

Project for Improvement of the Hygienic Environment of the Reconquista River Basin

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1. Project Description



Project Area



Pump Station No. 9

1.1 Project Objective

The objective of this project was to strive to perform flood control by upgrading rivers and improving drainage in the Reconquista River Basin, as well as to enhance its water quality by the development of sewage treatment facilities and the strengthening of systems like wastewater management, thereby contributing to mitigating flood damage and to improving the hygienic environment of the residents in the region.

1.2 Outline of the Loan Agreement

Approved Amount/ Disbursed Amount	8,150 million yen/4,725 million yen
Loan Agreement Signing Date/Final Disbursement Date	March, 1995/August, 2002
Ex-post Evaluation	FY2005
Executing Agency	Reconquista River Valley Administration Committee (COMIREC)

Main Contractor	Dragados y Obras Portuarias S.A., Pagliettini S.A., Impregilo SpA, Cartelline S.A., Codi S.A., Eleprint S.A.
Main Consultant	Black & Veatch International Company-Franklin Consultora S.A Electrosistemas S.A.S

1.3 Background of Ex-post Monitoring

The local industrialization policies of the 1940s and 1950s, promoted the development of general industry alone. These policies prioritized the development of industrial infrastructure, while neglecting the development of social infrastructure in the Reconquista River Basin. Adequate supply of basic services such as water supply, sewage, and medical care services were neglected. Flooding was frequent in much of the basin area during the summer rainy season when the water level of the rivers rose. During the winter, seasonal southeast winds with rainfall contributed to flooding in the lower area of the Reconquista River Basin causing considerable damage to local infrastructure. This project was implemented to improve the rivers, the drainage flow, and the overall local sanitary environment.

Argentina's economic and debt crisis forced JBIC to suspend loan disbursements, which in turn forced construction of the sewage treatment facilities to be terminated. Hence, in the ex-post evaluation, it was pointed out that the effectiveness of the project was curtailed in terms of river purification. A decline in river water quality was observed in FY2005, and there is a need to monitor the water quality of the river. Following the completion of the project, it was noted that the agency in charge of maintenance and operations was not functioning properly. Recommendations made to the executing agency stated "the need to prioritize the construction of sewage treatment plants as soon as the country's economic crisis ended, to strengthen the operating system of the maintenance agency, and to quantify the project's effectiveness in the region."

Therefore, based on the above issues concerning project effectiveness and sustainability that were observed during the ex-post evaluation, 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 the Monitoring Study

Duration of the Study: March 2011 to January 2012

Duration of the Field Study: June 22, 2011 to July 2, 2011

2.2 Constraints during the Monitoring Study

COMIREC is the management organization in charge of environmental improvements of the Reconquista River, but with limited governmental authority. Due to its limited authority, COMIREC has been having serious organizational problems. In addition, there were limits to the information that was obtained including the answers to the questionnaire about the segment where input was terminated by the Japan International Cooperation Agency (JICA).

3. Monitoring Results

3.1 Effectiveness

3.1.1 Quantitative Effect

Before the project was implemented (1994), the rivers in the Reconquista Basin maintained their natural course; dredging was carried out in very limited areas along the rivers. In addition to a small change in elevation that existed between the upstream and downstream areas, the ground surface was covered with permeable low concrete and asphalt as urbanization progressed within the basin. As a result, a major portion of the rainwater that poured into the basin was not absorbed by the soil, and most, if not all of the rainwater runoff went into the rivers increasing their water level. This caused the rivers to overflow and inundate the land nearby. Flooding occurred frequently especially during the summer rainy season.

During the winter, seasonal winds with rain from the southeast also contributed to the rise in the water level of Lujan River, Reconquista River, and La Plata River. The lower area of the Reconquista River Basin was constantly flooded causing extensive flood damage.

During the great flood of 1985, 18.6% of the entire basin area or 119.8km² was submerged, of which 28.4% consisted of residential areas. Some 305,500 people (12.3% of the total population in the basin) suffered flood damages, of which 71,000 were forced to evacuate and 28,000 lost their homes.

At the time of the appraisal, benefits such as a decrease in the number of deaths and injuries caused by floods, an improved living environment for the basin residents, an improvement in regional economic activities due to the mitigated risk of floods, and the reclamation and efficient utilization of land ruined by flooding were listed as the expected results of this project.

The ex-post evaluation confirmed that damage caused by floods has not increased since 2001. Ex-post monitoring also confirmed improvement in the sanitary conditions of residents, an improved local economy, and recovery and effective use of wasteland.

The water volume, water level and meteorological data of the 10 pump stations constructed in the project are monitored 24 hours from the 9th pump station. Monitoring data showed that the water level and flow rate has remained constant since the project's completion. The operating procedures of the pump station are set according to a manual, and the gates are operated to maintain a water level of 1.7 to 1.8m within the reservoir, with regularly held monthly inspections. The operating system to handle the floods that occurs an average of 2 to 3 times a year is in place.

In the project, the average estimated flood frequency of the Reconquista River is based on the

annual number of floods recorded during the last 50 years, and the useful lifespan of the pump station is estimated at 10 years. The number of floods exceeding these estimates has not been recorded since 2005. Any rise in water level that could potentially provoke a flood event has been adequately controlled by the pump stations.

Before the Project, floods occurred frequently in much of the area when the amount of water increased during the summer rainy season. Furthermore, seasonal southeasterly winds with rainfall in the winter caused flood damage in the lower area of the Reconquista River Basin.

According to COMIREC, the population residing in the newly developed residential area created by the project increased by more than 60% in contrast to the population before the project was implemented. The provincial government created a hazard map to help local residents become aware of flood risk areas and it is conducting a flood prevention and awareness campaign directed at the residents.

During the field survey study, it was observed that flood damage had not occurred in the project areas since the project was completed in 2001. Under this project, riparian works were conducted on the Reconquista River and its tributaries; and channels were created, the width of the river was expanded, and drainage improvements were achieved with the use of drainage pump facilities. All of these enhancements contributed to building a good monitoring system for controlling and reducing the risk of large-scale flooding.

3.1.2 Qualitative Effect

At the time of the evaluation, measures to reduce flood-induced overflows of septic tanks and to mitigate groundwater contamination were listed as examples of the project's effectiveness (including impact) in addition to a decrease in infectious diseases caused by contaminated water, an improvement in water quality, and the elimination of bad odors due to pollution.

Four sewage disposal plants, which were not constructed at the time of the ex-post evaluation, were completed by ENOHSA (National Institution for the Execution of Environmental Development Projects). Of the four plants, two are currently working and the other two will be completed in 2011.

The local water authority, ADA, is in charge of enforcing local industrial wastewater standards, and periodically monitoring the water quality of the Reconquista River. Based on the latest data that was obtained, ADA has collected fines from approximately 100 factories (prime meat, dairy products, lumber, garments, and processed drinking water among others) that violated the ADA Industrial Waste and Water Quality Standards¹.

But, despite ADA's enforcement of industrial waste standards, the water quality of the

¹ Dissolved oxygen: over 1mg/l, BOD: 70mg/l or below, pH: between 6.5 and 8.5, Total suspended solid: 0, Cadmium: less than 9.5µg/l, Chromium: less than 170.0µg/l, Mercury: less than 8.9µg/l, Lead: less than 70µg/l, Zinc: less than 250.0µg/l

Reconquista River has continued to decline since 2005. Deterioration of the BOD² average value of 29mg/l in 2007 in contrast to 23mg/l in 2005, and the detection of heavy metal (mercury) in the water observed in 2008 and 2011 were reported to the ADA and the local government. Fish were found to exist near the disposal plant during direct observations of the main stream and there was no stench. However, in the other subsidiary streams, fish were not found and there was some stench of the water.

Despite the installation of sewage disposal plants, there was no remarkable improvement in the water quality of the river. This appears to be because (1) two of the four wastewater treatment plants are scheduled to go into operation later, (2) the sewage network remains undeveloped, (3) the river water continues to be contaminated by the discharge of agricultural and industrial chemicals, and (4) an excessive regulatory approach has been adopted for industrial wastewater.

3.1.3 Re-calculation of the Economic Internal Rates of Return (EIRR)

The positive impact of the project included increased appreciation of the land along the river basin. Land value increased as the frequency of the floods and its adverse effects on social infrastructure, local residents, and industries located in the Reconquista River Basin, and on local transportation became controlled. The executing agency confirmed that if the project's positive impact was economic progress in the region, then the Economic Internal Rate of Return (EIRR) was estimated to be about between 12.7% and 14.2%.

The executing agency did not re-calculate the EIRR, and data for re-calculation were not available at the time of the monitoring study.

It was concluded at the time of the ex-post evaluation that JICA's financed flood control facilities located downstream of the Reconquista River are being operated and maintained properly, and no flood damage has occurred after the project was completed. However, the river purification effort has not achieved its objectives as yet, since only half of the sewage disposal plants constructed by ENOHSA are currently in operation.

3.2 Impact

3.2.1 Intended Impact

Based on the questionnaire responses and interviews³ of local residents, the Project's flood damage mitigation measures increased the land value downstream of the Reconquista River, which

² Biochemical Oxygen Demand (BOD) is an index that indicates the level of contamination due to organic matter in river water. It represents the amount of oxygen that is consumed when organic matter in the water is oxidized by microorganisms during a fixed time at a fixed temperature. The higher the numerical figure, the greater the amount of organic matter and the greater the contamination

³ A few local people residing in the project area were selected at random by the local government office for interviews.

was land previously classified as a flood risk area. According to COMIREC, the improved price of this land has made it competitive with the surrounding land. Land prices were estimated to be about 6,000 pesos maximum (approximately 11,028 yen) /m². Another effect of the project was an increase in the local population. The total local population recorded in 1991 was 2,510,000, 3,730,000 in 2001 and 4,120,000 in 2010.

However, the increase in the land value of the Project site can also be attributed to the country's unstable inflation rate, which was 40.95% (2002) and 11% (2011)⁴, and the recent surge in national land price (8.01%, 2007)⁵, which suggests that the rise in land value and the increase in population within the Project area may not be solely due to the Project's implementation.

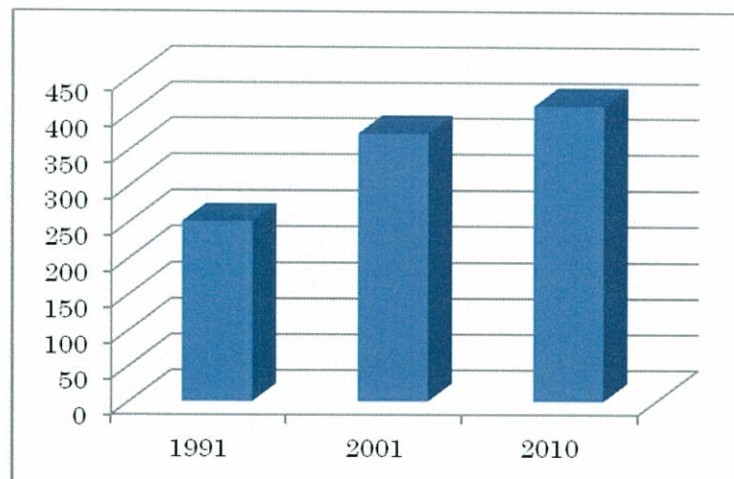


Fig. 1 Increase in the Local Population within the Project Region (unit: 1000 people)

Source: Responses to the Questionnaires from COMIREC

It has also been confirmed in interviews with local residents (see footnote #3) that domestic labor for women has been reduced. Housewives pump substantially less muddy water out of their houses due to the decrease in floods.

3.2.2 Other Impact

A sustainable environmental improvement program for the Reconquista valley has been implemented since 2005 to alleviate water pollution of the Reconquista River. This program is sponsored by the Inter-American Development Bank (IDB), and the estimated cost of this project, if implemented, will be 250 million dollars. The program consists among other inputs, enhancement of the existing drain pipe network, expanding the Hurlingham disposal plant, improvements to the

⁴ World economy, statistics http://ecodb.net/country/AR/imf_inflation.html

⁵ Articles in Clarin.com

current waste disposal system, and establishing a Water Quality Monitoring Institution. Of these inputs, the Water Quality Monitoring Institution was completed during the ex-post evaluation, while improvements to the existing drain pipe network and expansion of the Hurlingham disposal plant will start in 2013.

3.2.3 Land acquisition and Relocation of Residents

According to the COMIREC responses to the questionnaire on living conditions after relocation, the ex-post evaluation of the project also included assessment of the living conditions of the relocated families since land acquisition by the project was kept to a minimum. Alternative land was provided for relocated households to alleviate any problems or inconvenience caused by mandatory relocation. The total number of households that were relocated was 22 instead of 44 as initially planned.

The project's positive impact was confirmed by the growth in the local population and the increase in the price of land in an area previously classified as a high-risk flood area. Living conditions have improved in part because of the construction of pump stations.

But, as stated earlier, the increase in land price and population may not be exclusively due to the project.

3.3 Sustainability

3.3.1 Structural Aspects of Operations and Maintenance

The Organismo Provincial para el Desarrollo Sostenible (OPDS) is supervised directly by the Governor of the Buenos Aires Province, and it decides the region's (including the Reconquista River) environmental conservation policies. COMIREC, which is supervised by the OPDS, was established in 2001 as the operation and maintenance agency of this project as well as the agency for integrated management and water quality conservation in the Reconquista Valley, which is an essential part of the Integrated Valley Management Plan. Since 2008, COMIREC has gradually taken over the operation and maintenance of the facilities managed by the Water Department of the Buenos Aires provincial government. However, during the ex-post evaluation, COMIREC was no longer functioning and UNIREC was in charge of the supervision and control of the facilities. Due to organizational changes in 2002, UNIREC was no longer under the direct supervision of the Governor, and it was delegated to the Ministry of Public Works of the Province of Buenos Aires. With this change, UNIREC lost its status as an independent authority and organization. As of 2008, UNIREC's functions have gradually been transferred to COMIREC.

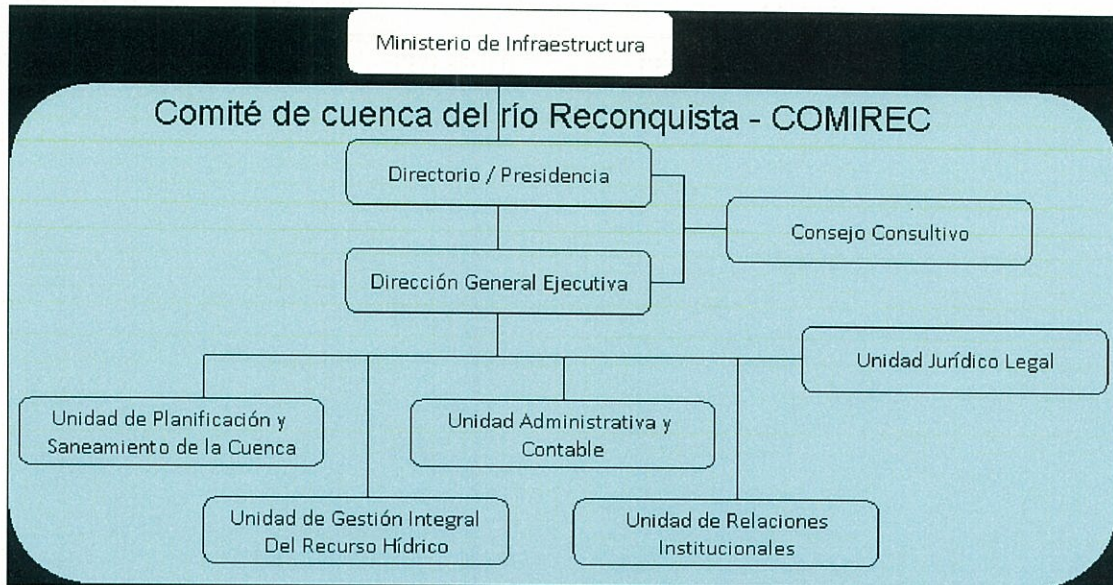


Fig.

Fig. 2 Organizational Chart of COMIREC

Source: Programa de Manejo Urbano Ambiental Sostenible de la Cuenca del Río Reconquista, IDB

The Drainage and Water Department, the Ministry of Infrastructure, and the provincial government consigned the private corporation, Ilubaires S.A. to operate and maintain the 10 pumping stations constructed under this project. The contracted amount totaled 20 million pesos that was distributed during the course of three years starting in 2008. Thereafter, starting in 2012, COMIREC will take over the maintenance and operations in lieu of the provincial government.

The integrated controls of the ninth pump station are usually operated by a staff of six members. The operations and maintenance of the other pump stations are monitored and supervised from this station. An additional eight people are assigned during the flood season. Government retirees assist the private corporation (Ilubaires S.A.) in the operation and maintenance of the stations. The local government cooperates with Ilubaires by posting monitoring data on their website.

AySA (the agency in charge of the city suburbs and about 90% of its capital is held by the government) and ABSA (agency in charge of the city water) are responsible for the operation and maintenance of the sewage treatment facilities shown in the Table 1. Currently there is a plan⁶ to expand the existing sewer system at four facilities. This expansion will be funded by loans from IDB and the World Bank.

⁶ "The Sustainable Environmental Improvement Program of the Reconquista Valley" is planned by IDB at a cost of 250 million dollars since 2005. The objectives of the project are to improve the existing drain pipe network, and to expand the Hurlingham disposal plant by 2013.

Table 1 Operation and Maintenance Organization at Each Main Plant

Plant Name	Pumping Station	Urban-areas Sewage Plant	Suburban Area Water Plant
Organization	Ilubaires S.A.	AySA	ABSA
Type of Organization	Private	Government Funded	Local Government Funded
Employees	1,000	5,000	1,000
Number of Engineers	800	3,500	800
Number of Sewage Engineers	-	1,500	400

3.3.2 Technical Aspects of Operations and Maintenance

Ten pumping stations are currently in operation, and the main control and monitoring center is located at the ninth station. Maintenance activities are performed regularly every three months. The garbage removal machine at each pumping station has also been replaced.

According to the private corporation, Ilubaires S.A, in charge of the stations operations and maintenance, the monitoring system for all ten stations has been improved since 2008. Former provincial government employees are in charge of the training program for plant operators, and an operations manual has also been prepared.

Training of staff members at the disposal plants is mainly OJT carried out by AySA and ABSA, the companies that are in charge of the operation and maintenance of the sewage plants. The current chief engineer of the plant has 22 years of experience. The water quality inspection procedures are based on the quality standards of these companies, which are more stringent than provincial government water quality regulations.

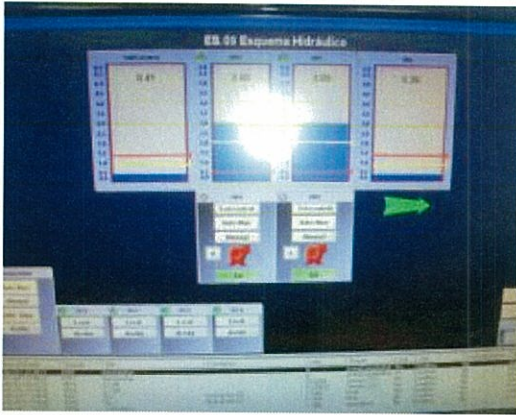


Photo 1 Monitoring the Pump Facilities



Photo 2 Facility Chart of the Sewage Disposal Plant

3.3.3 Financial Aspects of Operations and Maintenance

The FY2009 maintenance and operating budget of the pump stations was US\$8.17 million, of which US\$3.24 million were allocated for electricity, security and replacement expenses. The private company, Ilubaires S.A., was consigned the task of maintenance and operations. After the project was completed, the budget required to maintain and operate the pump stations and sewage disposal plants constructed under the project was allocated. In addition, a manual for mobilizing staff members and carrying out pump operations during both normal and flood periods has been prepared and the placement of relevant personnel have been adequately implemented. Presently, two sewage plants have been in operation for only several years since their completion, and the other two facilities will be in operation in 2011. As a result, much of the budget is taken up by repair and supply costs.

Table 2 Operation and Maintenance Cost of the COMIREC Pumping Stations

(unit: 1000 pesos)

	2006	2007	2008	2009	2010
Budgeted amount	2,420	2,710	10,092	9,512	18,633
Actual amount	2,000	2,223	2,569	11,377	13,778

Source: COMIREC Response to the Questionnaire

3.3.4 Current Status of Operations and Maintenance

AySA and ABSA are in charge of the operations and maintenance of the four sewage disposal plants. The local government-contracted corporation, Ilubaires, is in charge of the maintenance and operations of the pumping stations and carries out regular maintenance work once every three months.

The operational conditions of the two sewage disposal plants out of the four that are in operation and the maintenance of the pumping stations were confirmed through visual observations (at pumping stations 6 to 10), and the monitoring activity, periodic inspections, garbage removal, etc. were adequately implemented.

According to the COMIREC responses to the questionnaires, the Taurita Bridge, which spans over a narrow area of the Reconquista River, was listed as one of the reconstruction works planned by the IBD. Expansion and reconstruction of Taurita Bridge are scheduled to take place in 2012 to 2013.

Table 3 Overview of Newly Constructed Sewage Disposal Plants

Map Number	Name of Sewage Disposal Plant	Capacity	Operator	Present Condition
1	San Miguel	1000 m ³ /h	ABSA	Operational since 2008
2	Hurlingham	1500 m ³ /h	AySA	Operational since 2007
3	Catonas	-	ABSA	To be completed in 2011
4	Agustin Ferri	-	ABSA	To be completed in 2011

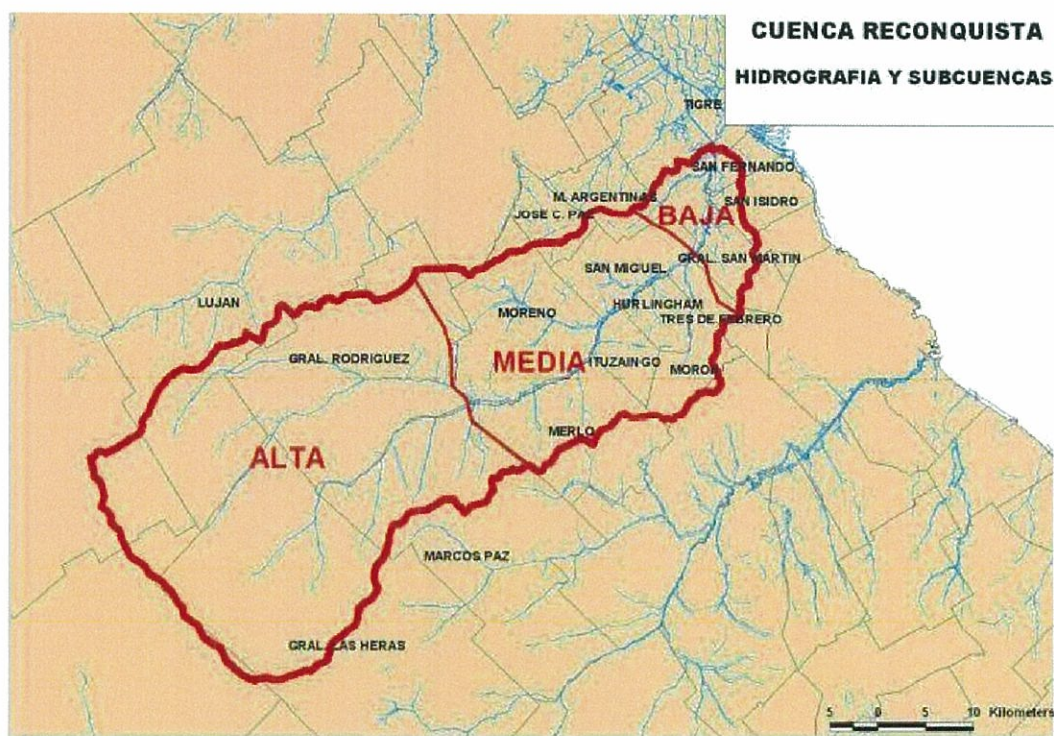


Fig. 5 Locations of the Sewage Disposal Plants

Source: Programa de Manejo Urbano Ambiental Sostenible de la Cuenca Del Rio Reconquista, IDB



Photo 3 Hurlingham Disposal Plant



Photo 4 San Miguel Disposal Plant

Table 4 Overview of Operations and Maintenance

Name of Facility	Pumping Stations	Hurlingham	San Miguel
Operator	COMIREC	AySA	ABSA
Capacity	97.5 m ³ / second	1500 m ³ /h	1000 m ³ /h
Area Population	305,000	178,000	100,000
Number of Employees	Six to eight	16 to 17	7
Annual Maintenance and Operations Cost	20 million pesos/3 years	20 million pesos	-

The operations and maintenance activities of the JICA funded flood control facilities along the Reconquista River are adequately implemented, and there have been no significant flood-related damages since the project was completed.

Although the sewage plant construction targeted for JICA financing was terminated during the course of the project, these plants were ultimately built by the central government. But, the surrounding sewage pipe network has not been built. IDB continues to support the development of integrated environmental improvements of the Reconquista River.

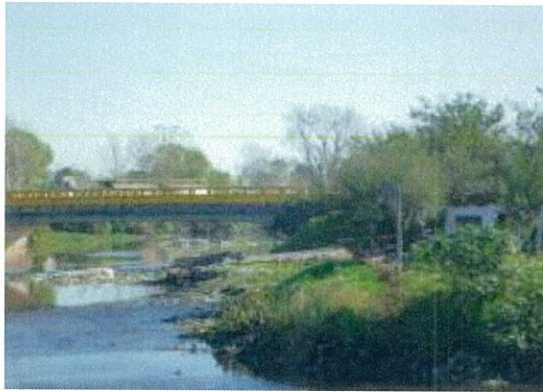


Photo 5 The Taurita Bridge



Photo 6 Pumping Station O&M Sign

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The operation and maintenance of the JICA financed flood control facilities along Reconquista River have been adequately implemented, and no flood-related damage has been reported after the project was completed. The surrounding land is developing into residential areas. Starting in 2012, COMIREC will take over maintenance and operations in lieu of the provincial government, however, its operational functions have not been fully established.

Although four sewage disposal facilities aimed at river purification were constructed despite JICA's termination of financial assistance, the sewage network remains undeveloped. IDB also continues to support the project in the areas of plant expansion and network improvement.

4.2 Recommendations

Although COMIREC is in charge of coordinating environmental improvements of the Reconquista River, it does not have the administrative authority to enforce these improvements. This organizational weakness is a substantial challenge to the sustainable operation and maintenance of the facilities constructed in the Project.

In the future, it will be necessary to establish a strong operation and maintenance organization in coordination with the provincial government and other relevant organizations. To achieve this, dispatching human resources, technology transfer, and other enhancement measures from the provincial government to COMIREC need to be implemented.

4.3 Lessons Learned

None

End

Comparison of the Main Project Plan and Performance

[JICA]	[IDB]
<p>(1) River improvement</p> <p>1) Improve discharge channels</p> <ul style="list-style-type: none"> · Lengthened by about 7km · Excavation and dredging 1,350,000m³ · Embankments/levees 170,000m³ <p>(2) Drainage Improvements</p> <p>1) Construct backwater drainage pump stations</p> <ul style="list-style-type: none"> · 10 pump stations (total capacity of 97.5m³/s, electrical capacity of 5,075kW, 30 units) · Power distribution facility (extended by 22.9km) <p>(3) Hygienic projects and planning</p> <p>1) Installation of sewage treatment plants</p> <p>Sewage treatment plants that were not constructed.</p> <p>2) Sludge treatment</p> <ul style="list-style-type: none"> · Total amount of disposed excavated and dredged soil 685,000m 	<p>(1) River Improvement</p> <p>1) Distributaries dams (divergence point and drainage ditch) as planned</p> <p>2) Improve Reconquista main trunk stream as planned</p> <p>3) Improve tributaries as planned</p> <p>4) Embankments along the Las Tunas River as planned</p> <p>5) Construction of bridges and other infrastructure</p> <ul style="list-style-type: none"> · 13 bridges were renovated, 9 bridges and 6 pedestrian bridges were reinforced · 1 electrical wire tower and 1 gas pipe line were relocated <p>(2) Drainage Improvements</p> <p>1) Improvement of drainage channels (surrounding the pump stations) as planned</p> <p>(3) Sanitary projects and planning</p> <p>1) Supplemental environmental plans</p> <ul style="list-style-type: none"> · Plan to control industrial wastewater → implementation completed · Comprehensive management plan for the basin → partially implemented · Social action plan → implementation completed · Development of flood relief regions → implementation completed · Development of a network for monitoring water levels, water volume, and water quality → not implemented