities: 2 units Central treatment facility: 7.2 imgd Construction of sludge treatment facility (constructed in the central treatment facility)	33.6km in total 5 units 10.0imgd Cancelled and changed to a wastewater stabilization pond
2) Lucea/Negril Water Supply Project	Construction of water purification facility: 5.0 imgd Construction of water distribution facilities: 21.2km in total	7.5 imgd 27.1km in total
3) Northern Coastal Highway Improvement Project	Improvement of highway between Negril and Montego Bay: total expansion 73.3km	Total expansion: 71.2km
4) Montego Bay Drainage and Flood Control Project	Construction of drainage channels, drain ditches, settlement tanks, etc.: total expansion 1,127m	Total expansion: 1,073m
5) Ocho Rios Port Expansion Project	Expansion of second berth: 180 feet (approximately 55m) (to make it possible for large passenger ships of up to 900 feet (approximately 275m) to come alongside the pier)	As planned (It is possible for large passenger ships with a length of 1,020 feet (approximately 311m) to come alongside the pier.)
2. Project Period	November 1991 – October 1996 (59 months)	November 1991 – September 2002 (130 months)
3. Project Cost		
Amount paid in foreign currency	4,881 million yen	11,600 million yen
Amount paid in local currency	6,593 million yen (Local currency: 398 million Jamaican dollars)	15,746 million yen (Local currency: 5,611 million Jamaican dollars)
Total	11,474 million yen	27,346 million yen
Japanese ODA loan portion	8,606 million yen	8,599 million yen
Exchange rate	1 Jamaican dollar=16.8 yen (As of October 1991)	1 Jamaican dollar= 2.8 yen (Average between October 1991 – September 2002)

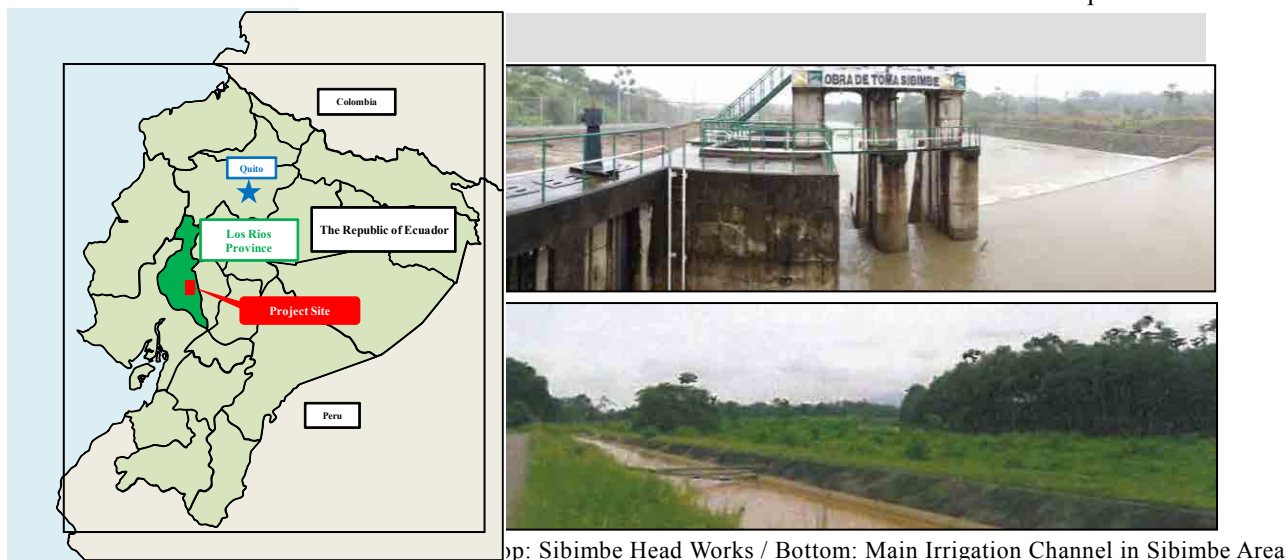
Ex-Post Monitoring of Completed ODA Loan Project

The Republic of Ecuador

Catarama River Basin Irrigation Project

External Evaluators: Tomoko Matsushita and Masahiro Yoshizawa

INGEROSEC Corporation



Top: Sibimbe Head Works / Bottom: Main Irrigation Channel in Sibimbe Area

1.1 Project Objective

The objective of this project is to increase agricultural production and improve agricultural productivity by building irrigation and drainage facilities in Ecuador's coastal region of the Catarama River Basin, thereby contributing to the betterment of farmers' livelihood, and encourage economic development in the region.

1.2 Outlines of the Loan Agreement

Approved Amount / Disbursed Amount	8,594 million yen / 7,320 million yen
Loan Agreement Signing Date / Final Disbursement	February, 1988 / February, 2003
Ex-post Evaluation	2005
Executing Agency	Comisión de Estudios para el Desarrollo de la Cuenca del Río Guayas (CEDEGE)
Main Contractor	Hidalgo & Hidalgo S.A (Ecuador)
Main Consultant	Nippon Koei Co., Ltd.

1.3 Background of Ex-post Monitoring

While Ecuador is an oil-producing nation and its economy is largely dependent on crude oil

production, its agricultural sector also plays a major economic role, and accounts for approximately 46% of the nation's workforce. Increasing agricultural productivity was a challenge for Ecuador's agricultural sector, and its undeveloped irrigation system was given as one of the reasons. In particular, concentrated efforts were made to develop the coastal region of Costa as an agricultural zone, but on account of its undeveloped irrigation system, water shortages during the dry season and flood damage during the rainy season were major factors in hampering the region's agricultural productivity increase. In light of such circumstances, the Government of Ecuador made the development of the nation's irrigation sector the focus of the four-year national development plan established in 1985, in which five large-scale irrigation projects were planned. The Catarama River Basin was included in one of the 10 plans constituting the irrigation plan for the lower Guayas River Basin, an area suitable for the cultivation of agricultural produce (Lower Guayas River Basin Irrigation Plan). This project was designed to improve poor drainage and improve agricultural productivity by developing an irrigation system in the Catarama River Basin.

At the time of ex-post evaluation in 2005, the area of cultivation did not reach the planned value and the project did not produce much from the viewpoints of effectiveness and impact. This is because the relation between benefits and burdens by implementation of the irrigation project was not understood well. In addition, support systems such as agricultural management guidance to support the effective use of the irrigation system were not well developed. Therefore, it was expected to conduct educational activities and establish a loan system to promote the use of the irrigation facilities.

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

2. Outlines of the Monitoring Study

2.1 Duration of Monitoring Study

Duration of the Study: March 2011 – October 2011

Duration of the Field Survey: Not conducted

2.2 Constraints during the Monitoring Study

Since study in the irrigation project had already been conducted by an expert by January 2011, this monitoring was conducted by analysis without any field survey. Internal documents with the latest information were used as reference for analysis to develop this report.

3. Monitoring Results

3.1 Effectiveness

3.1.1 Quantitative Effects

(1) Results from Operation and Effect Indicators

The effects brought by the Project after the ex-post evaluation were analyzed by the operational effect indexes such as area of cultivation, production volume and yield per unit.

1) Area of Cultivation

As shown in Fig. 1, the area of cultivation increased from 5,329ha at the time of the ex-post evaluation (2004) to 6,010ha (2008), however, it did not reach the planned value of 9,002ha. What were greatly increased after the ex-post evaluation were cultivation areas of African palms of 150ha (no report in 2004) and rice of 3,700ha (3,000ha in 2004).

Rice makes up a large portion of the area of cultivation and its production volume is large, while the yield per unit is not particularly high. On the other hand, the area of cultivation of bananas and African palms is smaller but the yield per unit is higher: especially, the production volume of bananas is greater than that of rice.

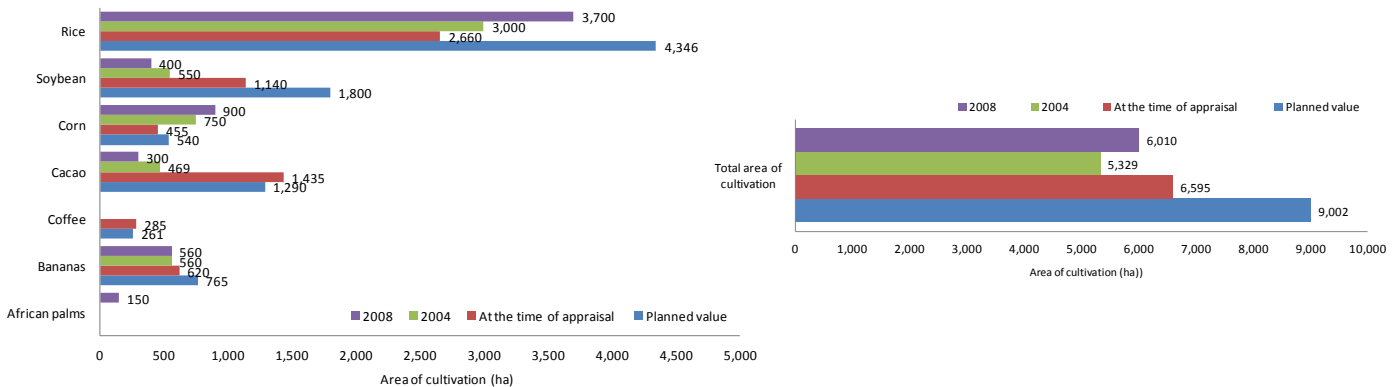


Fig. 1 Area of Cultivation (by crop and total area)

2) Production Volume

As shown in Fig. 2, the production volume of corn was greatly increased to 3,600t from 800t in 2004. This is considered to have resulted from introduction of new varieties, in comparison to an increase of the area of cultivation.

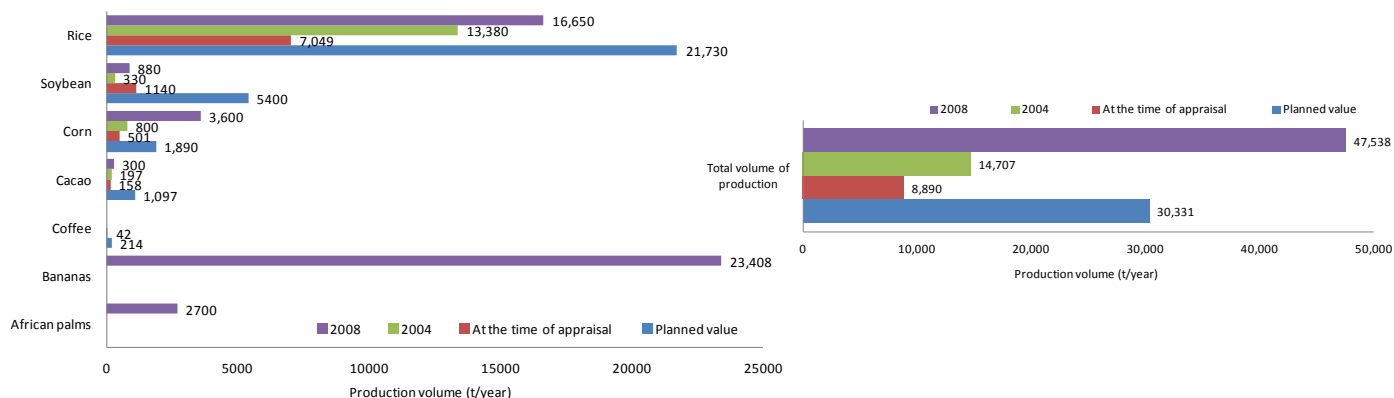


Fig. 2 Production Volume (by crop and total area)

3) Yield per Unit

As shown in Fig. 3, the yield per unit of cacao was increased to 1.0t/ha from 0.4t/ha in 2004. This is considered to have resulted from progress of change to a new hybrid variety CCN51.

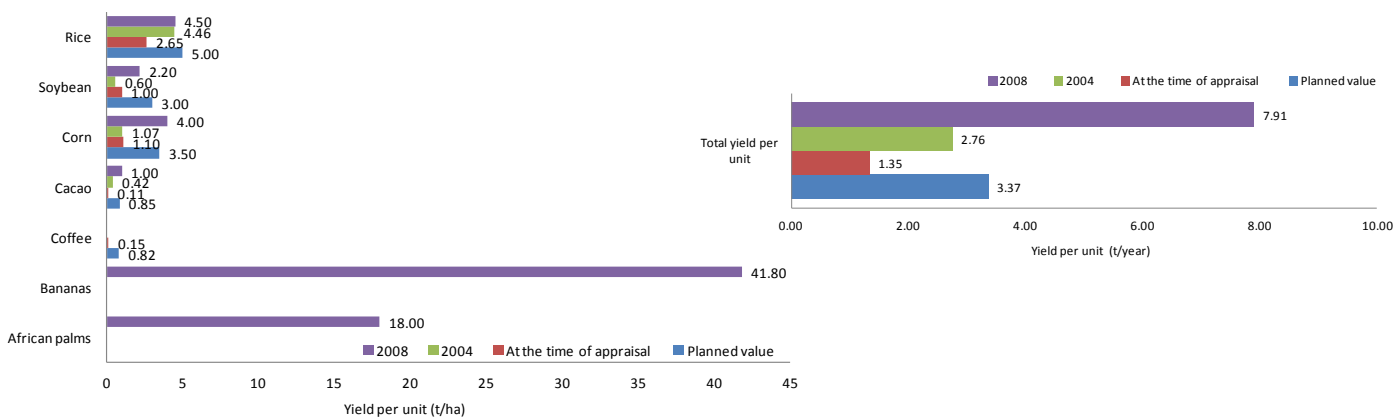


Fig. 3 Yield per Unit (by crop and total area)

Regarding the agricultural productivity, the average yield of rice is 4.0t/ha in the area (Los Rios Province, Agricultural Census, 2000), while it is a little higher, being 4.5t/ha (see Fig. 3, 2008) in the project area. The comparison of 2004 and 2008 for the area of cultivation (see Fig. 1) and the production volume (see Fig. 2) shows that the production volume increased in tandem with increase of the area of cultivation. Increase of the production volume is considered to have resulted from increase of the area of cultivation by irrigation, because it was not stated that new varieties had been introduced in the internal documents.

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

Neither the Financial Internal Rate of Return (FIRR) nor Economic Internal Rate of Return (EIRR) was calculated, because there were no data available.

3.1.2 Qualitative Effects

At the time of the ex-post evaluation, the drainage canals and embankments in the lower basin had been planned to be constructed at the expense of the Ecuador Government and they were expected to prevent the damage of 1,160ha out of 2,680ha of flood-prone area during the rainy season. However, it seems that the possibility of floods still remained for approximately 1,520ha in the lowest basin because the Ecuador Government did not construct a drainage pump station.

Regarding progress of construction, according to the internal documents, land expropriation and ground preparation of the construction site had been finished but construction has not been started as of January 2011.

The flood damage, especially the flood conditions of the lowest basin in relation to the drainage conditions, had been examined as of March 2009. According to the internal documents, the “Documentation about Drainage in Southern Part of Catarama Irrigation Project (December 1999)” states

that, of approximately 1,520ha in the lowest basin, 330ha would become uncultivable and 20ha would be affected in Sibimbe I Area; 250ha would become uncultivable and 285ha would be affected in Sibimbe II Area; and 635ha would be affected in Catarama Area. It means that a total of 1,520ha would be affected by floods in some way.

Table 1 Flood Area during Rainy Season

Crop Name		Flood Area			
		Sibimbe I (2,350ha)	Sibimbe II (1,380ha)	Catarama (2,030ha)	Total
Annual crop	Rice	330	250	360	940
Perennial crop	Bananas	-	105	-	105
	Cacao	20	50	150	220
	Coffee	-	120	120	240
	Pasture	-	10	5	15
Total		350	535	635	1,520

In conclusion, in terms of effectiveness, the agricultural productivity has been improved by execution of the irrigation project, while the flood countermeasures have merely remained as a plan.

3.2 Impact

3.2.1 Intended Impacts

“Improvement of agricultural incomes” is considered as an impact of the project concerned. The ex-post evaluation reported that a positive effect was not necessarily seen, because a certain increase in incomes

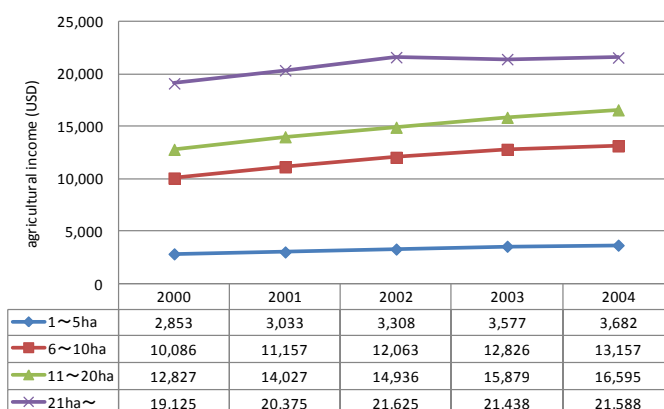


Fig. 4 Changes in Farmers' Incomes by Cultivation Area

since 2000 was observed but there was no big change in virtual incomes in consideration of the inflation rate¹.

The internal documents report changes in agricultural incomes as shown in Table 2. The incomes of landowner farmers are regarded as US\$800 – 1,000 per month. Compared with the farmers' incomes by cultivation area (US\$307 – 1,799/month)² as shown in Fig.4, it is assumed that the incomes of farmers with a relatively small cultivation area (10ha or less) are on the increase, while those of farmers with a larger cultivation area are either constant or on the decrease. Such increase is considered to have been partly

Table 2 Farm Economy & Living Conditions

	Landowner Farmers	Non-Landowner Farmers
Living conditions	<ul style="list-style-type: none"> • Living in urban areas • Small and medium-sized farming with an average farm field of 4.5ha (76% of the farmers have fields of 5ha or less) 	<ul style="list-style-type: none"> • Living in villages • Living as peasants on the rented farm fields without owning sufficient land and also engaged in farming as day agriculture workers
Economic conditions	<ul style="list-style-type: none"> • They do not necessarily run large-scale plantations and their average income is said to be about US\$800 – 1,000. 	<ul style="list-style-type: none"> • In the case of day workers, as their daily wage is US\$10, they are supposed to earn US\$200 – 300 per month if they work 20 – 30 days per month. • As the monthly income of the workers in cities is US\$480, that of the day agriculture workers is lower than that. Their incomes are not stable because • there may be no employment during agricultural off-seasons.

Table 3 Profitability of Crops

Item	Investment per hectare (Investment/ha)	Profit per hectare (Profit/ha)	Profit/Investment	
Rice	1,777.00 US\$	2,019.60 US\$	1.14	
Soybean	550.4 US\$	62.55 US\$	1.75	
Corn	1,465.74 US\$	1,950.80 US\$	1.33	
Cacao	1,580.20 US\$	2,340.00 US\$	1.48	
Bananas	1st year	30,432.00 US\$	25,530 US\$	0.83
	2nd year	9,237.00 US\$	25,530 US\$	2.76
African palms	1,024.00 US\$	2,326.10 US\$	1.27	

due to the higher profitability of crops as shown in Table 3 and higher production volume of profitable bananas as shown in Fig. 2.

On the other hand, the incomes of non- landowner farmers are lower than that of laborers in town, in consideration of the employment situations in agricultural off-seasons. Compared to the agricultural land holders (landowner farmers), it cannot be necessarily said that the agricultural income of the non-landowner farmers has improved due to irrigation.

3.2.2 Other Impacts

Regarding relocation of residents and land acquisition, there were problems such as non-approval of budget for land acquisition due to the financial situation of Comision de Estudios para el Desarrollo de la Cuenca del Rio Guayas (hereinafter referred to as CEDEGE) at the time of the ex-post evaluation.

¹ According to the “Key Economic Indicators of Ecuador, revised in 2009” (May 2009, Ministry of Foreign Affairs, Embassy of Japan in Ecuador), the inflation rate in Ecuador was increasing between 1.6% and 2.9% from 2001 to 2004, between 2.7% and 3.4% from 2004 to 2007, and stood as high as 8.8% in 2008, but it did not become a factor to dramatically increase incomes.

² In Fig. 4, 1 – 5ha is US\$3,682/year. Thus, US\$3,682/12 months = US\$307/month. In the same manner, 6 – 10ha gives US\$1,096/month, 11 – 20ha US\$1,383/month, and 21ha or more US\$1,799/month.

According to the internal documents, budgets were allocated to the labor costs, to a small portion of the facility costs and to maintenance costs. The difficult situation to secure financial resources for land acquisition had not changed since the time of the ex-post evaluation and the land acquisition expenses would not be approved. Therefore, problems arose concerning outstanding payments for land taken over to construct the facilities, and there has been no progress in payments for over one and a half years since June 2007. 165 people have not been paid yet and the total amount of outstanding payments is approximately US\$110,000. It will be difficult to reduce or dispel residents' distrust of this irrigation project unless this issue is solved. As mentioned below, according to the internal documents, while the responsibility of the local government (Los Rios Province) for the irrigation project has become greater, and the local budget is deemed to increase in the future, it was not clear if the financial resources for land acquisition have been secured.

The conclusion is that the living and economic situations of the non- landowner farmers could not be necessarily said to have been improved, while the living and economic situations of the agricultural landholders (landowner farmers) were improved as the profitability of crops increased.

3.3 Sustainability

3.3.1 Structural Aspects of Operation and Maintenance

(1) Executing Agency

CEDEGE, the executing agency at the time of the ex-post evaluation, experienced an organizational change by the time of the monitoring study as shown in Table 4. The systems and situations of each organization are as summarized in Table 4.

Table 4 Executing Agency Change

	CEDEGE (At the time of ex-post evaluation in 2005)	CEDEGE→INAR (2009)	MAGAP(INAR)+Los Rios Province (2011)
Systems & Situations	<p>The number of employees is 134 and 6 people are assigned to the project (3 agricultural engineers and 3 other engineering staff). Since CEDEGE is basically aimed at development of water resources, it is necessary to strengthen cooperation with other organizations for intangible support such as agricultural management guidance. In the future, to ensure the effects from the project, it is necessary to strengthen cooperation with the relevant government agencies such as Ministerio de Agricultura, Ganaderia, Acuicultura y Pesca and El Instituto Nacional Autónomo de Investigaciones Agropecuarias (INIAP) and improve the support system. The day-to-day operation and maintenance of the irrigation facilities were conducted by Hidalgo & Hidalgo Corporation but it was transferred to CEDEGE in December 2005, and after that, self-management of the facilities by an irrigation association is planned.</p>	<ul style="list-style-type: none"> ·The number of employees is 230 and 113 out of 230 are regular employees, and 117 are on contracts. 69 are engineers or technicians. ·The Maintenance and Production Development Department is in charge of the project after completion of construction works. ·Ventanas Office, which is in charge of this project organizationally belongs to Irrigation, Drainage and Flood Management Department. It has 10 staff. ·Ventanas Office is in charge of maintenance of this project. Its main tasks are collection of the usage fees of this project and maintenance, while it also works on facilitation of the procedures of land expropriation and promotion of utilization of irrigation facilities on a trial basis. ·INAR was founded by the presidential decree dated November 12, 2007. INAR is responsible for promotion of irrigation infrastructure aimed at small and medium-sized farmers and operation of irrigation projects and supervision of public administration of sustainable natural resources. This places INAR in a position to take over all irrigation projects in Ecuador and this project was taken over by INAR from CEDEGE. 	<ul style="list-style-type: none"> ·INAR was integrated into MAGAP on December 14, 2010. However, the current organization is expected to be maintained for the time being. ·In line with the new constitution, regarding division of the roles for irrigation development between MAGAP after integration of INAR and local governments, it was decided to give more roles to the local government (Los Rios Province). ·In response to increase of the roles for provincial economic development by the new constitution, Los Rios Province established the Bureau of Economic Development. The bureau has 60 staff (41 out of 60 are in charge of agricultural development), comprising a Production Enhancement Department and an Agricultural Development Department; The Agricultural Development Department is mainly responsible for agricultural development.

As described in Table 4, the agency in charge of operation and maintenance has changed from CEDEGE to Instituto Nacional de Riego (hereinafter referred to as INAR) and then to Ministerio de Agricultura, Ganaderia, Acuicultura y Pesca (hereinafter referred to as MAGAP) in a short period of time since 2005. Consequently, the maintenance system is not

consistent and the contents of maintenance, role sharing and personnel structure are not clear.

As the roles/responsibilities of the local government (Los Rios Province) have been recently increased based on the new constitution, it is considered that cooperation between the agencies of the central government (INAR and MAGAP) and the local government (Los Rios Province) will become more important. However, division of the roles is not clear and measures overlap between the central and provincial governments: for instance, support for community and irrigation association are listed as measures taken by the central and local governments respectively. It may be necessary to pay attention to the situation of unclear division of the roles, which may cause negative effects such as delay of implementation of measures.

As it stands now, maintenance is taken care of by INAR and has not been transferred to Junta General de Usuarios de Canal en Catarama Sibimbe (hereinafter referred to as JGU).

(2) Irrigation Association

The situations of the irrigation association are summarized in the table below.

Table 5 Change of Irrigation Association

	Irrigation Association (At the time of ex-post evaluation in 2005)	Junta General de Usuarios de Canal en Catarama Sibimbe (JGU) (2011)
Systems & Situations	An irrigation association per irrigation project should be established under the Water Act (Ley de Agua). An association has been already established and the association rules have been developed for this project. The organizational structure is to divide the canal into 11 areas and assign 3 representatives per area (1 head and 2 deputy heads), consisting of 34 representatives in total including the association representative. However, there was no actual activity performed and it was observed that some farmers had little intention to participate in maintenance.	<ul style="list-style-type: none"> • The committee consists of 125 registered members, which is a much smaller membership than the expected membership of 518 when the irrigation project was planned. • In 2010, an election was held at the committee to select a new head. The organization is being restructured in accordance with the road map (Basic Study Procedures for Catarama River Irrigation Project Vitalization) developed by INAR and it is planned to update the organizational rules, etc.

According to the internal documents, the responsibility for maintenance is planned to be transferred to JGU. An election to select the chief representative will be held at the committee and the rules will be reviewed and updated. It is judged from such situations that the environment is being improved to carry out maintenance activities systematically.

However, because the membership is small and the human resources to carry out activities are insufficient, and also because profitability may not be enough due to the small membership, it is considered that there still remain some issues to be solved for practical activities.

3.3.2 Technical Aspects of Operation and Maintenance

As stated in 3.3.1, at the time of January 2011, MAGAP (INAR) and Los Rios Province took care of maintenance, not CEDEGE. Therefore, the outlines of MAGAP (INAR), Los Rios Province (Bureau of Economic Development) and JGU are hereinafter described.

(1) MAGAP (INAR)

According to the internal documents, INAR had 370 employees in March 2009 and 86 out of 370 worked at the head office, however, the number of engineers/technicians had not been figured out.

This project is under the jurisdiction of INAR Guayas River Basin Office. The number of staff of the office was 17 in March 2009; 2 agricultural civil engineers, 1 agricultural engineer, some others specialized in marketing and environment, lawyers, etc. Not only its organization but also their staffs are not fully prepared for operation because this office was newly established.

At this time, INAR seems to function as a part of MAGAP but there is no information such as the number of specialists to figure out its engineering level.

(2) Los Rios Province (Bureau of Economic Development)

According to the internal documents, the bureau had 41 agriculture-related specialists. Their main areas of expertise are; agriculture (14 persons), veterinary (7 persons), social development (4 persons), organic agriculture (1 person), agricultural economy (1 person), commercial (1 person), etc.

(3) JGU

According to the internal documents, the committee played almost no role under the situation that utilization of the irrigation facilities was not used to the full.

In conclusion, while agriculture-related specialists and engineers are assigned to MAGAP (INAR) and Los Rios Province (Bureau of Economic Development), it is unclear how engineering and specialist issues are handled by each organization, because the executing agencies were changed in a short period.

JGU has had almost no role and the operation and maintenance tasks have not been transferred yet, but will be transferred to them in the future as mentioned above.

3.3.3 Financial Aspects of Operation and Maintenance

The financial situations of MAGAP (INAR), Los Rios Province (Bureau of Economic Development) and JGU for operation and maintenance are as summarized below:

(1) MAGAP (INAR)

According to the internal documents, the budget for operation and maintenance of the project was US\$424,320. INAR forecasts that the expenses necessary for operation and maintenance after 2011 will be US\$829,057 per year.

(2) Los Rios Province (Bureau of Economic Development)

According to the internal documents, the provincial budget was increasing every year and the budget for 2010 was US\$29,886,260. The budget for production sectors including the agricultural sector has been allocated in earnest since 2009; it was US\$1,590,000 in 2010. In 2010, the agriculture-related budget was further increased; US\$3,000,000 was allocated for irrigation and US\$2,500,000 for production.

(3) JGU

According to the internal documents, the committee was originally established as an organization to collect the usage fees of irrigation water and take responsibility for future operation and maintenance including facility maintenance and cleaning. In practice, the committee had almost no activity because CEDEGE was in charge of operation, maintenance and fee collection (as of 2009). Regarding the budget, the committee had neither budgets nor assets because it had no external financial resources such as subsidies and it was not in a position to collect the fees.

Regarding the usage fees for irrigation water, the contribution related to the use of irrigation water was said to be US\$80 ha/year at the time of planning. However, it was decided to be US\$3.52 ha/month through discussion between the users and CEDEGE. It means that the amount of contribution fee is only for the volume of used water on a monthly basis. There is no particular penalty, etc. to the delinquents. Thus, stable collection of usage fees is not ensured.

Regarding the financial situations of the execution agencies, as the operation and management were transferred to MAGAP (INAR) and Los Rios Province from CEDEGE, the financial discretion for operation is expected to be improved. However, actual budget allocation is still unclear because division of the operational roles between the central and provincial governments is not clear.

JGU does not perform activities as an irrigation association in the way as mentioned above, however, since the operation and maintenance may be transferred to JGU in the future, it will be important for them to gain the knowledge about finance, charging systems, and fee collection.

3.3.4 Current Status of Operation and Maintenance

The internal documents report the operation and maintenance conditions of the following facilities:

(1) Drainage

There is little margin between the culvert height and the water height and the garbage flowing down from the upper stream tends to pile up. This could cause flooding and the entire culvert could be under water at the time of flood, making some places impassable.

(2) Catarama Pump Station

The operating hours of the pump station, which is the main facility in the Catarama Area, are limited due to operation panel trouble, causing damage such as totally destroying rice which was planted as a dry-season crop. There are also other problems; for instance, the big figures in the upstream areas exclusively exploit the scarce irrigation water.

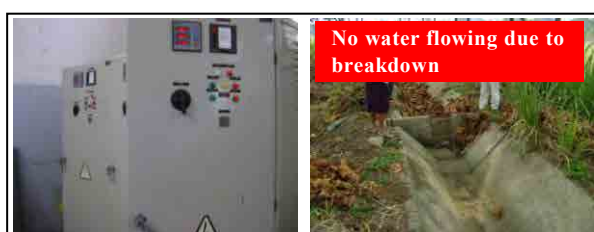


Photo 1 Switchboard (broken down) and Tertiary Channel

(3) Flap Gate

The farmers are not happy with the flap gate because it does not serve its designed function at the time of floods.

This happens because a lot of dried grass is tangled in the flap gate and causes the trouble that the gate cannot be closed. The daily maintenance of the main facilities such as the flap gate is particularly important.



Photo 2 Flap Gate

According to the internal documents, Hidalgo & Hidalgo Corporation who constructed the works was in charge of maintenance of the facilities for a while after completion of the works (December 2002). However, the maintenance agency was changed from Hidalgo & Hidalgo Corporation to CEDEGE in June 2005, having Ventanas Office be responsible for all maintenance tasks. After that, the responsibility was moved from CEDEGE to MAGAP (INAR), but there is no change in the situation that the executing agency performs the operation and maintenance. According to the internal documents, INAR Ventanas Office (under the jurisdiction of INAR Guayas Regional Office) performs the operation and

maintenance.

Problems about the maintenance include floods caused by clogged garbage, pump station trouble and flap gate trouble. These problems can be solved or reduced by appropriate daily maintenance. It is judged from these situations that the day-to-day maintenance may be inadequate.

In conclusion, regarding sustainability, it is unclear if adequate systems and sufficient budgets for operation and maintenance are secured, due to consolidation of the executing agencies after 2005.

3.4 Others

At the time of the ex-post evaluation, it was pointed out that the relation between benefits (increase in agricultural production) and burdens (provision of land due to development of fringe farmland and water fees etc.) was not understood well. It was also pointed out that intangible support such as agricultural management guidance to promote the effective use of the irrigation project has not been developed. These were seen as the causes of little progress of the development of fringe farmlands and the use of the irrigation facilities. The following points were suggested as follow-up activities: (1) promotion and establishment of the effects of the irrigation facilities and (2) improvement of comprehensive agricultural development. The results of monitoring about them are described below.

(1) Promotion and Establishment of Effects of Irrigation Facilities

Regarding educational activities about promotion of the use of the irrigation facilities, according to the internal documents, CEDEGE provided farmers education and irrigation agriculture guidance as described below, however, it did not lead to bringing-out of self-motivated activities by farmers.

1) Farmers Education

Until mid-2008 the problem often happened that farmers broke part of the concrete wall to take the water into their dry fields without permission because construction of tertiary canals did not make progress. In response to that, CEDEGE performed educational activities, for instance, they toured the regional groups to teach how to use the irrigation water without breaking the concrete wall of the canals. Owing to this, breaking of the irrigation canals has never happened again afterward. However, the instructions for the use of irrigation



Photo 3 Direct Water Intake

water does not include a clear calculation method about the amount of water used which serves as the base for collection of charges from the farmers. Thus there is no way to check the failure to declare the amount of water used by the users.

2) Irrigation Agriculture Guidance

CEDEGE established a demonstration farm field for one year in 2007 and provided guidance to the farmers for effective use of the irrigation water to improve productivity. Stevia, corn, cacao, balsa wood, etc. were experimentally grown in the demonstration farm field under contract between CEDEGE and two agricultural chemical companies but the project was discontinued in 2008 due to a budget problem.

What can be assumed as the reason why the educational activities were not so actively promoted is that the agencies in charge of operation and maintenance frequently changed after 2005, and consistent measures could not be implemented in a responsible manner. Moreover, since this irrigation project has not been completed yet to achieve the original target, the focus has been placed on infrastructure improvement to fulfill the plan; for instance, additional construction/improvement of the facilities (tertiary canal and farm field improvement). The situation would not allow to execute intangible measures such as educational activities due to the budget and implementation constraints.

Although there is no self-motivated activity by the farmers, it can be said that the farmers may gradually get involved in utilization promotion and operation of the irrigation facilities, based on the information that an election will be held at JGU, that the organization will be restructured and that there is willingness to be involved in management,

(2) Improvement of Comprehensive Agricultural Development

According to the internal documents, the irrigation improvement for the planned value (5,700ha of irrigation area) has not completed yet. While the focus has been placed on additional construction/improvement of the facilities (tertiary canal and farm field improvement) to achieve the plan, it seems difficult to establish appropriate improvement standards and to construct/improve tertiary canals and farm fields in order to enable many farmers to participate in the project, as the ex-post evaluation pointed out. Also, it will be more difficult to promote a plan combined with agricultural technology and agricultural finance together. Furthermore, due to frequent consolidation of the executing agencies, no appropriate system was available to plan and promote facility improvement and intangible measures as a package.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

- As the agricultural productivity is on the increase, the project is considered to have produced certain effects.
- 5,700ha of the irrigation area, the original target, has not been completed yet.
- Regarding maintenance, the agencies in charge of operation and maintenance have frequently changed since 2005 and it is unclear if the adequate systems and sufficient budgets for operation and maintenance are secured. Since some of the problems have happened due to inappropriate daily maintenance, it is assumed that adequate systems and sufficient budgets to perform daily maintenance activities are not secured.
- JGU has no experience of operation/maintenance and collection of fees at present, which is not different from the situation at the time of the study in 2005. However, based on the information that an election will be held at JGU, that the organization will be restructured and that there is willingness of farmers to involve in management of operation and maintenance, it can be said that there are signs of more involvement of JGU in promotion of utilization and operation of the irrigation facilities.

4.2 Recommendations

The executing agencies have been changed from CEDEGE to INAR/MAGAP (INAR) and then to provinces in a short period of time since 2005, and MAGAP (INAR) and Los Rios Province seem to be the executing agencies at present. However, division of the roles among the agencies is not clear. The following are recommendations to the agencies in charge of operation and maintenance of this project, which are based on the recommendations stated in the latest study:

(1) Recommendations and Follow-up Activities

1) Conducting Surveys Necessary to Achieve the Original Target

In order to improve the irrigation area of 5,700ha to increase the agricultural production in the subject area, additional construction or improvement of facilities such as tertiary canals and farm fields is an extremely important element. On the other hand, approximately 30 years has passed since completion of the Feasibility Study (F/S) and the social and economic environments around the farmers have changed. Therefore, for future construction/improvement of the irrigation facilities (additional construction/improvement), it is important to understand the changes in the social and economic environments for the farmers because farmers' awareness level about agricultural management and the proportion of the agricultural income in their household budget may have also changed. In other words, the position of agriculture for the farmers may have changed.

Thus, it is necessary to conduct a social and economic survey to clarify the position of agriculture for the farmers, the required scale of additional irrigation facility construction/improvement and the contents of the necessary maintenance of the existing facilities.

2) Short- and Medium-term Measures

The efforts should be made to keep the target by effective use of the existing facilities in the short term as more than 10 years have passed since the facility construction.

- To promote the use of irrigation by making the best use of the existing facilities. For instance, to make efforts to make the irrigation easy to use even tentatively, through construction of simple canals (earth canals) and repair of the existing tertiary canals to temporarily connect to the existing main and branch canals.
- To build a maintenance system. For instance, it is difficult for MAGAP (INAR) to perform maintenance activities due to its organizational structure, so daily maintenance is not adequately done and some facilities have got problems. By clarifying the division of the roles between MAGAP (INAR)/the provincial government and the irrigation association, the situation should get better.
- To construct/improve facilities suitable for the farmers' social and economic conditions. Planning and implementation of additional construction/improvement of irrigation facilities based on the current social and economic conditions should be conducted. In order to obtain the information which will become the basis for that, a survey about the farmers' social and economic conditions should be carried out.
- To take measures to improve the existing irrigation utilization ratio by the farmers. Some farmers in the area cannot make a living only with agricultural incomes. These farmers are considered to earn more from jobs other than agriculture. Agricultural incomes even for large-scale farmers may be secondary incomes because they tend to run processing factories. In addition, in Ecuador, there are private companies who offer a cultivation service on a contract basis. Therefore, it is important to make efforts to improve the utilization ratio of the existing irrigation system by the farmers, for instance, by providing and promoting agricultural management models in accordance with the social and economic conditions surrounding agriculture.

(2) Others

Regarding the outstanding payments for the land which was acquired to construct the facilities, the government of Ecuador should solve the problem as soon as possible in order to dispel residents' distrust of this project.

(3) Current Situation

MAGAP (INAR) has clarified the issues related to the irrigation project and developed a road map to solve these issues. The agencies and governments (INAR, MAGAP, the provincial government and the municipal government) are conducting surveys in accordance with the road map (started in October 2010). The Ecuador Government is conducting surveys and Japan is supporting³ it to make the surveys progress efficiently and effectively.

4.3 Lessons Learned

The followings are the lessons learned from the way of execution of this project:

- Regarding agricultural incomes associated with the production volume, further income increases can be expected by growing high-value-added varieties. However, it takes time and money to grow such varieties because they require extra effort. Therefore, it is necessary to pay attention to a future possibility that only rich farmers may gain more benefits while peasants who are non-landowner farmers may only gain benefits secondarily through employment as agricultural day laborers.
- Not only facility improvement (infrastructure improvement) but also improvement of measures to promote projects (intangible measures) should be together taken into consideration at the planning stage for making feasible plans and budgets. In the case of this project, it was found that the functions were not fully utilized because of the problems with the irrigation facilities, even though the facilities were completed. This was caused by inadequate daily operation and maintenance due to the inadequate system and the insufficient budget for operation and management because of policy changes and organizational restructuring. In order to solve these problems, for instance, in addition to make strict rules on the procedures of operation takeover in facility transfer, it is important to take certain measures, for example, securing maintenance personnel from the irrigation association and building a mechanism to use irrigation water fees for operating expenses.

³ A loan assistance expert (irrigation project) was dispatched from late April to late August 2011.

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1. Project Outputs 1) Sibimbe Plan 1. Construction of head works 2. Irrigation canal 3. Drainage canal 4. Development of fringe farms 2) Catarama Plan 1. Construction of pump station 2. Irrigation canal 3. Drainage canal 4. Development of fringe farms 3) Procurement of agricultural machinery 4) Procurement of maintenance facilities and equipment 5) Embankments in lower basin	1) Beneficial area: 3,470ha 1. Max. flow rate: 5.0m ³ /s 2. 54.0km 3. 52.2km 4. 2,250ha 2) Beneficial area: 2,330ha 1. Max. flow rate: 3.3m ³ /s 2. 28.1km 3. 24.8km 4. 1,850ha 3) Procurement of agricultural machinery 22 tractors, 6 combines, 52 other machines 4) Procurement of maintenance facilities and equipment Project office, workshops, bulldozers, etc.	1) 1. Max. flow rate: 4.85m ³ /s (almost as planned) 2. 42.1km (almost as planned) 3. 56.1km (almost as planned) 4. 796ha 2) As planned 1. Max. flow rate: 2.7m ³ /s (almost as planned) 2. 26.7km (almost as planned) 3. 15.2km (almost as planned) 4. 612 ha 3) Cancelled 4) Cancelled 5) Total: 13.7km Sibimbe 1: 4.8km Sibimbe 2: 7.6km Catarama: 1.3km
2. Project Period	February 1988 – December 1992 (59 months)	February 1988 – December 2002 (179 months)
3. Project Cost Amount paid in Foreign currency Amount paid in Local currency Total Japanese ODA loan portion Exchange rate	6,400 million yen 3,500 million yen 10,110 million yen 8,594 million yen 1 sucre=1.06 yen (As of August 1986)	7,320 million yen 3,560 million yen 10,880 million yen 7,320 million yen US\$1=119.7 yen (Average over 1990 – 2003)

Ex-Post Monitoring of Completed ODA Loan Project

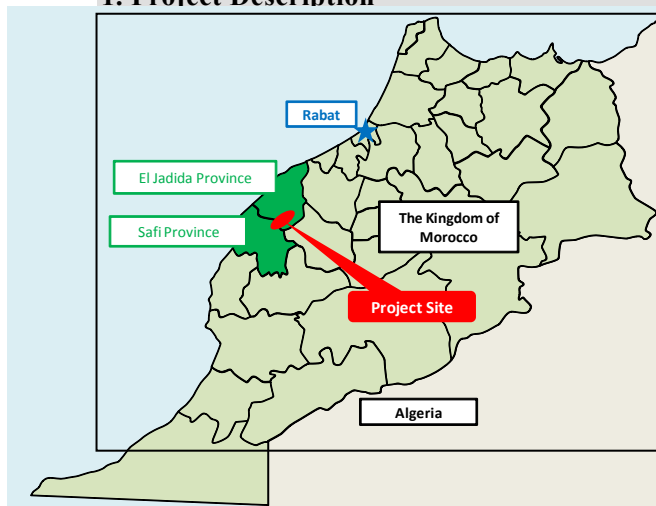
Kingdom of Morocco

Abda-Doukkala Upper Scheme Irrigation Project

External Evaluators: Tomoko Matsushita and Masahiro Yoshizawa

INGEROSEC Corporation

1. Project Description



Main Canal

1.1 Project Objective

The purpose of this project was to construct irrigation facilities in Abda-Doukkala for the supply of irrigation water, to increase agricultural production and create employment and thereby increase farmer income and promote rural economic development.

1.2 Outline of the Loan Agreement

Approved Amount/ Disbursed Amount	13,548 million yen / 13,426 million yen
Loan Agreement Signing Date / Final Disbursement Date	June, 1996 / November, 2001
Ex-post Evaluation	2005
Executing Agency	Office Regional de Mise en Valeur Agricole des Doukkala (ORMVAD)
Main Contractor	BECAM(Morocco) / STAM(Morocco)(JV) / GRUPOACCIONA.S.A.(Morocco) / S.T.A.I.P.(Morocco)(JV) / S.T.A.I.P.(Morocco) / EMT(Morocco) / SOCA(Morocco) / SOGEA(Morocco)(JV) / AIC(Morocco)/ OMCE(Morocco) / SOGETRAMA(Morocco)(JV) / DIAMATIT(Morocco) / SNCE(Morocco)(JV)
Main Consultant	HYDROPROJECTO(Portugal) / EWI MAROC(Morocco) / SCET(Morocco)(JV)

1.3 Background of Ex-post Monitoring

Moroccan agriculture consumes over 90% of the usable water resources. Considering the increase in demand for industrial-use water and water supply as the country's industry develops and its cities grow, there is a strong possibility that in the future the proportion of irrigation water could be limited. Therefore the efficient use of water through the construction of irrigation facilities has been an urgent issue. In addition, in years when agricultural production dropped, such as during droughts, the growth of the overall Moroccan economy stalled or declined. Therefore the stable development of agriculture was the key to stabilizing the overall economy, which makes the installation of irrigation facilities to free agriculture from dependence on rainwater a pressing need.

The plan for constructing irrigation facilities in the Doukkala Plain was to irrigate 32,400ha in El Jadida Province and 31,550ha in Safi Province. Phase 1 (16,000ha) had already been executed with financial assistance from the African Development Bank, European Investment Bank, and Arab Fund for Economic and Social Development, so it was decided to use the yen loan for the 18,901ha of Phase 2.

At the time of the ex-post evaluation, the area under cultivation was below the originally planned value. This was found to be due to insufficient supply of irrigation water during the drought in the dry season and inadequate countermeasures for the efficient use of water resources. Therefore, it was desired to be considered to set appropriate water fees by the government, to appropriate the income from irrigation earned by the executing agency exclusively to irrigation-related projects, and to shift to high-profit agricultural crops, in order to efficient use of the water resources. There were also other issues for the executing agency, i.e. introduction of water-saving irrigation systems, resolution of the duplication of tasks with the Ministry of Agriculture and Fisheries, establishment of a self-supporting financial system and provision of support activities for the irrigation association.

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

2. Outline of the Monitoring Study

2.1 Duration of Monitoring Study

Duration of the Study: March 2011 – October 2011

Duration of the Field Study: Not conducted

2.2 Constraints during the Monitoring Study

Since follow-up studies had already been conducted, this monitoring was conducted by analysis without any field survey. The following reports with the latest information were

used as reference for analysis and development of this report:

- ODA Loan Collateral Project, “Abda-Doukkala Irrigation Project” – Report on Detailed Design Study (I), July 2010
- ODA Loan Collateral Project, “Abda-Doukkala Irrigation Project” – Report on Detailed Design Study (II), December 2010

Hereinafter, both reports are referred to as the “Report on Detailed Design Study”.

3. Monitoring Results

3.1 Effectiveness

3.1.1 Quantitative Effects

(1) Results from Operation and Effect Indicators

The effects produced by the project after the ex-post evaluation were analyzed by the operational effect indexes such as the irrigation water volume, the area of cultivation and the yields of main crops.

1) Irrigation Water Volume

As shown in Fig. 1, the irrigation water has never exceeded the necessary volume in Doukkala Region since the construction had been implemented (2002), and it has been on the decline since the time of the ex-post evaluation (2005). Only 25% - 55% of the necessary water volume has

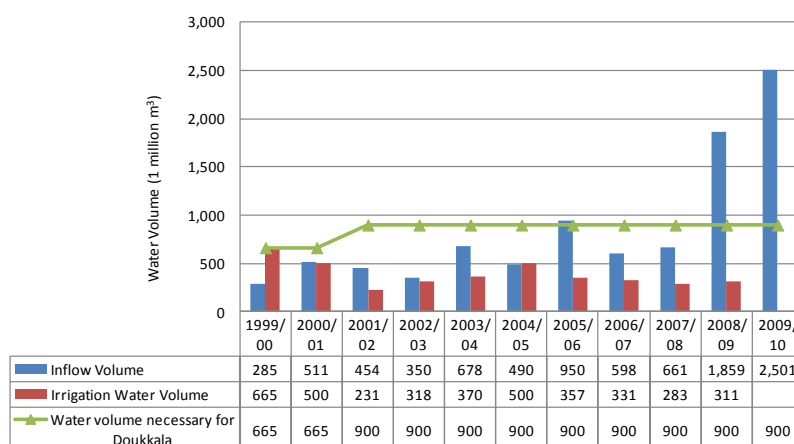


Fig. 1 Changes in Annual Irrigation

been obtained since the construction. There was no irrigation water supply in summer from 2001 to 2008.

Regarding the water volume in the area concerned, the precipitation¹ in the reservoir areas has declined continuously since the 1980s and therefore the water volume² flowing into the four dams along the river has also declined. Due to this situation, the water storage rates of the dams have decreased. In addition, the entire watershed area has not been able to supply

¹ According to the “Report on Detailed Design Study”, precipitation in the upper basin of the Oum Er-Rbia River has been on the decline since the 1980s and the average annual precipitation from 1934 to the mid 1970s was 590mm and after that the average annual precipitation till 2006 decreased by 164mm to 426mm (28% decrease).

² According to the “Report on Detailed Design Study”, the annual average water volume flowing into the four dams along the river was 3,817 million m³ from 1940 to 1980, but it was 2,511 million m³ from 1981 to 2006, a decline of 34%. The inflow water volume to some of the dams decreased by 50%.

enough water for the irrigation since the 1980s.

In such a situation, the Government of Morocco has promoted water-saving irrigation systems as a countermeasure for low rainfall and a means of saving irrigation water, and as part of this effort, it has executed drip irrigation projects. For instance, the drip irrigation system has been introduced for agriculture in the coastal region to grow vegetables such as tomatoes. While the area of cultivation and the production volume in this coastal region have declined, the yield per unit has increased slightly. This could be due to the spread of the drip irrigation system.

2) Area of Cultivation

The area of cultivation expanded from 2002 to 2006, as shown in Fig. 2. However, it has fluctuated between 15,000 and 18,000ha since 2007, remaining rather flat. Since the construction of the irrigation system (2002), the actual results have never exceeded the annual planned values. This could be due

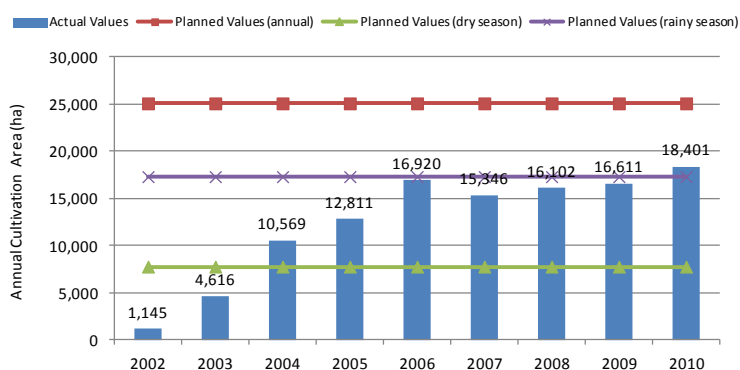


Fig. 2 Changes in Annual Cultivation Area

to the fact that sufficient water for irrigation was not available as mentioned above, and especially there was no water supply in the dry season (summer).

3) Yields of Main Crops

The total yield of the main crops increased until 2006 after the construction (2002) as shown in Fig. 3. However, it has fluctuated between 300,000 and 400,000 t/year since 2007.

The yields have increased since the ex-post evaluation (2005), although the yields of wheat and sugar beet vary from year to year. Compared to other products, the yield of sugar beet is particularly high, and the shifts in the yield of sugar beet show the same tendency as the shifts in the total yield.

Although there was a plan to cultivate soybeans, there are no records of any soybean harvests. The actual yield of corn is less than the planned value. The possible reasons for such low yields are that soybeans and corn require a lot of irrigation water; ORMVD prioritizes the crops for cultivation in an environment where irrigation water is insufficient; and in particular it is difficult to obtain soybean seeds.

While the original target for pasture was not high, the actual yields are much higher than the planned values. Vegetables, which were not included in the original plan, had high yields especially in 2006, 2007 and 2009.



Fig. 3 Shifts in Annual Yields of Main Crops

(2) Beneficial Area

According to the “Report on Detailed Design Study”, there was no change in the beneficial area of 18,901ha in which irrigation system was constructed by the ODA loan project. Only 25 - 55% of the normally required volume of irrigation water has been obtained because droughts have continuously occurred every year since the completion of the ODA loan project (2002). Water distribution is prioritized in a situation of water shortages; for instance, vegetables are given the lowest priority because they are considered to be subsidiary food in Morocco. So vegetables cannot be double-cropped in times of water shortage, resulting in a difficulty of stable cultivation. Due to the above-mentioned reasons, double cropping which was planned at the time of the appraisal is not carried out at present.

Whether double cropping is possible or not depends on the available water volume in the area. Even if the water volume increases, the irrigation water volume does not increase. Because the irrigation water is limited as just described, in order to practice double-crop farming, it is considered necessary to execute more effective use of water by the introduction of water-saving irrigation systems, improvement of existing irrigation techniques, improvement of the water management system, etc.

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

Neither the Financial Internal Rate of Return (FIRR) nor Economic Internal Rate of Return (EIRR) was calculated, because there were no data available.

3.1.2 Qualitative Effects

At the time of the ex-post evaluation, it was reported that water-consuming livestock feed such as sugar beet and alfalfa were cultivated after the construction of the irrigation facilities and the production of milk increased in line with the increase of the yield of livestock feed, which was contributing to creation of local employment.

Then, the following points were studied, (1) whether there had been any changes in the cultivation of livestock feed, and (2) the operation and employment situation of milking and milking facilities. The results are as described below.

(1) Cultivation of Livestock Feed

According to the “Report on Detailed Design Study”, alfalfa requires more irrigation water than wheat. Such crops as alfalfa and sugar beet which require a lot of water were cultivated only in the irrigated areas and crops which do not require a lot of water were cultivated in the rain-fed areas.

In this sense, there were no changes in the cultivation method.

(2) Operation and Employment Situation of Milking and Milking Facilities

The number of dairy cows was 3,000, the production volume of milk was 8,500 kiloliters and milk sales were worth 1.5 billion dirhams in 2008 in the ODA loan project area. There are 255 agricultural associations (194 active and 61 inactive) related to milk production under the jurisdiction of ORMVAD in Doukkala District. The membership is 17,455 (14,873 active members). The milk association is the largest of the agricultural associations in the area concerned in terms of the number of active associations and members. The main tasks of the milk association are to collect raw milk and pass it to the milk collection vehicles from the dairy product companies and to distribute the payment from the dairy product companies to the association members.

The production volume of milk has almost doubled since the time of the ex-post evaluation and the number of milk-related associations has increased nearly ten-fold to 194. It can be said that milk-related activities hold an important position as the main industrial and economic activities in the area.

In conclusion, while the area under cultivation has increased slightly since the execution of the irrigation project, it has not reached the planned value. Double cropping has not been practiced due to irrigation water shortages. However, the project was highly effective because it has contributed to improvement in agricultural incomes, by cultivating livestock feed in the irrigated area, leading to more milk production.

3.2 Impact

3.2.1 Intended Impacts

Increase in farmers' incomes was considered to be one of the impacts of this project. At the time of the ex-post evaluation, it was thought that sugar production by cultivation of sugar beet supported local industry and influenced farmers' incomes. Thus, the situation of sugar production and the shifts in farmers' incomes were studied.

(1) Sugar Production

1) Condition of Sugar Production

Regarding the overall situation of agriculture in Abda-Doukkala District, the number of farming households that benefited from the ODA loan has increased to 9,230 from 7,099 at the time of the ex-post evaluation. The estimated population that benefitted from the ODA loan is 55,000 (approximately 9% of the population of the district concerned), and the poverty ratio is approximately 15%, lower than the national average (19.0%). Sugar beet is considered to be a characteristic crop in the area and sugar production supports local industry. There is one sugar factory in Sidi Bennour, which is operated by COSMAR SA Corporation.

The processing capacity of the Sidi Bennour sugar factory was improved to 15,000 t/day with an investment of 850 million dirhams in 2008.

The sugar production company has increased in line with the yield of sugar beet. This is because the yield has increased after construction of the irrigation facilities as mentioned earlier, and the sugar processing capacity of the sugar factory has been improved.

2) System of Sugar Beet Cultivation and Trade

Sugar beet farmers in the district concerned ship all their products to the Sidi Bennour factory. Sugar beet is cultivated for wholesale purchase by COSMAR SA Corporation: fertilizers and seeds are provided by the corporation to the farmers and the farmers cultivate the seeds, and after shipment, the farmers receive payment after deduction of the cost of the fertilizers, seeds and irrigation water fees.

3) Superiority of Sugar Beet Cultivation

The irrigation farmers always include sugar beet in their cultivation system. This is because the sugar company is there as the buyer and there is no change in the price as long as the sugar is the same quality. In addition, the highest priority of water rights is given to sugar beet farmers by an agreement between the sugar company and the National Office of Potable Water.

Although the yield is high, the profitability is not necessarily high, because the buying price does not go hand-in-hand with the yield since the sugar company may beat down the price due to the exclusive contract, and/or the profits may disappear due to loans, payment to laborers, etc.

(2) Farmers' Incomes

The statistical data on sugar beet farmers' incomes per ha is as shown in Fig. 4. Regarding the details of production expenses, "labor cost" is around 8Dh/day during the busy harvesting and sowing seasons, the "rental fee for agricultural machinery" is around 600Dh/ha and the "land rent" is 2,500 - 5,000Dh/ha/year (in some cases, 50% of the harvest). The total payment by COSMAR SA Corporation to sugar beet farmers is increasing as shown in Fig. 5.

The total yield in the area remains at around the originally planned value. Because the yield of

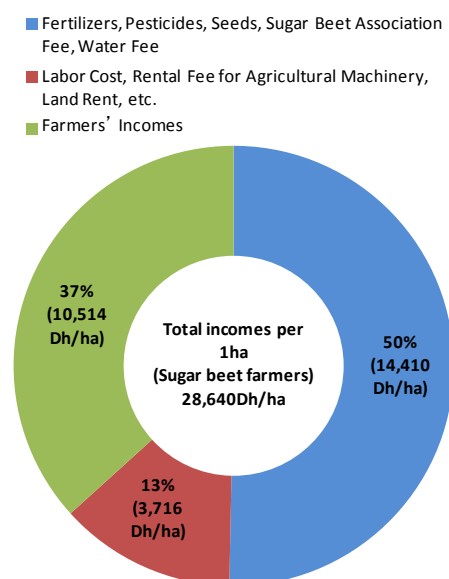


Fig. 4 Breakdown of Sugar Beet Farmers' Incomes

sugar beet is especially high, the yield and prices of sugar beet seem to have a big impact on agricultural management in the area. The price of sugar beet is unknown, but it should be rising, considering the changes in the total payments to the sugar beet farmers.

According to an interview survey of the farmers, as shown in Fig. 4, the farmers earn 10,000Dh/ha from sugar beet and 5,000Dh/ha from wheat. This indicates that agricultural activities are increasing in the case of sugar beet, although there was no yield increase by double cropping because there was no water distribution until the summer of 2009.

The annual agricultural income per hectare of the beneficiary farmers was 9,538Dh in 2009 and the annual income per farming household was 18,000Dh. This indicates that there has not been much change from the level of 8,500 - 9,000Dh (excluding expenses for agricultural input material) at the time of the ex-post evaluation. It had not reached 15,000 - 19,740Dh at the time of the appraisal but a straight comparison was not appropriate because yield increases from double-cropping were expected at the time of the appraisal.

The profitability of tomato farmers is said to have increased 1.5 times by changing from furrow irrigation to drip irrigation, which is contributing to savings on irrigation water fees, labor saving and yield increases.

According to the “Report on Detailed Design Study”, many farmers mentioned in individual interviews that their profits disappeared due to payment of debts, payment to laborers, etc. and that they were making a living with their earnings from milk sales, although the situation varied depending on the area (large-scale irrigation area, coastal area or rain-fed area), the scale of the fields and the cultivated crops.

3.2.2 Other Impacts

After the execution of the project, the number of livestock increased and the number of truck owners also increased. As for the changes experienced by farmers, the number of farming households who own satellite dishes, TVs and refrigerators increased. On the other hand, it has become difficult to secure a workforce for agricultural work because agricultural work has increased due to the irrigation project and thus the employment opportunities have increased for laborers. In this manner, the irrigation project has had the effect of indirectly improving the economic conditions of the farmers.

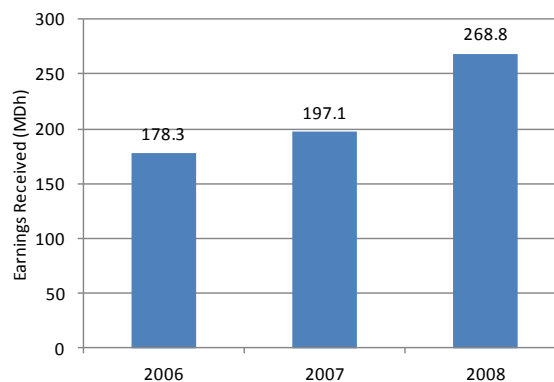


Fig. 5 Changes in Total Payments to Sugar Beet Farmers

In conclusion, in terms of impact, agricultural activities for sugar production have increased and the incomes of the sugar beet farmers have increased. However, the profitability is not necessarily high.

3.3 Sustainability

The systems, technologies/techniques and finances of the executing agency ORMVAD and the irrigation committee were studied to analyze sustainability of the project.

3.3.1 Structural Aspects of Operation and Maintenance

(1) ORMVAD

The farmlands under the jurisdiction of ORMVAD are mostly located in El Jadida Province. In the province, there are also areas which come under the jurisdiction of the Provincial Department of Agriculture (DPA), a local administrative organ of the Ministry of Agriculture and Fisheries. The whole of Safi Province, another province in Doukkala District, comes under the jurisdiction of Safi Province DPA. ORMVAD and the DPAs of the above-mentioned two provinces were integrated and restructured around 2009 into the “Doukkala-Abda Regional Department of Agriculture”. This is an embodiment of the country’s policy of decentralization and integration of related organizations. However, the director of ORMVAD has been appointed as the director general of the new organization (Department of Agriculture) and holding the two posts concurrently. The DPAs (Provincial Department of Agriculture) of the two provinces still have their own offices and director generals.

The organization is largely divided into the head office and branch offices. There are four branch offices in the jurisdictional area and the jurisdictional area is divided into 28 sub-areas, with 28 Agricultural Development Centers (CDA) and 28 Irrigation Network Management Centers (CGR). These centers are located at almost the same places. There are four CDAs in the Phase 2 irrigation area.

ORMVAD has five divisions. Three of the five divisions, (1) Agricultural Improvement Division, (2) Irrigation Network Management Division, and (3) Agricultural Development Division, are responsible for the execution of projects. The remaining two divisions, (4) Personnel and Training Division and (5) Planning and Finance Division, are responsible for organizational management. The total number of staff in the head office and branch offices is approximately 540.

The total number of staff in the Irrigation Network Management Department is approximately 260 and 16 of the 260 staff (excluding secretaries, etc.) are assigned to the head office in El Jadida City. The remaining 240 are assigned to branch offices, field-level offices or remote control centers.

The restructured organization “Doukkala-Abda Regional Department of Agriculture” has 540 staff, fewer than the 780 staff at ORMVAD at the time of the ex-post evaluation. There were no clear materials to prove whether the issue of duplicated tasks with the Ministry of Agriculture and Fisheries had been resolved or not. The duplicated tasks are expected to be resolved due to integration, though there are some worrisome elements; for instance, the DPAs (Provincial Department of Agriculture) still have their own offices and director generals.

(2) Irrigation Committee

No irrigation association was established in the upper irrigation area covered by the ODA loan project.

In the lower irrigation area which is outside of the ODA loan project, an irrigation association was established 15 years after the construction was completed. As for the background, an irrigation association was organized at the end of 1980 as part of the activities of the PAGI program (World Bank loan) aimed at rehabilitation, management and improvement of the irrigation facilities. This irrigation association has 39 organizations (association membership: 7,202 people) but only two of the 39 organizations are essentially active.

The association relies on ORMVAD for the technical and financial aspects of irrigation facility management and it neither performs operation or maintenance of the irrigation facilities nor collects water fees.

3.3.2 Technical Aspects of Operation and Maintenance

ORMVAD is responsible for maintenance of the tertiary canals and no training in maintenance of the irrigation facilities is provided for the farmers.

There are training courses aimed at the staff of the Irrigation Network Management Division of ORMVAD, many of which are not conducted due to budget constraints, and it often happens that training courses planned in the previous year were not conducted in the following year. (For instance, eight training courses were planned in 2010 but only two courses were conducted.)

Training courses for improvement and maintenance of the technical level were planned and conducted for the staff of the Irrigation Management Division. This is recognized as activities to maintain the technical level. However, attention should be paid to the fact that not many courses have been conducted due to budget constraints.

Regarding the operation and maintenance conditions, there is no major damage to the facilities and machines such as the concrete structure and pumps, and the effectiveness of the project is not impaired due to the functional decline of the facilities and machines. Thus, it

is judged that maintenance has been conducted to some extent. The technical level is assured to carry out basic maintenance.

3.3.3 Financial Aspects of Operation and Maintenance

The budget system of ORMVAD is divided into two: revenue from the collection of irrigation water fees and the budget from the Ministry of Agriculture and Fisheries. Revenue from the collection of irrigation water fees is used for items related to execution of the project such as vehicles, electricity costs for pump stations and personnel costs. Collection of irrigation water fees (revenue) and expenditure are handled independently. However, due to less information, it is not known if the irrigation water fees collected are enough to cover the operational expenses.

On the other hand, improvement of the facilities and canals and procurement of the necessary equipment are covered by the budget from the Ministry of Agriculture and Fisheries. This indicates that operation and maintenance are conducted based on financial resources from the government. It is not known whether or not enough financial resources are available because there are no available materials about the content, frequency and expenses for inspection and maintenance of the facilities.

Regarding collection of the irrigation water fees, they are charged to the irrigation water users every three months and payment is basically made at the CGR pay station in each area. The irrigation water fees consist of two charges; the fees are calculated by combining (1) the basic water rate and (2) a pump tax for electricity costs, etc. if pumping of water is necessary. Since the actual costs were not reflected in past irrigation water fees, the law on water fees was applied from September 1, 2009. Consequently, users were notified that the basic water rate would be increased twice a year (on September 1 and February 1). Until then the basic water rate and the pump tax had been inclusive of value-added taxes, but the system was changed following the increase on September 1, 2009 to include 7% value-added tax in addition to the water rate.

The sugar beet farmers can get seeds, pesticides and fertilizers in advance from COSMAR SA Corporation and pay the irrigation water fees later to COSMAR SA Corporation. This is possible because of a system based on a contract between COSMAR SA Corporation and ORMVAD whereby the farmers harvest and sell the sugar beet to COSMAR SA Corporation and receive the balance after deduction of expenses for seeds, pesticides and fertilizers as well as irrigation water fees from the sales of the sugar beet. This collection system is expected to ensure that the expenses are collected without omission and the collected amount is large because the yield of sugar beet is the largest of the crops in the area concerned and there are many sugar beet growers.

If farmers do not grow sugar beet, ORMVAD does not provide them with irrigation water.

So cultivation of sugar beet is almost compulsory. It was found that, as a result, most of the farmers cultivate sugar beet in large-scale irrigation areas and pay irrigation water fees and there are few cases of no payment.

3.3.4 Current Status of Operation and Maintenance

ORMVAD is in charge of maintenance of the main canals, relevant facilities and tertiary canals. The farmers are in charge of maintenance of the quaternary canals (earth canals).

If there are any problems with the facilities, the staff of CGR contact the irrigation network maintenance office of the Irrigation Network Management Office and the maintenance staff handle it. If major repairs are required, the repair work is outsourced to a private company.

The diversion gates, secondary and tertiary canals, low-pressure pipelines, etc. in the area covered by the ODA loan project were generally well maintained. Water leakage from some of the joints in the concrete canals was observed, but the amount of leaking water was not big.

The most serious problem in maintenance of the irrigation facilities was intentional damage to the facilities. During times of water shortage, some farmers try to get irrigation water outside of the allocated hours and open the gates on their own, damaging the facilities. In addition, children throw stones at the pipes for fun, damaging the pipes. People from other areas also sometimes come and steal the metal gates, damaging the facilities. In the sprinkler irrigation area which is not part of the ODA loan project, many of the flow meters had been broken by farmers who did not want to have the flow measured.

3.4 Others

At the time of the ex-post evaluation, the following were suggested as follow-up items: (1) improvement of economic benefits by efficient use of water resources and irrigation facilities, (2) confirmation of review of irrigation operation and (3) securing of the stability of the irrigation project. The monitoring results of these items are as described below.

(1) Improvement of Economic Benefits by Efficient Use of Water Resources and Irrigation Facilities

Conservation of Water Resources

Water conservation is treated as an important element in the policies and strategies of the “Green Morocco Plan (PMV)”, “Regional Agricultural Plan (PAR)”, “National Water-Saving Irrigation Program (PNEEI)”, etc. PNEEI was developed to actively save water (irrigation water) through a plan to convert a total of 555,090ha of irrigated cultivation area nationwide to “drip irrigation”, with a detailed plan formulated for each locality.

Regarding drip irrigation, a pilot project and an implementation project were executed by other donors (FAO, USAID/ Coca-Cola Educational and Environmental Foundation, the

World Bank and the African Development Bank) in order to achieve efficient use of water. It is possible to reduce the volume of water required for irrigation by introduction of drip irrigation. However, careful investigation and study are considered necessary before introduction because it may require a lot of labor and money for operation and maintenance.

PNEEI for conversion to drip irrigation in Doukkala District started in 2008 and is expected to be completed in 15 years, aimed at changing 76,600ha to drip irrigation. At the same time, it also aims to improve the irrigation facilities for 4,200ha, covering 80,800ha in total. Since the large-scale irrigation area in Doukkala District covers 96,000ha, it is planned to convert 80% of the entire irrigation area to drip irrigation.

In conclusion, it is considered that due measures to promote efficient use of water resources by conservation of water have been implemented.

Water Demand Management

Since the water stored in the reservoir dams is used not only as irrigation water in Doukkala District but also as drinking and industrial water and irrigation water in and outside the basin, how much water should be distributed to which user is decided by the Oum Er-Rbia River Basin Authority through discussions with the parties concerned. After the water distribution for agriculture has been decided through this process, ORMVAD studies multiple scenarios regarding what types of crops are to be cultivated and the size of the cultivation areas in such a way as to ensure maximum benefits for the areas concerned. On the scenarios, the strategic (priority) crops in Doukkala District, sugar beet, livestock feed crops and wheat, are taken into consideration. Water distribution is decided in consideration of the maximum benefits produced and avoidance of damage to investments (minimum material supply to the sugar company, investment in livestock feed to raise livestock, etc.).

Improvement of Economic Benefits through Irrigation Facilities

Agricultural investment in the private sector and support for farmers by the national human development initiative are the principal pillars of the “Agricultural Plan for Doukkala-Abda Region” and the support for the farmers includes social and economic aspects and elimination of poverty.

As a scheme for the improvement of economic benefits, as described above, cultivation of sugar beet is actively promoted from the viewpoint of farmers’ incomes and collection of irrigation water fees. At first glance, it appears that changing to profitable crops is promoted, but it can be said that there are many restrictions on cultivation of crops other than sugar beet; for instance, there is no irrigation water supply for crops other than sugar beet. Furthermore, since the business partner in the case of sugar beet is only one company and seeds, fertilizers, etc. are supplied by that company, attention should be paid to the fact that the farmers are in a

disadvantageous position in terms of buying prices.

(2) Confirmation of Review of Irrigation Operation

Execution and Supervision of Irrigation Operation by Utilization of Private Sector

Regarding utilization of the private sector, the irrigation water fees are collected from the sugar beet farmers through the sugar company and the collection rate is high due to the payment mechanism. Of the irrigation facilities which are managed by ORMVAD, practical management work at the main facilities such as the pump stations, gates and pipelines is outsourced to the private sector and there are no major problems in terms of maintenance.

Improvement of Technical and Financial Capabilities of ORMVAD

While training courses are provided to improve the technical capabilities of ORMVAD, it is assumed that it may be difficult to execute training plans in the long term under the financial constraints.

Introduction of Water-saving Irrigation and Matching Support for Agricultural Production Activities

A pilot project and a project for the introduction of drip irrigation as a water-saving irrigation system have been executed by other donors and efforts to improve irrigation technology are being made. However, there are no activities to support or revitalize the irrigation association. There are also technical issues and problems to be solved in donors' pilot project as mentioned above.

Revitalization of Irrigation Association

No particular support has been provided to the irrigation association and revitalization of its activities has not been promoted. It is necessary to reconsider the role of the irrigation association.

(3) Securing of Stability of Irrigation Project

Establishment of Self-supporting System of ORMVAD

ORMVAD uses the revenue from collection of the irrigation water fees for items related to execution of the project such as personnel costs, and revenue and expenditure are handled independently. However, it is not totally self-supporting because the budget of the Ministry of Agriculture and Fisheries is used for maintenance of the irrigation facilities.

Usage of Water Fees

As mentioned above, the water rates were reviewed and are being changed to a new

mechanism. However, the scale of the water fee-related revenues is not clear and the detailed content of the costs is not clear either, so it is not clear to what extent operation and management can be achieved only with the irrigation water fees.

If the rates are set in such a manner that the costs for daily operation and maintenance can be covered only by the irrigation water fees, it is thought that the facilities will be maintained in a good condition in the long term. However, large-scale repairs of the facilities should be covered by the budget from the Ministry of Agriculture and Fisheries because they would involve high costs.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

- There are no problems from the perspective that irrigation is available even for farm fields, the end canals are in place, and the facilities are not impaired in their function.
- The effectiveness of the project has been achieved to some extent; for instance, agricultural incomes are higher than before the execution of the project due to milk and sugar production, though some issues concerning agricultural productivity still remain: the cultivation rate in relation to the planned cultivation area is 70% these days and the yield per unit is around 80%.
- The reason why agricultural productivity has not improved is that sufficient irrigation water is not supplied due to strict water distribution adjustment which is made every year due to the absolute shortage of the volume of water resources for the dams. This makes it difficult to practice agriculture with the limited volume of water resources.

4.2 Recommendations

The recommendations and future follow-up activities are as follows, based on the “Report on Detailed Design Study”. In addition, measures based on the following recommendations are being implemented through the technical cooperation project which started in July 2011.

(1) Introduction of Water-saving Technologies

The introduction of drip irrigation has enabled 20 - 30% water saving in the farm fields, resulting in a reduction in the burden of irrigation water fees on the farmers. Water saving could lead not only to saving of irrigation water fees but also to a possible increase in agricultural incomes through further implementation of irrigation using the saved water. This will eventually lead to promotion of the agricultural sector. Securing irrigation water for agriculture in summer will make it possible to grow highly profitable vegetables and fruits in summer, and therefore, improvement of agricultural incomes can be expected. In addition,

it is very attractive because it will make it possible to supply the products to new markets.

(2) Organizing Farmers

Judging from the situation of the irrigation association of the lower irrigation area which is outside of the site covered by the yen loan project, the farmers are highly reliant on the government, and the farmers in the irrigation association seem to have no intention of managing the water on their own. Therefore, provision of the running costs, offices, means of transportation, etc. are necessary for the organization activities of the farmers. These cost burdens may hinder the farmers from organizing and getting them to participate in organization activities. It is necessary to study how to effectively link the change in the attitude of the farmers who are users and the water management and irrigation water fee systems of the government.

(3) Long Life of Irrigation Facilities

The irrigation facilities in the upper irrigation area are around 10 years old, but the quality of construction has been ensured and the facilities are in a relatively good condition with no impediment to their functions. It is thought that not only the maintenance costs but also the irrigation water fee burden can be reduced by maintaining the functions of the facilities for a long time. As for financial support in the long term, it will be effective for the long life of the facilities, such as the canals, to transfer diagnostic and maintenance techniques.

4.3 Lessons Learned

None

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1. Project Outputs		
Construction of irrigation facilities	18,901ha	As planned
Main canals	17.3km	As planned
Secondary canals	33.7km	As planned
Installation of water management system		As planned
Irrigation network	654km	703km
Drainage network	700km	676km
Farm roads	205km	193km
Land development	18,901ha	As planned
Drainage outside the area	75km	As planned
Milk collection facilities	21 places	Cancelled
2. Project Period	June 1996 – December 1999 (42 months)	June 1996 – September 2002 (75 months)
3. Project Cost		
Amount paid in Foreign currency	5,656 million yen	94 million yen
Amount paid in Local currency	12,408 million yen	16,996 million yen
Total	18,064 million yen	17,090.27 million yen
Japanese ODA loan portion	13,548 million yen	13,426 million yen
Exchange rate	1 dirham=11.0 yen	1 dirham=11.0 yen

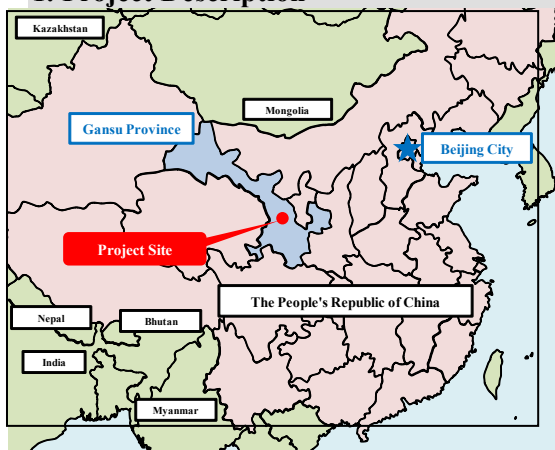
Ex-Post Monitoring of Completed ODA Loan Project

The People's Republic of China

Lanzhou Zhongchuan Airport Expansion Project

External Evaluators: Tomoko Matsushita and Masahiro Yoshizawa,
INGEROSEC Corporation

1. Project Description



Terminal building of Lanzhou Zhongchuan Airport

1.1 Project Objective

The project's objective was to newly construct a runway except for the existing runway and a passenger terminal building in the former runway area of Lanzhou Zhongchuan Airport situated 70km northwest of the urban district of Lanzhou, Gansu Province in order to cope with the predicted increase in the demand for air transport, thereby contributing to activating economic activities in the northwestern region. At the same time, the project aims to grade up the aforesaid airport serve as an emergency or alternative airport, thereby contributing to the improvement of aviation safety in the northwestern region.

1.2 Outline of the Loan Agreement

Approved Amount / Disbursed Amount	6,338 million yen / 6,299 million yen
Loan Agreement Signing Date / Final Disbursement Date	December, 1996 / June, 2002
Ex-post Evaluation	2004
Executing Agency	Gansu Airport Group Co., Ltd.
Main Contractor	Local company
Main Consultant	—

1.3 Background of Ex-post Monitoring

Gansu Province, which located in Northeastern China near Xinjiang Uygur Autonomous

Region and Central Asia, plays an important role in terms of politics and economics. Since the surrounding areas including the Tarim Basin are abundant in oil reserves, transportation of materials in the province was expected to increase when the development of oil fields started on a large scale. Lanzhou, the capital city of Gansu Province, was expected to function as a base for the transportation of resources and people, and the demand for air transport was predicted to increase, boosted by the development of energy and tourism resources. Considering that the flight routes connecting Europe and Central Asia to Central China pass mostly over mountain ranges including mountains over 8,000m as well as deserts, there was a need to develop an airport in Lanzhou at the center of China that can serve as a site for emergency landings in this region. Based on this, this project was implemented with the aim of coping with the predicted increase in the demand for air transport by constructing a new runway and passenger terminal building, thereby contributing to stimulation of economic activity in the northwestern region. At the same time, the project aimed to enable the airport to serve as an emergency or alternative airport, contributing to the improvement of aviation safety in the northwestern region.

When the ex-post evaluation was conducted in FY2004, the fiscal balance of the executing agency was in deficit and the management was required to make efforts to improve the financial situation. Since the airport was an indispensable economic infrastructure for growth of the regional economy, it was pointed out that a review should be conducted on the executing agency's management efforts and that provincial and national governments should consider offering financial support to the airport.

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

2. Outline of the Monitoring Study

2.1 Duration of Monitoring Study

Duration of the Study: March 2011 - October 2011

Duration of the Field Study: Not conducted

2.2 Constraints during the Monitoring Study

During implementation of this monitoring process, the process of privatization of the executing agency, which had been indicated during the ex-post evaluation, was advanced. Additional changes were made in the execution structure, and now Lanzhou Airport Co. Ltd.¹ would take charge of the operation and maintenance of Lanzhou Airport. Since there were

¹ Lanzhou Airport Co., Ltd. is a company to manage the Lanzhou Zhongchuan Airport and one of group companies of Gansu Airport Group Co., Ltd.

no personnel left at the company who had been in charge of the airport at the time of project implementation, according to the Chinese side that the company would have difficulty in accepting a field survey. Therefore the monitoring process was done through desk analysis by obtaining the minimum necessary information from Lanzhou Airport Co., Ltd. To fill the gaps in the information obtained from the company, civil aviation statistics generally available in China and other information available through the Internet were obtained and used. In addition, in an analysis of the facilities, Japanese standards which comply with the International Civil Aviation Organization (ICAO) were drawn upon.

3. Monitoring Results

3.1 Effectiveness

3.1.1 Quantitative Effects

(1) Results from Operation and Effect Indicators

The effects of the project after the ex-post evaluation were analyzed by the same indexes used in the ex-post evaluation such as aircraft and passenger traffic and cargo volume handled.

By comparing the data from 2003 and 2009 on the number of aircraft takeoffs and landings (Figure-1), the number of passengers (Figure-2) and cargo volume handled (Figure-3), it was found that the traffic volume in all these categories grew rapidly, with aircraft traffic growing 2.1 times, passenger traffic 3.55 times and cargo volume handled 2.59 times.²

It is thought that the rise in

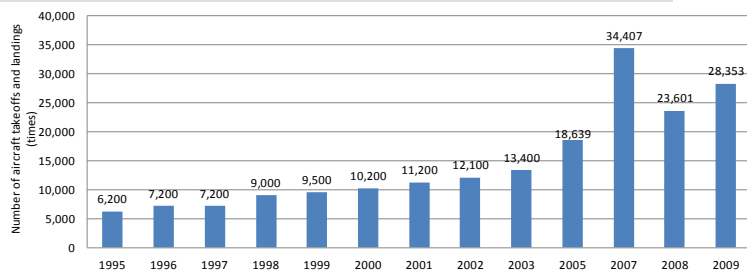


Figure-1 Changes in the Number of Takeoffs and Landings

(Source: 1995–2003 Ex-post Evaluation Report, 2009 Statistical Data on Civil Aviation of China and Lanzhou Airport Co., Ltd.—Recent operational condition (provided by the Chinese side))

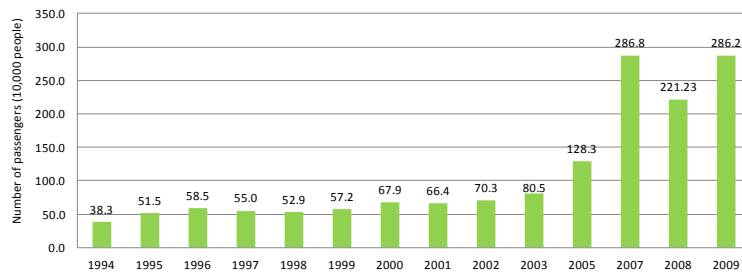


Figure-2 Changes in the Number of Passengers

(Source: 1995–2003 Ex-post Evaluation Report, 2009 Statistical Data on Civil Aviation of China and Lanzhou Airport Co., Ltd.—Recent operational condition (provided by the Chinese side))

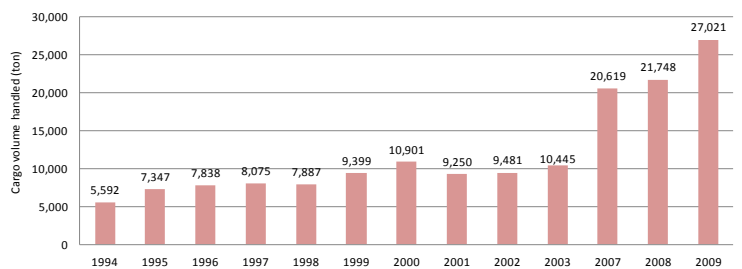


Figure-3 Changes in Volume of Cargo Handled

(Source: 1995–2003 Ex-post Evaluation Report, 2009 Statistical Data on Civil Aviation of China and Lanzhou Airport Co., Ltd.—Recent Operational condition (provided by the Chinese side))

² According to “Lanzhou Airport Co., Ltd.—Recent operational conditions” (material provided by the Chinese side), at the end of October 2010 aircraft traffic at the airport totaled 28,549 takeoffs and landings, passenger traffic totaled 3,103,500 people (a 30% increase over the same period in the previous year) and cargo traffic totaled 25,320.4t (an 18% increase), which represent the largest increase in use among the airports in the provincial capitals in the northwestern region of China.

these indexes is due to an increase in the number of flight routes. According to a document entitled “Lanzhou Airport Co., Ltd.—Recent operational conditions” (provided by the Chinese side), Lanzhou Airport Co., Ltd. launched new flight routes in 2006 connecting Lanzhou with cities such as Shenzhen, Changsha, Nanjing and Hangzhou, and in 2010, in cooperation with 12 domestic and international airlines, the company also launched 59 new flight routes connecting Gansu Province with larger cities in China including Beijing, Shanghai and Guilin as well as with 33 medium size cities. The reasons for launching new flight routes as mentioned above are seen in the fact that the aviation market in eastern China has become saturated and the aviation market in the western part of China has grown.

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

Neither the Financial Internal Rate of Return (FIRR) nor Economic Internal Rate of Return (EIRR) was calculated, because there were no data available.

3.1.2 Qualitative Effects

When the ex-post evaluation was conducted, the effects of the project were evaluated in terms of (1) the status of the airport facilities, (2) the safety of aircraft takeoff and landing and (3) the convenience of the passenger terminal building.

(1) Status of airport facilities

The airport has a runway with a length of 3,600m and a width of 45m. According to “Statistical Data on Civil Aviation in China 2009,” the area of the passenger terminal building remains at 27,500m², meaning no changes have been made since it was completed. This indicates that no expansion has been made to the cargo terminal building. It became possible to separate the flow lines of departing passengers and arriving passengers as much as possible with the development of the passenger terminal building. Therefore, it can be considered that the efficiency of movement of passengers has been promoted. In the same way in the cargo terminal building, separation of the flows of cargo and passengers has been ensured, indicating that the efficiency of cargo handling has also been promoted.

Prior to the implementation of this project, only small aircrafts could take off and land at this airport. Thanks to the development of the 3,600m runway, it was found during the ex-post evaluation that large aircrafts are able to take off and land.³ In China, airports are categorized by the airport classifications (Table-2) in accordance with the ICAO airport code (Table-1). According to the airport classification, aircraft types that can take off and land at

³ With respect to services involving the arrival and departure of large aircraft, it is known that a typical large aircraft, the B747 requires a runway of at least 2,500m to accommodate landing and take-off, and more desirably, a runway of more than 3,000m should be provided for greater safety to serve aircraft taking off at the maximum takeoff weight. Lanzhou Airport, which has a runway of 3,600m, can therefore accommodate large aircraft landing and taking off.

Lanzhou Zhongchuan Airport are generally medium size aircrafts such as B767, B757, A300 and MD82.

In Japan, in the “Establishment Criteria and Description of Airport Civil Engineering Facilities” (July 2008), it states that “if any aircrafts categorized as code E (B747 and B777) are in service, it is desirable that the runway have a width of 60m for improvement of the safety of the aircrafts in service.” For example, international airports in Japan including Narita Airport have runways with a width of 60m. Lanzhou Zhongchuan Airport, however,

has a runway with a width of 45m and it will be necessary to increase the width of the runway in order to allow large aircraft to operate safely.

In summary, although the ex-post evaluation concluded that large aircrafts could serve the airport, such aircrafts do not seem to be taking off or landing at the airport at present for reasons of safety. However, since the runway is long enough for large aircrafts, the airport would be able to accommodate large aircrafts landing in an emergency. As a result, it can be said that the airport retains the capacity to act as an airport capable of accommodating large aircrafts landing and as an alternative airport to substitute for neighboring airports in the event of an emergency, as described in detail in “3.2.1 Impact” below.

(2) Safety of aircraft takeoff and landing

How to improve safety was analyzed in this monitoring, because during the ex-post evaluation, it was pointed out that the old facilities at the airport did not satisfy ICAO standards concerning the distance between the runway and the taxiway and the width of the taxiway. Also in parts of the old runway the surface had peeled off or caved in, which could cause aircraft taking off or landing to overrun the runway. Therefore, it was decided to confirm how to improve safety.

Table-1 ICAO Airport Standard Code

Code element-1		Code element-2		
Code No.	Runway length with reference to aircraft	Code	Wing span	Outer main wheel track distance
1	Less than 800m	A	Less than 15m	Less than 4.5m
2	800m-1,199m	B	15m- 23m	4.5m – 5.9m
3	1,200m-1,799m	C	24m- 35m	6.0m – 8.9m
4	1,800m or over	D	36m – 51m	9.0m - 13.9m
		E	52m – 64m	9.0m – 13.9m
		F	65m – 79m	14.0m – 15.9m

(Source: A System of Airport Development and Management in China, Japan’s National Institute for Land and Infrastructure Management, 2005)

Table-2 Airport Classification in China

Airport Standard Code	Aircraft Type	Number of Airports	Example of Airport (runway length x width) (m)
4F	A380	3	• Beijing Capital International Airport (2,800 x 60, 3,200 x 50, 3,800 x 60) • Shanghai Pudong International Airport (3,400 x 58, 4,000 x 60, 3,400 x 60, 3,800 x 60), etc.
4E	B747	30	• Shenzhen Bao’an International Airport (3,400 x 45) • Chengdu Shuangliu International Airport (3,600 x 45, 3,600 x 60), etc.
4D	B767 / B757 / MD82 / A300	38	• Lanzhou Zhongchuan Airport (3,600 x 45) • Jiayuguan Airport (3,000 x 60), etc.
4C	B737	77	• Dunhuang Airport (2,800 x 45), etc.
3C	Smaller than B737	17	• Qingyang Airport • Beijing Nanyuan Airport, etc.
1B	Y12	1	• Changhai Dachangshandao Airport

(Source: 2009 Statistical Data on Civil Aviation of China)

First, according to “Statistical Data on Civil Aviation in China 2009,” the surface of the runway at the airport is said to have PCN (Pavement Classification Number)⁴ “75.” ICAO also has its own standards for runway pavement (Aerodrome Design Manual Part 3 Pavements), which apply ACNs (Aircraft Classification Numbers) as shown in Table-3. With respect to the aircraft types (A300-600 and B767-300) to be accommodated at the airport, a comparison between ACNs and PCNs⁵ confirmed that some parts of the airport runway pavement exceed the ACN. This is because measurements differ in countries depending on how the PCN is calculated or on the thickness of the pavement.

Table-3 Example of ACN of ICAO DM3 (asphalt pavement)

Aircraft type	Roadbed Design CBR (%)			
	13 or over	8 – 12	4 – 7	Less than 4
B747-400	58	64	80	102
A300-600	49	56	68	84
B767-300	43	47	56	76

(Source: Material of Japan’s National Institute for Land and Infrastructure Management No. 604)

With regard to facilities to prevent overrun such as an overrun area, landing strip and runway end safety area, they were confirmed by using Japanese standards, “Establishment Criteria and Description of Airport Civil Engineering Facilities (July 2008)⁶”, because China has not established particular standards for installing such facilities. It can be said that the airport is of a structure to satisfy the standards and it is prepared for incidents such as overrun, as shown in Figure-4.

Table-4 Standards for Overrun Area and Others in Japan

Item	Standard
Overrun area	In principle, the length of the overrun area should be 60m or over and the width should be the same as that of the runway.
Landing strip	The length of the landing strip should be that of the runway plus 60m on each side except for landing strips approved as having special reasons not to have such length. The width of the landing strip should comply with the standard for the strip grade except for landing strips approved as having special reasons not to have such width. If precision approach is made (for instrument landing) on a runway with a length of over 1,280m, the distance between the centerline in the lengthwise direction and the longer side of the landing strip should be over 150m.
Runway end safety area	In principle, the length of the runway end safety area should be between 40m (general rule) and 120m (standard) for non-instrument landing on a runway with a length of less than 1,200m and between 90m (general rule) and 240m (standard) for instrument landing on a runway with a length of over 1,200m. In principle, the width of the runway end safety area should be the same as that of the landing strip.

(Source: Establishment Criteria of Airport Civil Engineering Facilities and the Descriptions” (July2008)

Moreover, the aviation security-related radio facilities were introduced by this project such as an Instrument Landing System (ILS) and Non-Directional Radio Beacon (NDB). According to the “Statistical Data on Civil Aviation of China 2009,” a VHF Omnidirectional Range (VOR) Beacon, Distance Measuring Equipment (DME) and

⁴ PCN values for airports around the world indicate to what extent the airport pavement can endure the aircraft load. The values are indicated for each type of aircraft taking into account the impact of the aircraft on the pavement.

⁵ When reviewing pavement strength, ACN and PCN established for each aircraft type should be compared. In case of $ACN \leq PCN$, the pavement can be deemed to be strong enough for the aircraft type.

⁶ As Japanese standards comply with ICAO standards, it can be deemed that an airport largely complies with ICAO standards to the extent that it complies with Japanese standards.

Secondary Surveillance Radar (SSR) were also installed. By introducing them, takeoff and landing from both north and south became possible at the airport and reduced the risk caused by the weather and ensured safe takeoff and landing.

Based on the above, it is considered that the situation at the airport does not pose a threat to the safety of aircraft takeoff or landing or of aircraft services.



Figure-4 Status of Airport Facilities (created based on data from Google Earth)

(3) Convenience of the Passenger Terminal Building

There seem to be no significant changes in the facilities themselves. Since the flow lines of departing and arriving passengers are separated as much as possible to further promote efficiency and safety of movement, it is deemed that the convenience and safety of airport users are ensured.

In summary, in terms of the airport's effectiveness, the number of aircraft takeoffs and landings as well as the number of passengers and cargo volume handled are increasing and that the airport facilities ensure the safety of aircraft takeoff and landing.

3.2 Impact

3.2.1 Intended Impacts

During the ex-post evaluation, the followings were mentioned: (1) aviation safety was ensured in the northwestern region of China and (2) the economy of the northwestern region has been stimulated.

(1) Ensurement of Aviation Safety in the Northwestern Region

As mentioned above, the runway at Lanzhou Zhongchuan Airport is long enough to accommodate large aircrafts taking off and landing. When looking at neighboring airports in the region, Lanzhou Zhongchuan Airport is found to be relatively large in terms of runway

standard and airport code, too. As shown in Figure-5, relatively large airports located close to Lanzhou Zhongchuan Airport include Urumchi Airport (4E), Xian Airport (4E) and Chengdu Airport (4E) and other surrounding airports are 4D or smaller.

Based on the above, it is considered that the airport can function as an emergency airport to accommodate landings by large aircrafts and as an alternative airport to substitute for surrounding airports in an emergency.

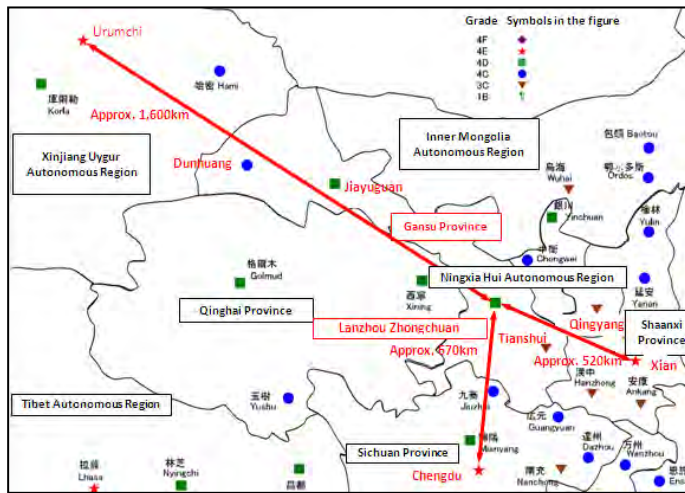


Figure-5 Airport Located around Gansu Province

Table-5 Size of Airports in the Neighborhood of Lanzhou Zhongchuan Airport

Airport Name	Province/ Autonomous Region	Airport Standard Code	Runway: Length x width (m)
Lanzhou Zhongchuan Airport	Gansu Province	4D	3,600 x 45
Jiayuguan Airport		4D	3,000 x 60
Dunhuang Airport		4C	2,800 x 45
Qingyang Airport		3C	Unknown
Tianshui Airport		3C	Unknown
Xian Airport	Shanxi Province	4E	3,000 x 45
Chengdu Airport	Sichuan Province	4E	3,600 x 45, 3,600 x 60
Urumchi Airport	Xinjiang Uygur Autonomous	4E	3,600 x 45
Xining Airport	Qinghai Province	4D	3,000m x 45

(Source: 2009 Statistical Data on Civil Aviation of China)

(2) Stimulation of the economy in the Northwestern Region

1) Economic trends in the northwestern region

Changes in the number of domestic travelers in Lanzhou, the capital city of Gansu Province, located adjacent to the airport, are shown in Figure-6 and changes in GDP in Figure-7. It can be seen that the number of domestic travelers has increased 2.0 times from 2006 to 2009, while GDP (regional gross domestic product) has also grown 1.5 times during the same period. As mentioned earlier, it is known that the number of passengers and aircraft takeoffs and landings and cargo volume handled are growing, while both the number of travelers and GDP in the region are also increasing following this trend.

One of the reasons for such trends toward economic growth is the growth of tourism and promotion of the use of airports.

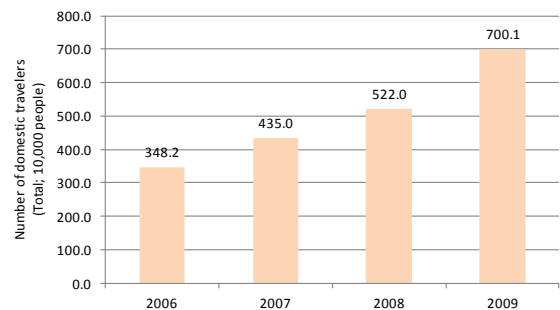


Figure-6 Changes in Domestic Travelers in Lanzhou City (Source: Searchina (Internet website))

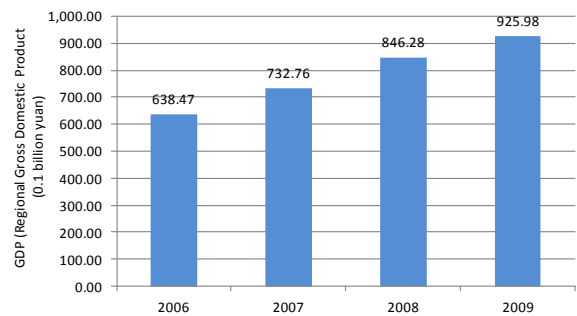


Figure-7 Changes in GDP of Lanzhou City (Source: Searchina (Internet website))

2) Trends in tourism

In Gansu Province, there is a wealth of tourism resources, including Dunhuang (Mogao Caves) which was designated as a World Heritage Site, and tourism plays an important role in the region's economy. It is thought, therefore, that changes in the number of travelers are closely connected with the state of the regional economy and that there is a close relationship between changes in the number of travelers and changes in airport-related indexes such as the number of passengers using the airports.

Based on this, it is highly possible that the development of the airport, which is the traffic hub for the region, has impacted on regional tourism and contributed to stimulation of the regional economy.

3) Promotion of the use of airports

According to the document entitled "Lanzhou Airport Co., Ltd.—Recent operational conditions" (provided by the Chinese side), as the flight routes have expanded, the airport market in Gansu Province has been stimulated and hence convenience for business and pleasure trips has been enhanced. In addition, in order to attract a greater number of travelers and passengers, in January 2010, operation of a limousine bus service⁷ was launched by Baiyin Longxin Automobile Transport Co., Ltd. connecting the central area of Baiyin City and Lanzhou Zhongchuan Airport, thereby improving accessibility to the airport. In 2007, through cooperation with the "Gansu Year Campaign" held by Hainan Airlines Group, the airport also contributed to the development of the aviation market in the region.

From these circumstances, it is understood that the use of the airport has been promoted by placing importance on collaboration with outside entities while actively taking advantage of a range of incentive schemes and supporting airlines' PR programs to contribute to a significant increase in air traffic.

⁷ Following the start of the limousine bus operation, on October 18, the Hainan Airlines Lanzhou Airport Baiyin City Air Terminal was opened in the West Station of Baiyin Longxin Automobile Transport Co., Ltd. to operate the first city air terminal in Gansu Province.

3.2.2 Other Impacts

(1) Natural environment, relocation of residents and land acquisition

Since documents and materials related to environmental standards and the status of waste disposal in China were not available, the situation surrounding air pollution and waste disposal is not known. As far as understood from Figure-8, although residential districts are scattered around the airport, there are mainly agricultural fields to the east and in the mountainous areas to the west. Therefore, it is thought that there are not many areas or entities that

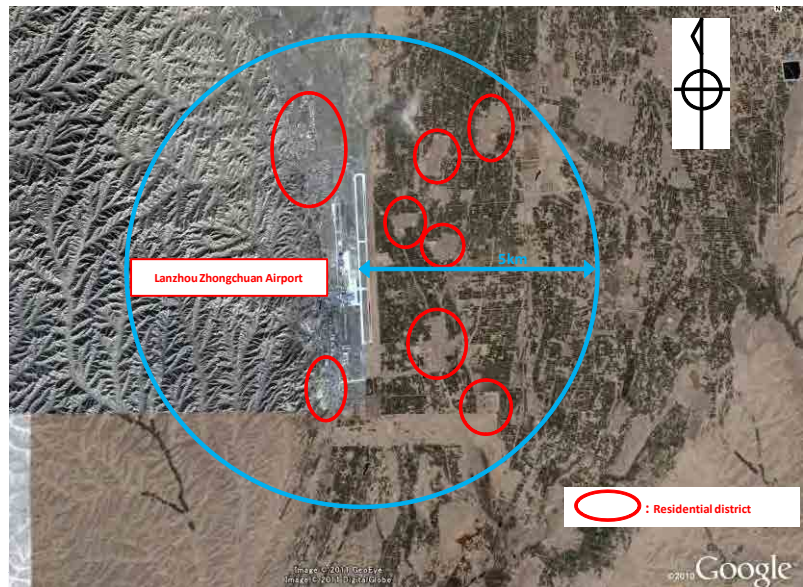


Figure-8 Condition of the Surrounding Area
(created based on data from Google Earth)

are affected by aircraft noise. In addition, relocation is considered completed since there are few residential districts or agricultural land in the vicinity.

(2) Others (disaster-relief assistance)

According to “Lanzhou Airport Co., Ltd.—Recent operational conditions” (provided by the Chinese side), when disasters occurred in a row such as the earthquakes in Sichuan and Yushu and mudslide in Zhouqu, Lanzhou Airport Co., Ltd. immediately offered assistance for relief goods and workforce as emergency measures. Lanzhou Airport fulfilled its role for emergency relief transport assistance: a total of 69 relief planes were accepted, supporting the transportation of 454 relief workers, 186 injured people, 167 attendants to the injured and 108t of relief goods.

In this way, it is known that the airport can function in the emergency assistance system not only as an alternative airport but also as a priority “disaster relief” center for disaster relief transportation.

Based on the above, the airport not only functions as an alternative airport to ensure aviation safety in the northwestern region but also contributes to the stimulation of the regional economy, for example, in the tourist industry.

3.3 Sustainability

3.3.1 Structural Aspects of Operation and Maintenance

Since there were no detailed materials available on the operation and maintenance of the

airport facilities, the detailed status of operation and maintenance could not be grasped. However, judging from the fact that the name “Lanzhou Airport Co., Ltd.” is found in the “financial data” (provided by the Chinese side) and from “Lanzhou Airport Co., Ltd.—Recent operational conditions” (also provided by the Chinese side), efforts to make each airport a subsidiary company have been made in accordance with the policy established during the ex-post evaluation. The organizational structure is considered to have been established already, by making “Gansu Airport Group Co., Ltd.” the parent company and by establishing and controlling subsidiary companies under the group, including Lanzhou Airport Co., Ltd., Dunhuang Airport Co., Ltd., Qingyang Airport Co., Ltd. and Jiayuguan Airport Co., Ltd.

According to “Lanzhou Airport Co., Ltd.—Recent operational conditions” (provided by the Chinese side), Gansu Airport Group Co., Ltd. has made efforts to promote corporate governance by allocating personnel appropriately, streamlining the personnel system and promoting management efficiency after coordinating and reorganizing the management framework and organization. As a result, the scope of the group’s services was expanded, the management level of related operations was improved, and streamlining of organization was promoted. In addition, Gansu Airport Group is further promoting corporate governance through business collaboration with Hainan Airlines Group,⁸ improving the management of business operations, administration, financial matters, projects management and service standards.

3.3.2 Technical Aspects of Operation and Maintenance

Although detailed data on technical aspect of operation and maintenance were not available, according to “Lanzhou Airport Co., Ltd.—Recent operational conditions” (provided by the Chinese side), it is known that Lanzhou Airport Co., Ltd. has been promoting various programs such as “Safe Operation Month,” “Safe Operation Risk Roller Campaign” and “Special development of control area certificate documents” in order to further develop a sound safety management system. In 2007, Lanzhou Airport passed the safety review and national aviation security examination of the Civil Aviation Administration of China (CAAC), further enhancing the level of safety management. It also obtained safety titles such as “Organization that Successfully Passed the Safety Evaluation” from the CAAC Northwest Regional Administration, while being designated as a “national model of a reliable air transport sales agency” for the second year in a row.

In summary, it is presumed that a certain level of education, training and maintenance is in

⁸ The official name is Hainan Airlines Co., Ltd. based at Haikou Meilan International Airport located in Haikou City, Hainan Province. On November 29, 2007, China Xinhua Airlines, Chang An Airlines, Shanxi Airlines and Grand China Express Air merged with the company to establish Grand China Air. Following the merger, the group positioned itself as the 4th largest airline company in China after China Southern Airlines, Air China and China Eastern Airlines.

place at the company.

3.3.3 Financial Aspects of Operation and Maintenance

As shown in Figure-9, when looking at the financial status of Lanzhou Airport Co., Ltd. in 2005 and later, sales have grown while the deficit in net profits has decreased.

As shown in Figure-10, the company's financial status was extremely poor from 2005 to 2007, which cannot be deemed a healthy situation. In 2008, although the company's assets exceeded liabilities at a rate of over 100%, in 2009, again liabilities exceeded assets, lowering the airport's liquidity ratio to 87.5%.

In terms of business management, although the number of takeoffs and landings has increased and it is expected that the principal source of income, such as landing fees and airport charges collected from airlines, will increase, the airport is tending to spend more because operating, financial and administrative costs have not declined.

When looking at the budget related to maintenance, according to "Financial data: List of major operating costs of Lanzhou Airport" for 2007 (provided by the Chinese side)", the major operating costs in 2007 amounted to 83,786,002 yuan, of which 3,381,091 yuan were accounted for as "maintenance costs" (4.0% of the operational costs). The ratio is not very high.⁹

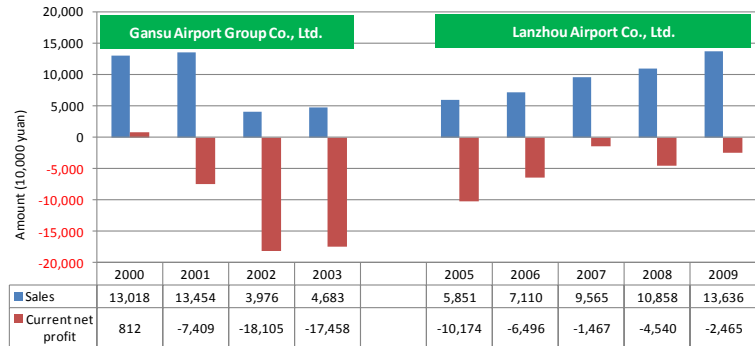


Figure-9 Changes in Sales and Net Profit

(Ex-post Evaluation Report and material provided by the Chinese side)

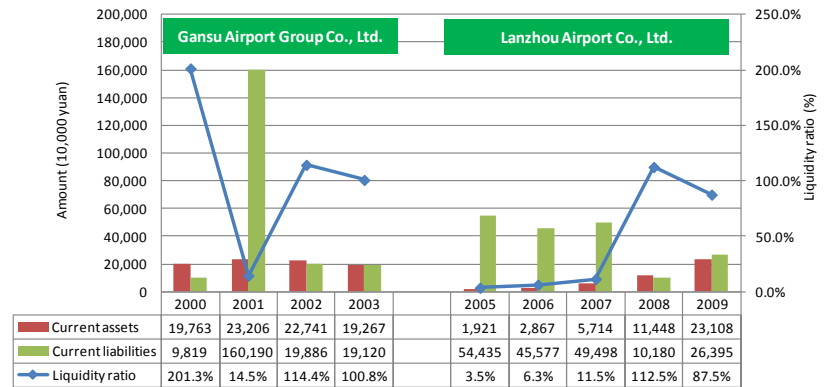


Figure-10 Changes in Liquidity Ratio

(Ex-post Evaluation Report and data provided by the Chinese side)

⁹ To compare the maintenance budget with that of Narita Airport by referring to Narita Airport's "FY2010 Financial Report," about 13% of total operational costs (107,839 million yen) is accounted for as "repair and maintenance costs" (13,833 million yen) at Narita Airport. Because the scale of the two airports is significantly different, the comparison should not be made lightly, but it shows that the figure of 4% at Lanzhou Zhongchuan Airport cannot be deemed high.

3.3.4 Current Status of Operation and Maintenance

When the ex-post evaluation was conducted, it was reported that daily maintenance was performed in accordance with the procedure manuals developed based on rules. In this monitoring study, however, the status of maintenance could not be confirmed because the procedure manuals could not be obtained.

Since the runway is maintained in a good condition such as not to hinder takeoff or landing of aircrafts and the aviation security-related facilities are operated in an appropriate manner, it can be presumed that the number of takeoffs and landings at the airport is on the rise as mentioned above.

Based on these conditions, it is considered that daily maintenance is performed in accordance with the procedure manuals.

In summary, with respect to sustainability of the project, when looking at the airport’s financial and management conditions, it is still recording losses although sales are rising. In terms of operation and maintenance, it is presumed that maintenance is performed, because the airport is in an appropriate condition as not to hinder aircraft traffic.

3.4 Others

During the ex-post evaluation, it was pointed out that Lanzhou Airport Co., Ltd. (Lanzhou Zhongchuan Airport) recorded losses. Therefore, it was suggested that the executing agency should make efforts to improve its financial status, while financial assistance should be provided by the provincial and national governments. The policies of such governments were not known in detail since detailed data were not available to know financial assistance by the provincial and national governments. However, judging from the airport’s financial status, in which liabilities and negative balance have not been eliminated, it can be presumed that no assistance has been provided by the governments.

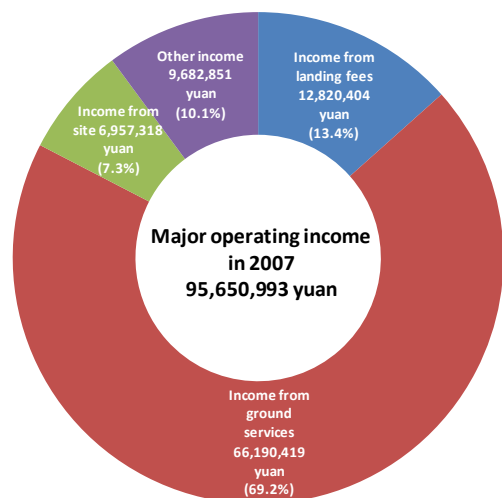


Figure-11 Operating Income of Lanzhou Airport Co., Ltd.

(Data provided by the Chinese side)

Details of the major operating income of Lanzhou Airport Co., Ltd. in 2007 are shown in Figure-11. About 70% of the operating income comes from ground service operations, which includes income from airport charges collected from airlines and apron service operations. Other non-aviation related income includes franchise business, which corresponds to just 0.5% (441,530 yuan) of total operating income. Since there is only a small income from

non-aviation related business, it can be presumed that efforts to diversify airport business have not progressed significantly.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

- Thanks to the expansion of the airport, the number of aircraft takeoffs / landings and passengers, and volume of cargo handled have increased. Coupled with this positive trend, the regional economical indexes (the number of travelers and GDP) are also on the rise, and as a result the project is considered to contribute to the growth of the regional economy.
- The airport has a role as an alternative airport for surrounding airports and as an emergency landing airport. In terms of safety, it is deemed that the airport is in an important position.
- With regard to the executing agency, Lanzhou Airport Co., Ltd., a member of Gansu Airport Group Co., Ltd., the company has not been able to eliminate its deficit although sales have increased since 2005.

4.2 Recommendations

- China has implemented necessary measures to develop and maintain airports and perform aviation operation and maintenance in accordance with ICAO standards. While the airport was placed under the control of a private airport company, it continues to be developed, managed and maintained in accordance with ICAO standards. In addition, it plays an important role as it is positioned to function as an alternative airport for surrounding airports as well as an emergency landing airport, which means it should be always maintained in a good condition. Therefore necessary measures should be continuously taken to perform regular maintenance of the major facilities, such as the runways, and to secure the budget and organizational structure to perform the maintenance successfully.
- When looking at the financial status, the airport has not eliminated its deficits since 2005, although sales have increased. As the number of aircraft takeoffs and landings increases, income from landing fees and from ground service operations such as passengers' airport charges is expected to increase. However, it is expected that the airport will make further efforts to increase non-aviation related income as diversification of airport operations has not progressed.

4.3 Lessons Learned

None.

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1. Project Outputs 1) Basic facilities Runway Parallel taxiway Apron 2) Passenger terminal building 3) Cargo terminal building 4) Control tower 5) Hangar 6) Aviation security facilities 7) Other facilities	3,600m x 45m 3,600m x 23m Loading 71,400m ² Night stay: 54,800m ² 25,000m ² 2,000m ² 4,000m ² 4,000m ² Instrument Landing System (ILS): 1 unit Non-Directional Radio Beacon (NDB) 4 units Water and sewage system, fuel supply system, etc.	As planned As planned As planned As planned 27,495m ² 3,328m ² As planned As planned As planned As planned As planned
2. Project Period	December 1996 – February 2000 (38 months)	December 1996 – August 2001 (56 months)
3. Project Cost Amount paid in Foreign currency Amount paid in Local currency Total Japanese ODA loan portion Exchange rate	6,338 million yen 7,379 million yen (in local currency: 615 million yuan) 13,717 million yen 6,338 million yen 1 yuan = 12 yen	6,299 million yen 14,033 million yen (in local currency: 926 million yuan) 20,332 million yen 6,299 million yen 1 yuan = 15.155 yen