

PUBLIC

DOCUMENT OF THE INTER-AMERICAN DEVELOPMENT BANK

VENEZUELA

**SEWAGE TREATMENT SYSTEMS FOR THE
LAKE VALENCIA BASIN**

(VE-0060)

LOAN PROPOSAL

NOVEMBER 1988

Basic Socioeconomic Data of Venezuela

1. General Data

Land Area (thousands of Km ²)	898,805
Total population (thousands of inhabitants, 1987)	18,272
Rural Population (%)	18.7
Population Growth Rate (%) (1980-85)	2.9
Birth rate per thousand population (1980-85)	33.0
Mortality rate per thousand population (1985)	5.6
Infant mortality rate per thousand live births (1980-85)	38.7
Life expectancy at birth (years) (1980-85)	69.0
Literacy rate (%) (1987)	89.5

Wage Income Distribution, October 1985 (Percentage)

<u>Percentiles</u>	<u>Urban</u>	<u>Rural</u>	<u>National</u>
1 - 10	2.0	2.3	1.8
11 - 20	3.4	3.7	3.2
21 - 30	4.5	4.8	4.1
31 - 40	5.6	5.7	5.3
41 - 50	6.9	6.6	6.6
51 - 60	8.3	7.8	8.0
61 - 70	9.9	9.7	9.9
71 - 80	12.6	12.1	12.5
81 - 90	16.5	16.2	16.9
91 - 100	30.3	31.1	31.7

Source: OCEI, Household Sample Survey.

Electric energy per capita consumption Kwh/year (1985)	2,039
Unemployment Rate (II Semester, 1987)	8.5

Economically Active Population by Sectors (Average 1987)

<u>Sector</u>	<u>Percentage</u>
Agriculture, forestry, fishing	13.6
Hydrocarbons and mining	1.0
Manufacturing	17.0
Construction	9.4
Others	59.0
<u>Total</u>	<u>100.0</u>

Source: OCEI.

2. <u>Gross Domestic Product 1/</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>
<u>Origin</u>					
<u>Primary Sector</u>	<u>26.9</u>	<u>21.9</u>	<u>18.5</u>	<u>14.2</u>	<u>16.3</u>
Agriculture	6.9	5.3	5.8	6.6	6.5
Mining	20.1	16.7	12.7	7.6	9.7
<u>Secondary Sector</u>	<u>24.1</u>	<u>25.1</u>	<u>26.7</u>	<u>29.5</u>	<u>30.2</u>
Manufacturing	19.5	19.1	20.7	23.0	24.4
Construction	3.0	4.5	4.4	5.0	4.6
Electricity	1.7	1.5	1.5	1.5	1.1
<u>Tertiary Sector</u>	<u>49.0</u>	<u>52.9</u>	<u>54.7</u>	<u>56.2</u>	<u>53.5</u>
Commerce	11.0	14.1	15.9	18.4	18.0
Transportation	10.9	5.9	6.3	7.3	6.6
Financing	11.0	16.2	16.0	12.6	13.1
Government	10.3	8.7	8.6	8.9	7.7
Other services	5.8	8.1	8.0	8.9	8.2
<u>Destiny</u>					
Final Consumption	72.9	73.0	73.3	79.7	n.d.
Gross Investment	14.8	15.7	17.2	20.2	n.d.
Rest of the World 2/	12.3	11.3	9.5	0.1	n.d.

1/ Based on current prices estimates (National Accounts, BCV).

2/ Exports of goods and services minus imports of goods and services.

	<u>Real Growth Rate</u>		
	<u>1985</u>	<u>1986</u>	<u>1987</u>
<u>Gross Domestic Product</u>	1.3	6.8	1.7
(At 1968 constant prices) 1/			
<u>Petroleum</u>	<u>-2.4</u>	<u>5.6</u>	<u>-4.8</u>
Production of crude oil	-5.8	7.3	-0.5
Refining	8.8	0.7	-6.3
<u>Rest of the Economy</u>	<u>3.2</u>	<u>7.1</u>	<u>2.0</u>
Agriculture	8.3	8.3	4.1
Non-oil Manufacturing	3.5	9.3	3.7
Construction	1.6	9.8	2.0
Services	2.6	6.0	2.9

1/ New National Accounts at constant prices (1984) have been estimated for 1984-87 only. They are not compatible with old estimates for previous years.

3. <u>Foreign Trade</u>	In Millions of US\$				
	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>
Exports of Goods (FOB)	<u>14,759</u>	<u>15,967</u>	<u>14,178</u>	<u>8,686</u>	<u>10,369</u>
Petroleum	13,667	14,794	12,862	7,218	9,034
Iron	80	81	107	186	n.d.
Aluminum	439	370	375	347	350
Productos siderúrgicos	149	134	192	223	202
Cacao	18	15	18	17	n.d.
Coffee	5	22	27	57	n.d.
Others	401	551	596	638	n.d.
Imports of Goods	<u>6,409</u>	<u>7,262</u>	<u>7,388</u>	<u>7,700</u>	<u>8,172</u>
Consumer Goods	1,912*	1,518	1,529	1,217	n.d.
Intermediate Goods	2,368*	3,057	2,763	2,587	n.d.
Capital Goods	2,129*	2,687	3,096	3,896	n.d.

* Central Bank data, in bolivares transformed into dollars using the implicit rate of exchange for each year.

4. <u>Balance of Payments</u>	In Millions of US\$				
	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987*</u>
Exports of Goods (FOB)	14,759	15,967	14,178	48,649	10,487
Imports of Goods (FOB)	-6,409	-7,262	-7,388	-7,834	-8,430
Services (Net)	-3,712	-3,150	-3,576	-2,734	-2,320
(Investment Income, Net)	(-2,133)	(-1,352)	(-2,338)	(-1,465)	n.d.
Transfers	-211	-137	-128	-93	-54
Balance in Current Account	4,427	5,418	3,087	-2,012	-317
Net Capital Flows	-3,830	-4,156	-1,457	-1,703	-802
Change in Net International Reserves (- = increase)	-329	-1,586	-1,328	3,934	1,119

* Preliminary Estimate.

5. <u>Public Finances</u>	Percentage of GDP				
	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>
<u>Central Government</u>					
Current Revenues	21.0	24.3	23.1	20.5	21.7
Current Expenditures	15.6	16.6	16.0	14.4	16.0
Savings in Current Account	5.4	7.7	7.1	6.1	5.7
Capital Expenditures	6.0	4.9	5.1	6.5	6.4
Surplus (+) or Deficit (-)	-0.6	2.8	2.0	-0.4	-0.7
Domestic Financing	2.1	-0.2	0.3	3.3	3.9

6. <u>Money and Credit</u>	<u>Year-End Balances</u>				
	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>
<u>Foreign Assets (Net)</u>	51,114	77,397	85,703	91,580	113,103
<u>Domestic Credit</u>	<u>100,811</u>	<u>114,211</u>	<u>105,405</u>	<u>142,030</u>	<u>184,384</u>
To the Government (Net)	-1,715	-5,116	-20,965	-19,435	-34,846
To Public Enterprises	1,488	1,073	1,492	1,274	1,520
To the Private Sector	91,625	106,934	118,120	152,458	209,488
Money (M1)	70,049	86,693	93,708	98,479	133,779
Savings and Time Deposits	69,994	76,787	88,603	119,418	154,325
Monetary Liquidity (M2)	140,043	163,480	182,311	217,897	288,104

	<u>Percentage Change</u>				
	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>
<u>Foreign Assets (Net)</u>	<u>22.7</u>	<u>51.4</u>	<u>10.7</u>	<u>6.9</u>	<u>23.5</u>
<u>Domestic Credit</u>	<u>6.2</u>	<u>13.3</u>	<u>-7.7</u>	<u>34.7</u>	<u>29.8</u>
To the Government	22.5	-198.3	-309.8	7.3	-79.3
To Public Enterprises	18.0	-27.9	39.0	-14.6	19.3
To the Public Sector	5.5	16.7	10.5	29.1	37.4
Money (M1)	20.7	23.8	8.1	5.1	35.8
Savings and Time Deposits	20.7	9.7	15.4	34.8	29.2
Monetary Liquidity (M2)	20.7	16.7	11.5	19.5	32.2

7. <u>Prices</u>	<u>Annual Growth Rate (Percentage)</u>					
	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988*</u>
Consumer Price, Caracas	6.7	11.9	11.4	11.6	28.1	16.9
Wholesale Price (General)	7.0	17.5	18.2	15.7	44.7	
Wholesale Price (Imported)	6.0	17.8	15.3	9.2	n.d.	
GDP Deflator	5.7	21.3	6.8	3.2	38.2	

* December 1987 to September 1988 change.

8. <u>External Public Debt</u>	<u>End of:</u>			
	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987**</u>
Outstanding Balance	27,322.6	26,538.6	25,291.6	26,003.8
1. Commercial Banks	24,207.8	23,539.7	22,783.0	23,191.3
2. Other Creditors	3,114.8	2,998.9	2,508.6	2,812.5
Bond Holders	1,791.1	1,934.3	1,725.4	1,934.4
Suppliers and Contractors	831.7	677.7	518.3	581.1
Multilateral Agencies	333.2	290.9	200.8	81.6
Other Governments	155.7	96.0	64.1	71.9
Others	3.1	-	-	143.5
<u>Debt Service</u>				
Total Debt Service (millions of US\$)	6,261	4,997	4,184	n.d.
Interests/exports of goods and non-factor services (%)	20.0	26.1	32.6	25.1

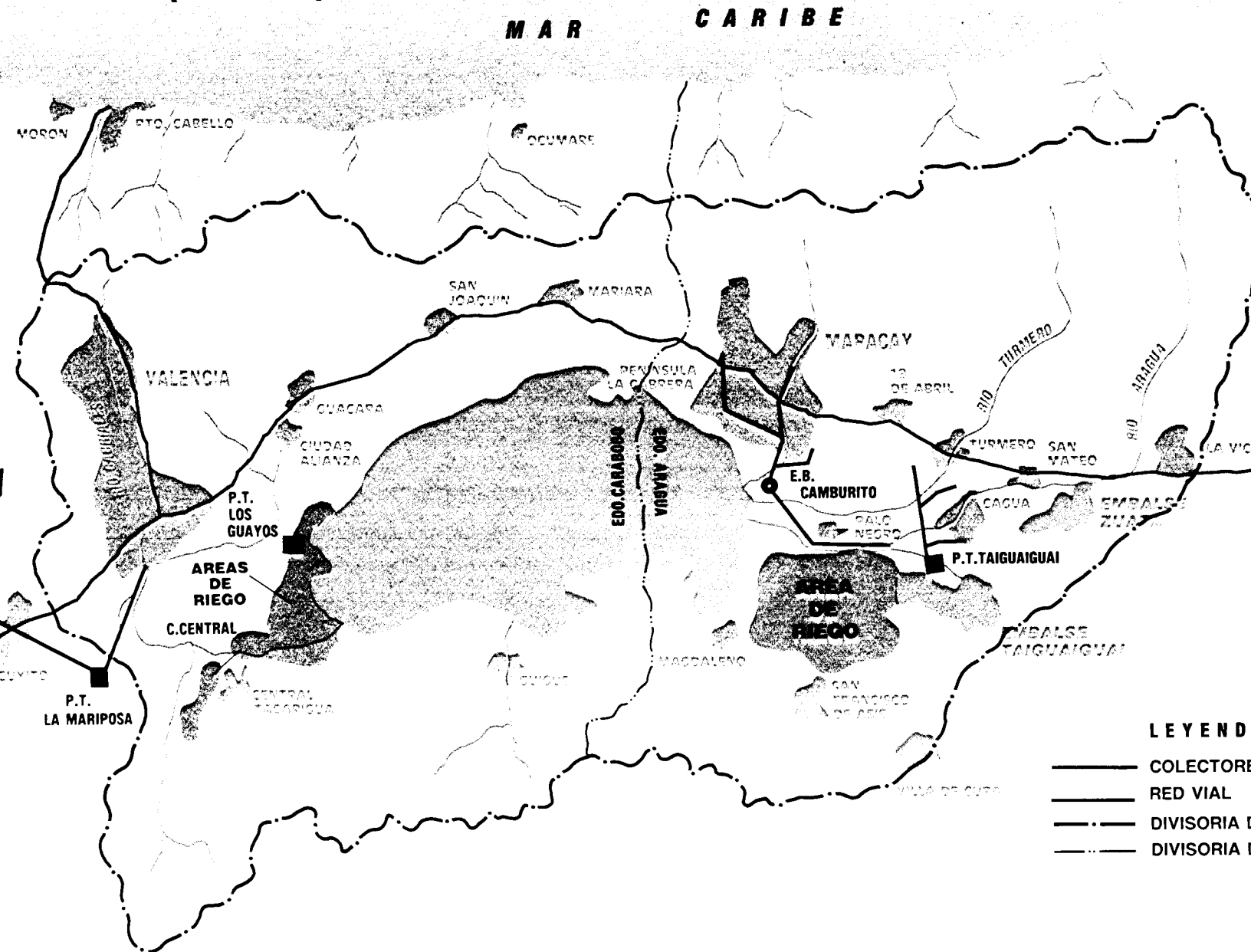
** June 30, 1987 balance.

9. <u>IDB Loans Approved up to June 30, 1988</u>	<u>Millions of US\$</u>	<u>Percentages</u>
Total approved (40 loans)	1,242.0	100.0
Ordinary Capital	1,067.7	86.0
FSO	101.4	8.2
Other Funds	72.9	5.9
<u>By Sectors</u>		
Agriculture and Fisheries	198.8	16.0
Industry and Mining	316.0	25.4
Tourism	-	-
Transportation and Communications	71.6	5.8
Energy	375.9	30.3
Education, Science and Technology	34.6	2.8
Public Health and Environment	209.0	16.8
Urban Development	31.9	2.6
Preinvestment	2.9	0.2
Exports Financing	1.4	0.1

DOC. DATOSVE
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VENEZUELA

EMAS DE TRATAMIENTO DE AGUAS RESIDUALES EN LA CUENCA DEL LAGO DE VALENCIA (VE-0060)



VENEZUELA

SEWAGE TREATMENT SYSTEMS FOR THE
LAKE VALENCIA BASIN
(VE-0060)

LOAN PROPOSAL

I. INTRODUCTION

A. Basic information on the proposed operation

- 1.01 The participants in the proposed operation and the main elements of the project are as follows: Borrower: The Republic of Venezuela. Executing agency: The Ministry of the Environment and Renewable Natural Resources (MARNR). Operating agency: Empresa de Aguas Regional del Centro, S.A. (EMPREDARSA). Date of loan request: May 25, 1988. Project objectives and description: The project is the second stage of the Comprehensive Environmental Sanitation Program for the Lake Valencia Basin. Its primary objective is to improve the quality of water in Lake Valencia and its main affluents by building main and intercepting sewers and two treatment plants, which will process approximately 70% of the household waste and industrial sewage discharged into the lake. The specific works to be built for the project are: (i) at the western end of the lake, a network of sewer mains and intercepting sewers for the cities of Valencia and Tocuyito, and a tertiary treatment plant with a capacity of 2.4 m³/sec; and (ii) at the eastern end of the lake, a network of sewer mains and intercepting sewers, a pumping plant, and a treatment plant with a capacity of 3.8 m³/sec, to handle sewage from the city of Maracay and other towns. An industrial effluent control program and a training program will be carried out as supplementary activities. Under the first of those programs a rate structure will be established for industrial users of the system. The project calls as well for a prefeasibility study to be prepared for the third stage of the Comprehensive Environmental Sanitation Program for the Lake Valencia Basin. Total cost of the project: US\$125 million. Proposed loan: US\$50 million (ordinary capital).

B. Background and formulation of the project

1. Contamination of Lake Valencia

- 1.02 Most of the rivers in the Central Region of Venezuela, which is one of the country's most rapidly-growing industrial areas, flow into Lake Valencia, which is the center of a closed watershed with no natural drainage outlet and whose waters thus are very vulnerable to pollution. Waste matter carried along by the rivers concentrates in

the lake, adding constantly to pollution levels. It has been estimated that about 6.7 cubic meters of untreated municipal sewage, primarily from the Valencia and Maracay metropolitan areas, are brought into the lake every second. The lake serves as a biological reactor in which biodegradable waste is consumed through biochemical oxidation and decomposition processes, and non-biodegradable wastes are left to form dissolved or suspended solids. The decomposition process is accelerated by the relatively tepid water temperature. The specific problems now being faced, for which the government is seeking solutions, are: (i) a shortage of water for human and agricultural use, which gives signs of becoming more serious in the future; (ii) alarming levels of pollution in the water of the lake and its affluents, in the absence of systems to control and eliminate contaminants; and (iii) the rapid rise in the water levels of the lake in recent years, which poses a serious flood threat for farmland and towns and cities in the area.

2. Formulation of the Comprehensive Environmental Sanitation Program for the Lake Valencia Basin

- 1.03 After research was done on the environmental problems in the Lake Valencia Basin, an action plan was devised to eliminate pollution in this important body of water and its watershed, and to institute means of monitoring and controlling its pollution levels there. This particular lake basin is unique in terms of its urban and industrial development patterns, use of agricultural land, and availability and utilization of water resources. In 1986, on the basis of studies conducted by the Ministry of the Environment and Renewable Natural Resources (MARNR), the government designed the Comprehensive Environmental Sanitation Program for the Lake Valencia Basin, to improve the quality of water in the lake and to rescue it as a natural resource.
- 1.04 The specific projects envisaged in this program share the common goal of finding solutions to serious problems in the area of water supply, pollution, and control of the lake's water levels. The program has been divided into the following stages: (i) supply of water to towns and cities in the basin. The Bank has already approved financing to defray part of the cost of this first stage of the program, through loan 538/OC-VE for US\$153.4 million, which was approved by the Board of Executive Directors on December 17, 1987. The loan contract was signed on September 30, 1988; (ii) collection and treatment of domestic and industrial sewage from the main towns and cities in the basin (the project described in this document). It should be mentioned that Resolution 124, which requires industries in the basin to treat their liquid wastes, has been in effect and enforced since 1984, with substantial success; and (iii) control of Lake Valencia water levels and construction of storm drain systems and other works needed to alleviate the pollution caused by other urban centers in the basin and by crop- and stock-farming operations. To ensure the continuity of the program, financing for studies for this third stage has been included as part of the project described herein.

3. Firm commitment to build sanitation works

- 1.05 When the request for a loan for the first stage of the Comprehensive Program (for a water supply system for the region) was being processed, the Government of Venezuela committed itself to continuing the implementation of the program until all of the above-mentioned stages had been completed. Recommendation 8 of Appendix II to the loan proposal approved by the Bank's Board of Executive Directors consisted of the following paragraph, which appears as clause 6.17 of the contract for loan 538/OC-VE signed on September 30, 1988:

"The borrower undertakes to execute the works for the sanitation of the Valencia Lake, consisting of the sewage treatment plants for the cities of Valencia and Maracay. In this respect, the borrower, through the MARNR shall submit to the Bank, within six months from the effective date of the loan contract, the final plans and designs for the construction of the sewage treatment systems in the La Mariposa site (Valencia) and in Maracay-Taiguaiguay (Maracay) with their financing plan and execution schedule. Additionally, the borrower shall present to the Bank, within the first 60 days of each calendar year starting in 1989, a report on the progress of the execution schedule of said works."

C. IDB participation

1. Advisory support from the Bank

- 1.06 The Bank has been working actively with the Venezuelan authorities since the earliest stages in the formulation of the Comprehensive Environmental Sanitation Program for the Lake Valencia Basin. In 1987 it provided the services of three consultants, one specializing in water quality, one in the reuse of sewage for irrigation and aquifer recharging, and one hydrologist, financed under the PAHO-IDB agreement. In 1988, an economist was hired to advise the Ministry of the Environment on the socioeconomic evaluation of the project, with funding initially under short-term technical cooperation operation ATN/SF-2991-VE and subsequently under the PAHO-IDB agreement.

2. Orientation and analysis missions

- 1.07 Since February 1987 the Bank has participated, through a number of orientation missions to Venezuela, in the successive stages of project preparation, and has been recommending the adjustments that would be needed to ensure that the final document supporting the loan request would contain all of the technical, financial, economic, and legal information the Bank requires for this type of operation. An analysis mission that visited Venezuela from August 15 to 26 1988, gathered the information used to prepare the report that is summarized in this proposal.

II. FRAME OF REFERENCE

A. Recent economic trends and outlook

1. Inflation

- 2.01 In 1987, Venezuela's authorities were confronted with the strongest inflationary surge in the country's recent history. At the same time, they were relatively successful in keeping up the expansion of the non-oil sector of the economy and reducing the heavy balance-of-payments deficit recorded the previous year. As price increases tripled that year, Venezuela posted real growth of 1.7% in gross domestic product (GDP), despite a drop of 4.8% in real value added by the petroleum sector. Meanwhile, the 1986 loss of some US\$4 billion in international reserves fell to below a third of that figure in 1987.
- 2.02 One of the major objectives of the economic authorities in 1987 was to contain and eliminate as quickly as possible the strong inflationary pressures that followed in the wake of the December 1986 devaluation, to which end domestic price controls were strengthened and expanded. The government had to resort to the massive use of extraordinary sources of financing to help pay for its investment programs and for the cost-of-living bonus given to public employees in the second half of the year. Thus, despite efforts by the monetary authorities to keep internal liquidity down, the money supply grew even more quickly, by 35.7%, and consumer prices soared. The consumer price index rose by 28.1% over the 1986 average, an increase well over double that of previous years.

2. Exchange rate

- 2.03 In accordance with exchange-rate measures announced in December 1986, the year 1987 opened with substantial changes in the price of foreign exchange on the official and preferential markets and in the transactions covered on the different markets. For a time, oil exports and a small group of essential import products were left at 7.50 bolívars to the dollar, while the official exchange rate was lowered from that level to 14.50 bolívars. In July 1987, the preferential rate for oil products was also lowered to 14.50 bolívars, leaving the country with virtually a unified rate for its most important commercial transactions. The free-market rate, for its part, was lowered gradually from 23.30 bolívars to the dollar in January to the bottom monthly average of 33.20 bolívars in September. Until 1986 this rate had been applied for export earnings of the private sector. The shift of these exports from the free to the official market meant a heavy loss in their value in bolívars, which was partially offset by an export bounty. These changes in the exchange-rate system will have an important and, in the long run, positive impact on non-oil production in Venezuela.

3. Tight credit policy

- 2.04 To combat the surge in inflation that followed the December 1986 devaluation, the government strengthened and expanded price controls, with the aim of limiting authorized price increases to those that could be clearly demonstrated to be tied in to cost increases. In the area of wage policy, while it was announced that support would continue to be forthcoming for industry-wide or sector-wide collective agreements, the country was faced in 1987 with worker demands for general compensation for the rapid loss in purchasing power of their wages and salaries. Accompanying the anti-inflation policy was an extremely tight domestic credit policy, which was heightened in mid-1987 when the Central Bank instituted a deposit facility for commercial banks which offered interest rates higher than their lending rates and thus soaked up excess liquidity.

4. Outlook

- 2.05 Changes in the international price of oil continue to be a major determinant of Venezuela's economic performance. As has been the case in the past, major shifts in oil prices affect the execution of public investment programs and the foreign-exchange budget, making it necessary at times to take corrective action. In light of these limitations, and since the strongest cost pressures appear to have unfolded in 1987, the outlook for the Venezuelan economy could be summarized as follows: modest growth, repeating the 1987 trend; no change in the unemployment rate; a substantial improvement in the inflation rate; and international reserve losses higher than those posted in 1987, given the possibility of a narrowing of the merchandise account surplus and an increase in external debt service.

B. The basic environmental sanitation sector

1. Agencies working in the sector

- 2.06 Pursuant to Decree 304 published in Official Gazette 31829, the Ministry of the Environment and Renewable Natural Resources is empowered to issue regulations governing the protection, conservation, and improvement of the Lake Valencia watershed. The Ministries of Health and Welfare, Development and Agriculture also have some degree of responsibility for environmental sanitation in this basin, although the decrees in these cases are national in scope. One of a number of organizations working in this area is the Instituto para la Conservación del Lago de Valencia (Association for the Conservation of Lake Valencia), a non-profit entity set up by virtue of the animus societatis (desire or will to associate) of a group of juridical persons, some of them established under public law and others under private law. In addition, the following national institutes report to the MARNR: (i) the Instituto Nacional de Obras Sanitarias (National Sanitation Administration - INOS), which supplies cities of more than 25,000 residents with water and sewerage services; (ii) the

Instituto Nacional de Parques (National Parks Administration - INPARQUES), which is in charge of national parks and natural monuments; and (iii) the Instituto Metropolitano de Aseo Urbano (Metropolitan Urban Sanitation Administration - IMAU), which is responsible for the solid waste collection and disposal.

2. Population with access to water and sewer systems

- 2.07 The growth in basic environmental sanitation services has gone hand in hand with the growth in the population. It is estimated that at the end of 1986 the country's water supply systems served 81.4% of the total population, and its sewer systems 57%. In urban areas coverage was 81% for water and 64% for sewerage; for rural areas these figures were 83% and 23%, respectively.

3. Basic sanitation in the project area

(a) Water supply

- 2.08 The region has few surface-water sources that would be fit for human consumption after treatment. Most of its potential lies in ground-water resources, which have been overexploited for multiple uses and cannot meet the demand (10.5 m³/sec). INOS thus has been forced to bring water in from the nearby Pao river basin, at the rate of 7 m³/sec. Since 1974, that external water supply of 7 m³/sec has been brought from the Pao river reservoir at Cachinche, which is the major source of water for the regional water supply system.

(b) Sewerage

- 2.09 The six sewage collection systems currently operating in the Central Region dump untreated wastes into the watercourses flowing into Lake Valencia, thereby raising the pollution levels of these rivers and the lake itself. The towns and cities served by these systems are Valencia, Tocuyito, Guacará, Mariara, San Joaquín, Maracay, El Limón, Cagua, Villa de Cura, Turmero, La Victoria, and San Mateo. A total of 1.7 million people were served by the systems in 1986, representing 72.7% of the total population of the Central Region.

4. Water and sewer rates

- 2.10 The rate system in effect in Venezuela at present for water and sewerage services was established in a joint resolution of the Ministry of Development and the Ministry of the Environment and Renewable Natural Resources. The Instituto Nacional de Obras Sanitarias (INOS), as the agency in charge of water and sewerage services nationwide, prepares studies, which must first be approved by its own Board and then are forwarded to the MARNR for its consideration, as the Ministry to which INOS reports. The draft proposal then is submitted for the consideration of the National Commission on Costs, Prices, and Wages, which reports to the Ministry of Development, and finally to the government's Economic Office.

C. IDB support for the development of the sanitation sector

- 2.11 The IDB has provided partial financing for four projects in this sector. This support falls into two periods: between 1961 and 1966 it approved a total of US\$33.8 million in loans, and in 1987 it approved loan 538/OC-VE for US\$153.4 million to expand the Central Region's water supply system. Because the first loans date back over 20 years, no evaluation will be provided here of the works they helped finance, but it can be noted that all of the objectives of the financing were fulfilled and the loans were disbursed in full and repaid in full.
- 2.12 The construction work called for in the project being funded with loan 538/OC-VE has not yet begun. The primary objective of this project is to expand the capacity of the Central Region's water supply system, to resolve the current shortfall and satisfy the demand up to the year 2000, when the population is expected to reach 3.5 million, distributed among 15 cities and towns and 24 rural communities. The specific goals of the project are as follows:
- (a) To add a volume of flow of 5 m3/sec of water from the La Balsa reservoir on the Pao river.
 - (b) To install 110,000 meters in Valencia and Maracay in order that 70% of the population will have metered service connections.
 - (c) To implement a program to gradually reduce water unaccounted for.
- 2.13 As part of the water supply project (the first stage of the Environmental Sanitation Program for the Lake Valencia Basin), the first steps have been taken to prequalify firms to supply the 40,000 meters to be installed in the Central Region. Once those meters are operating, billings for water based on metered consumption will increase. In addition, a nation-wide program is now under way to shut down illegal connections, also in order to reduce the percentage of unaccounted-for water. The following are the results achieved between April 1988, when this program was instituted, and August 1988 in the states that make up the Central Region:

<u>State</u>	<u>Number of illegal</u>	<u>Volume recovered</u> (l/sec)
	<u>connections</u> <u>closed off</u>	
Aragua	136	541.1
Carabobo	171	265.4
Cojedes	33	126.2
	<u>340</u>	<u>932.7</u>
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D. Description of the Lake Valencia Basin

1. Geographical situation and main cities

- 2.14 The Lake Valencia depression is located in north-central Venezuela. It is shared by the states of Carabobo and Aragua, and for administrative purposes is part of the Central Region. Lying between the coastal and interior mountain ranges of the Coastal System, it occupies an area of about 3,000 square kilometers, or less than 1% of the total area of the country. The Lake Valencia Basin covers much of the states of Aragua and Carabobo, and is home to major cities located along the highway linking Las Tejerías, Valencia, and Tinaquillo, to the north of the lake. The most important cities are Valencia, to the north-west, and Maracay, to the north-east, which have populations of 800,000 and 500,000, respectively. The 1988 population of the basin is approximately two million, or 13% of the country's total (see Map).

2. Concentration of industry and agriculture

- 2.15 There are approximately 2,000 industrial concerns operating in the basin, which generate some 30% of all factory jobs in the country (270,000). The basin accounts for 13% of all irrigated land in Venezuela, and its crops are more profitable than the national average. It contributes 20% of non-oil GNP. Since colonial times this area of the country has been responsible for a heavy share of the nation's total agricultural output. It has 46,000 hectares of top-quality farmland, surrounding the lake and at an elevation of over 400 meters above sea level. It is the only heavily-urbanized area in the country that offers good potential for agriculture and has a major farming industry.

3. Use of water resources

- 2.16 The growth of cities and the expansion of industry and agriculture have had drastic repercussions on the ecology of the basin, and particularly on its water resources. The water available is simply not sufficient to satisfy the huge demand, and it has become necessary to obtain water from other sources, to subject those sources to more intensive use, and to divert water from other watersheds. At present, about 7 m³/sec are being brought from the Pao-Cachinche reservoir; this accounts for almost three-quarters of all water now being supplied to major towns and cities in the basin. In the short term, plans for the project being financed with loan 538/OC-VE call for a further 7.5 m³/sec to be brought in.
- 2.17 Because water is scarce in the Lake Valencia Basin, excessive use has been made of its main aquifers. The 2,000 wells now in place produce an estimated 14 m³/sec of water. About 58% of that total is used to irrigate crops, and the rest is used by industries and homes. The imbalance created in areas where the aquifers' natural recharge

capacity has been exceeded has forced the groundwater level down, in some cases by as much as 10 meters. This in turn has gradually worsened the quality of groundwater, as the natural flow of water from the aquifer to Lake Valencia has been reversed. There is a substantial backflow of lake water with a salt content too high to be used in irrigation, particularly in the Maracay and Valencia aquifers where concentrations of dissolved solids have been found to exceed 2,000 mg/l.

- 2.18 As a closed system with no natural drainage outlet, the Lake Valencia Basin loses water only through evaporation. At the turn of the century, the surface elevation of the lake was 414 meters above sea level. In 1978, after many years of slowly drying out, the lake stood at 401.5 meters above sea level, but has since risen again to 405.5 meters. It is said that in previous times the lake could have drained into the Pao river basin (elevation 427m). As the water level of the lake dropped, the land left bare was gradually taken over for farming and ultimately for urban development purposes. The slow drying-up of the lake was halted in 1979 when the Cabriales river was diverted and more and more water began to be brought in from the Pao river basin. Since that year, the water level has been rising slowly. It is calculated that some 3,400 hectares have been flooded over this period. The average rise in the water level, under current conditions, is estimated to be 25 cm/year.

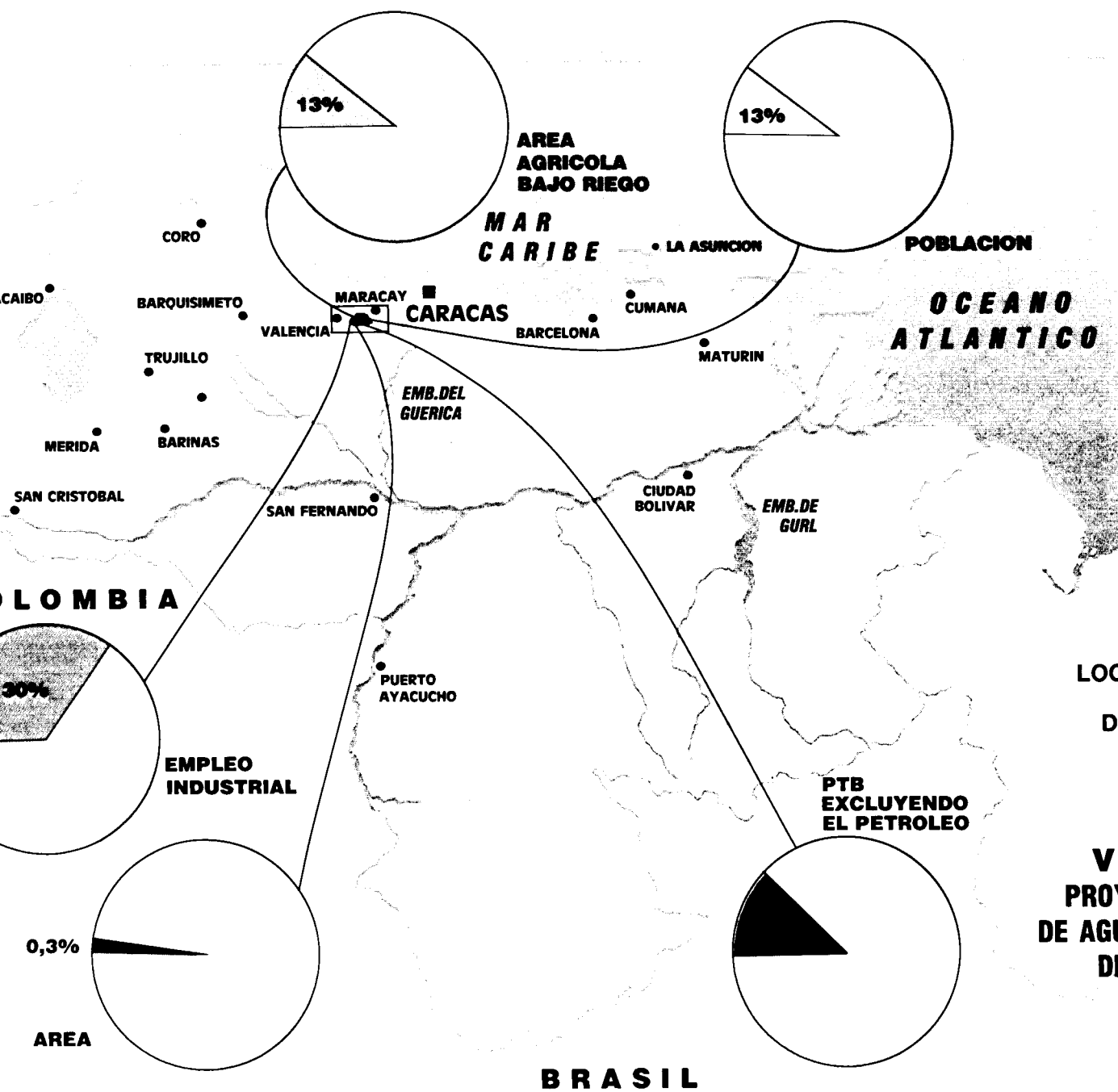
E. Sources of pollution

1. Urban pollution

- 2.19 According to census data and the population projections prepared, there are now about two million people living in the Lake Valencia Basin, and by the year 2000 that number will have risen to 3.5 million. At present, sewage volumes of about 6.7 m³/sec are being discharged, untreated, into the nearest rivers like the Cabriales and the Guey, or directly into Lake Valencia through small creeks. The two treatment plants being proposed in this project and the plant that INOS is now building will make it possible to treat sewage from the major cities in the basin. However, sewage will continue to be dumped into the lake and other bodies of water in the basin from the towns of Mariara, Guigue, Tacarigua, San Joaquín, San Francisco de Asís, Magdaleno, Belén, La Victoria, and Villa de Cura. These nine towns have a total population of 330,000, some 200,000 of whom dump sewage directly into Lake Valencia or its affluents. The latter figure is equal to 10% of the total population of the basin. The MARNR is, however, planning to build more treatment plants at future stages of the Comprehensive Environmental Sanitation Program for the Lake Valencia Basin (see paragraph 3.06).

2. Industrial pollution

- 2.20 The rapid growth of industry in the Lake Valencia Basin has been accompanied by extensive urban development. Virtually every branch



of industry is represented in the basin, with metal-products firms in first place (machinery, electrical devices, equipment), followed by non-metallic mineral processing companies (clay, china and porcelain objects), and the food industries. Of the 2,000 registered firms in the area, 271 are considered to be major or fairly high contributors to pollution. Of those, 106, or 39%, already have in place systems to pretreat their wastewater, to satisfy the requirements of Resolution 124 of 1984. That Resolution stipulates that industries must install pretreatment systems before their waste can be discharged into the public sewer system or directly into the lake or its affluents. Since it is mainly the largest industries that have installed treatment plants, the flow of industrial waste being treated is about 80% of the total volume being generated. The following table summarizes this situation.

Pretreatment of industrial effluents in
the project area: Current status

	T R E A T M E N T S Y S T E M S			
	La Mariposa	Taiguaiquay	Los Guayos	Total
Total number of industries	42	91	138	271
Number of industries with pretreatment plants	23	26	57	106
Percentage of industries with pretreatment plants	34.5	28.6	41.3	39.1
Total volume of industrial sewage (l/sec)	97.6	196.5	264.4	558.5
Volume of industrial sewage pretreated (l/sec)	77.6	166.6	206.7	450.8
Percentage of industrial sewage pretreated	79.5	84.8	78.1	80.7

- 2.21 The MARNR plans to continue enforcing the regulations set out in the above-mentioned resolution, and in the course of execution of the project (i.e., before the two proposed plants begin to operate), 67

further industrial firms are expected to install pretreatment systems. The MARNR also intends to be particularly firm in the case of industries whose effluents may contain toxic elements or substances which would interfere with the effective operation of the treatment systems to be built under the proposed project (see paragraph 3.04 and Recommendation 4).

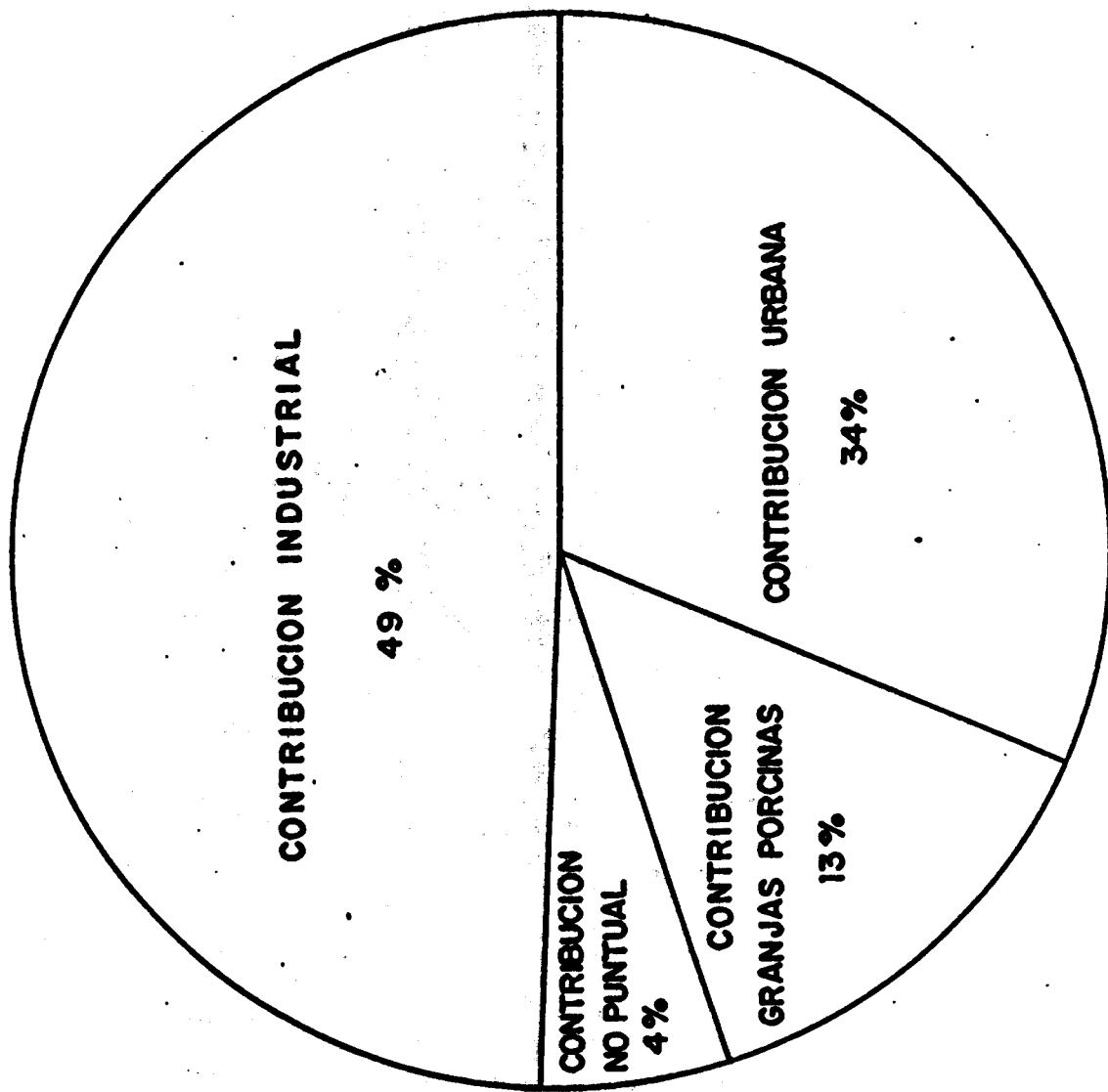
3. Contamination from pig-farming operations in the basin

- 2.22 There are 154 pig farms in the Lake Valencia Basin, with a total stock of some 310,000 hogs. The organic waste produced by these farms is equivalent to the waste output of a population of 740,000 (see Figure 1). In the state of Aragua, 68 farms already have oxidation ponds, 11 use wastewater to irrigate their farms, and two have septic tanks. Of the 34 farms in the state of Carabobo, only 11 have proper sewage disposal facilities. In other words, 60% of the organic waste produced by the farms in the two states is being treated in some form. The Corporación Regional del Centro (Central Region Corporation - CORPOCENTRO) and the MARNR are studying the feasibility of relocating those farms that do not have enough space to build treatment systems to the state of Cojedes. It can be concluded from an examination of the problem of liquid waste being produced by the basin's pig farms that waste equivalent to that produced by a population of 300,000 is still not being treated. The MARNR expects that this figure can be reduced substantially through the enforcement of existing laws and the relocation of some farms, as mentioned above. It should also be noted that the farms having no treatment facilities at all account for only 5% of the total waste being discharged into the basin, in population-equivalent terms. It is recommended that the contract contain a clause requiring the borrower to report to the Bank each year, beginning in 1990, on the progress made in implementing the planned measures (see Recommendation 4 b).

4. Agricultural pollution

- 2.23 The land surrounding Lake Valencia is heavily farmed. Just under 7,000 hectares are now under cultivation between the shore and elevation 415 meters above sea levels, accounting for 55% of the total land use in this area. At the eastern end of the lake about 2,800 hectares are being irrigated with water from the Taiguaiguay reservoir, and 1,300 hectares with groundwater. A further 1,500 hectares have irrigation infrastructure but not enough water. It is widely believed that part of the fertilizers and pesticides being used in farming may be entering the lake through surface run-off (see Figure 1, "Contribución no puntual" - Area-source contribution). However, to date the concentrations of pesticides observed in the lake are very low. Furthermore, while it still is not known what portion of the nutrients present in the lake may be due to the fertilizers used in farming, the lake does show symptoms of being overly rich in nutritive compounds, as evidenced by the high algae

**CUENCA DEL LAGO DE VALENCIA
CONTAMINACION ORGANICA POR ACTIVIDAD**



**TOTAL POBLACION
EQUIVALENTE = 5.880.000**

FIGURA 1

concentrations on the surface and plants floating along the shore. For this reason, provision is being made in the project for a study of area-source pollution to detect and alleviate any negative effects of agricultural activity in the area (see paragraph 3.06).

G. Pollution of rivers

- 2.24 The origin of most of the pollution entering Lake Valencia is the sewage discharged into its main tributaries, most of which have meager flows in the dry season. Only three rivers - the Guey, the Los Guayos, and the Cabriaes - maintain their water levels year-round, and the household and industrial waste they carry along are the chief sources of pollution of the lake.
- 2.25 The Guey river flows into Lake Valencia from the north-east. It cuts through the city of Maracay, and has been channelized from the central core to the point at which it leaves the city. Along the way, sewage is dumped into it from homes and industries. The Los Guayos river, north-west of the lake, also receives domestic and industrial wastes. The Caño Central river to the south-west of Lake Valencia is a natural channel which can be considered to be an extension of the Cabriaes river, since in 1978 the latter was diverted toward Lake Valencia. This river receives drainage water from the cities of Valencia and Central Tacarigua, to the west and south-west of the lake, respectively. Domestic, industrial, and agricultural wastes are discharged into this waterway as well. Another important river is the Guigue, situated south of the lake, which receives wastewater from the town of the same name and surrounding farming areas.

III. THE PROJECT AND ITS FEASIBILITY

A. Objectives

- 3.01 The proposed project is the second stage of the Comprehensive Environmental Sanitation Program for the Lake Valencia Basin. Its primary objective is to improve the quality of the water of Lake Valencia and its principal affluents, by building main and intercepting sewers and two treatment plants, which would process approximately 70% of the domestic and industrial waste discharged into the lake. As well, the project would seek to reduce the volumes of sewage now being dumped into the lake, to help slow the rise in water levels of the lake, which would climb from 25 to 43 centimeters a year with the additional volumes of water from the water supply project. The proposed project also envisages reusing the effluents of the treatment plants to irrigate land and recharge aquifers. In this way, the project would also help meet the demand for water in the agriculture sector, cut back on the excessive use being made of groundwater in the basin, and increase the water supply capacity of the Pao river basin.

B. Description

- 3.02 The proposed sanitation project, which would be implemented in tandem with the water supply project referred to above, consists of the following construction work and supplementary activities:

1. Main construction projects

- (a) At the western end of the lake, a network of sewer mains and intercepting sewers, totaling 42 kilometers, for the cities of Valencia and Tocuyito, and a tertiary treatment plant with a capacity of 2.4 m³/sec, which will discharge treated sewage into the El Pafito marsh. The treated sewage will be extracted from the marsh for use in irrigation in the summer months; the rest of the year it will go back into the Pao river watershed, which supplies the Central Region.
- (b) At the eastern end of the lake, a network of sewer mains and intercepting sewers totaling 49 kilometers, a pumping plant, and a treatment plant with a capacity of 3.8 m³/sec which will discharge treated sewage from the city of Maracay and other towns into the Taiguaiguay reservoir, (which has been operating below capacity), from which it will be taken for use in the existing irrigation system (see the system diagrams which follow).

2. Supplementary activities

- 3.03 Provision has been made as well for the following supplementary activities, which are indispensable for the success of the project and the Comprehensive Environmental Sanitation Program for the Basin:

(a) Industrial effluent control program

- 3.04 To ensure ongoing monitoring and effective control of the industrial wastes being discharged into public sewer systems and watercourses in the basin the project envisages the following activities and studies:

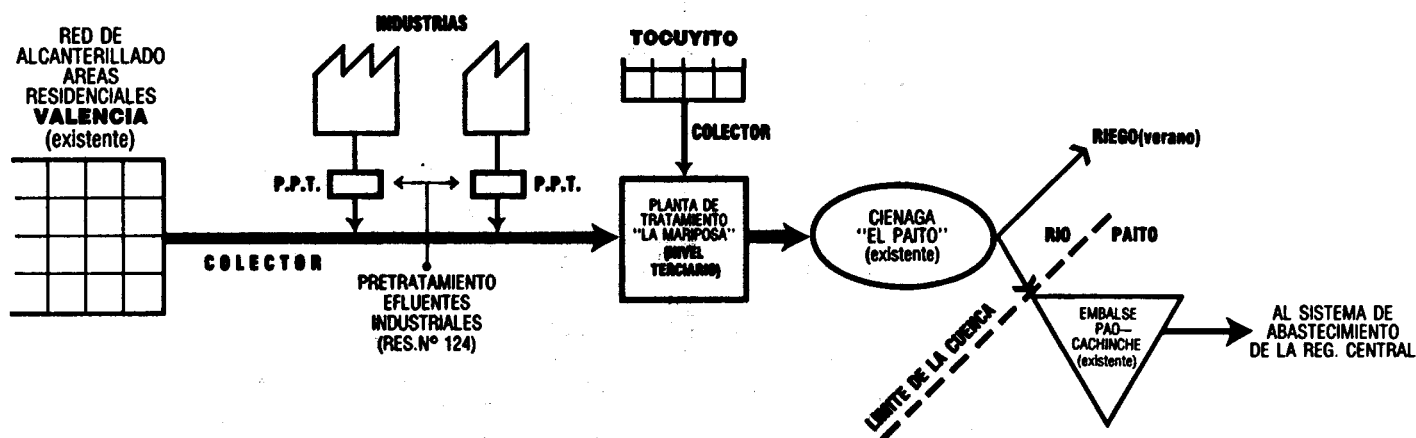
- (i) The two laboratories to be placed in charge of effluent control will be provided with additional equipment. The EMPREDARSA laboratory, which will be located at the La Mariposa treatment plant, will assist with and monitor the operation of the plant itself and will analyze sewage inflows to determine whether the wastewater contains any substances that could jeopardize the proper operation of the treatment plants and to identify the industries responsible for the problem. The other facility, the MARNR's Central Region Laboratory in Maracay, will be in charge of monitoring and controlling all wastes discharged into watercourses, including the industrial sewage dumped directly into rivers and Lake Valencia, pursuant to the provisions of Resolution 124 of 1984. This second laboratory will be strengthened

V E N E Z U E L A

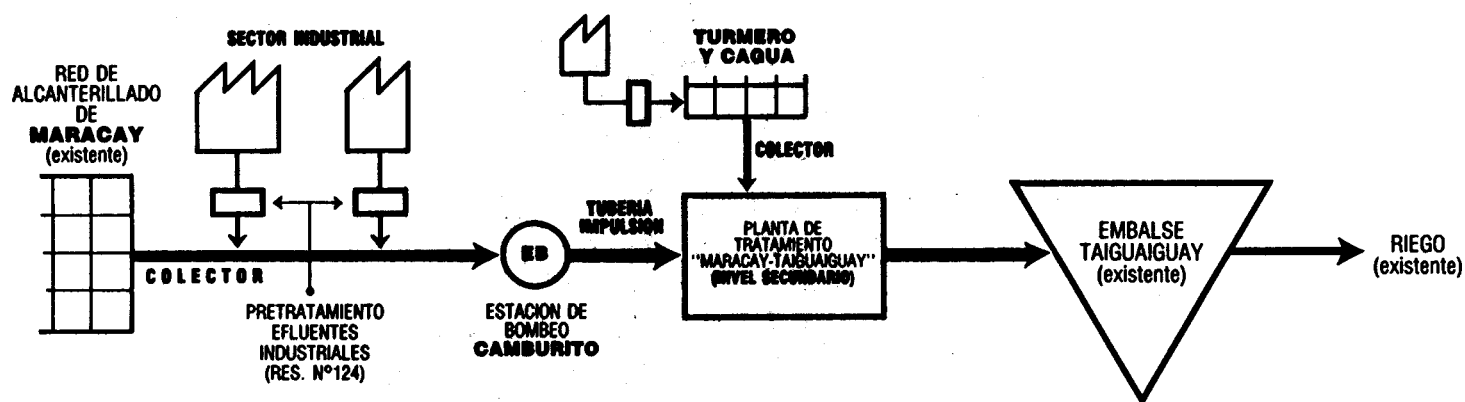
SISTEMAS DE TRATAMIENTO DE AGUAS RESIDUALES EN LA CUENCA DEL LAGO DE VALENCIA (VE—0060)

ESQUEMA DESCRIPTIVO DE LOS SISTEMAS DE TRATAMIENTO

SUBPROYECTO OESTE



SUBPROYECTO ESTE



———— OBRAS DEL PROYECTO

———— Plantas de Pretratamiento de Residuos Industriales (Resolución N° 124)

in the first year of execution of the project, to facilitate and bolster the surveillance and inspection work that is already being performed in the area, in relation to the effluent pre-treatment plants that are gradually being installed by industrial concerns.

- (11) A study of rate levels for industrial users and industrial effluent control systems will be conducted, with the following objectives: (1) to design a better monitoring and control system; (2) to determine the rate surcharge to be paid by users of the sewage collection and treatment system, depending on the pollution loads they generate; (3) to recommend a viable, equitable rate structure; and (4) to suggest changes or additions to existing regulations, to facilitate and preserve sewerage and sewage treatment services (see Recommendation 3).

(b) Training program

- 3.05 Another element of the proposed project would be a program to train the professional staff that will be in charge of operating the treatment plants and of EMPREDARSA's other work in the areas of environmental protection and sanitation. Under this program, three professional staff members would pursue specialized graduate-level sanitary engineering studies, after agreeing in writing to work for EMPREDARSA for a specified period of time. Provision also is being made for a special component under which direct training would be given to the operations and maintenance staff of the La Mariposa plant. This training would be provided during the "start-up" phase of the plant, over a period of approximately three months. The services of an international consultant specializing in treatment plants like the ones to be built in the project will be required for this purpose.

(c) Studies for the third stage of the Comprehensive Environmental Sanitation Program and complementary studies

- 3.06 To ensure that there will be continuity in the initiatives to protect and improve the quality of the basin's water resources, provision is being made in the proposed project for financing for a number of studies. The object of the studies is to ascertain whether the sewage and control works and water-use elements envisaged for in the third stage of the Comprehensive Environmental Sanitation Program for the Lake Valencia Basin are feasible and desirable, and to examine related sanitation problems. The studies selected are as follows:

(1) Feasibility and design of Stage III

- (1) Feasibility studies and designs of works to control Lake Valencia water levels.

- (2) Feasibility studies and designs of sewage treatment systems for the cities of La Victoria and Guigue.
- (3) Feasibility study and design of the works needed to make optimum use of the El Paíto marsh area as a "polishing" area for additional treatment of effluents of the La Mariposa plant.

(ii) Other studies

- (1) Study of area-source agricultural pollution in the Lake Valencia Basin.
- (2) Study of pollution and overexploitation of groundwater in the basin.

C. Scope of the project

1. Clean-up of rivers

- 3.07 The proposed network of sewers that would carry water to the treatment plants will intercept direct outfalls through which sewage is now being dumped directly into rivers flowing through towns or cities, to recover and clean up these watercourses. At the western end of the lake, 20 existing outfalls will be intercepted in this way, along the Cabriales and Tocuyito rivers, to recover about 30 kilometers of these rivers. At the eastern end, 29 sewage outfalls will be intercepted along the Guey, Las Delicias, and Turmero rivers, cleaning up about 19 kilometers of riverways. These two systems will clean up the pollution now plaguing these rivers.

2. Reduction of pollution loads

- 3.08 The proposed sewerage works will have the capacity to collect and treat the 6.2 m³/sec of sewage that is expected by the year 2005. This is equivalent to treating 70% of the volume of sewage dumped into Lake Valencia. With the Los Guayos project, being built by the Instituto Nacional de Obras Sanitarias (INOS) using its own funds, which has a design capacity of 2 m³/sec, 94% of the total waste discharged into the lake will be treated. The quality of the effluent of the La Mariposa plant will be high enough to be reusable indirectly in the Central Region's water supply system. Because this system includes the Pao-Cachinche reservoir, which has been found to have eutrophication problems, it was necessary to include nutrient control measures for the biological removal of nitrogen and phosphorus (tertiary treatment). With the La Mariposa plant it also will be possible to treat sewage from the Tocuyito area (about 35,000 people), which at present is being dumped untreated into the Pao-Cachinche reservoir.

3. Additional benefits

- 3.09 The proposed sewage collection and treatment systems will reduce the volumes of sewage dumped into Lake Valencia and allow for the reuse of treated sewage for irrigation purposes at the eastern end of the lake (3.8 m³/sec), and for irrigation and water supply at the western end (2.4 m³/sec). The project thus would help to slow the average rise in water levels of the lake from 43 centimeters to 11 centimeters a year, and to gradually recharge aquifers that are being overused at present. With respect to the potential for irrigation, it is estimated that some 5,400 hectares in the Taiguaguay area could be irrigated with treated waste water, and about 1,300 hectares in the Valencia area, in which no storage system is available. Depending on how well the lake recovers and on future activities under the Comprehensive Program, it is hoped that it will be possible to use water from the lake to supply part of the needs of the Central Region and the Caracas metropolitan area, to supplement current sources of supply in a proportion to be duly determined. This possibility has been studied at a preliminary stage, and would be further examined in one of the studies for the third stage.

D. Cost and financing of the project

1. Investment categories

- 3.10 The total cost of the project is estimated at the equivalent of US\$125 million. The Bank's share of the financing would be the equivalent of US\$50 million from the ordinary capital (40% of the total cost). A breakdown of the cost by investment category and source of funds is given in the following table.

TOTAL COST AND FINANCING PLAN

(in US\$ thousands equivalent)
(Official exchange rate: US\$1.00 = Bs.14.50)

<u>INVESTMENT CATEGORY</u>	<u>IDB</u>	<u>LOCAL</u>	<u>TOTAL</u>	<u>%</u>
1. <u>Engineering and administration</u>	-	7,366	7,366	5.9
1.1 Designs and engineering	-	1,528	1,528	1.2
1.2 Supervision	-	4,584	4,584	3.6
1.3 Administration	-	1,254	1,254	1.1
2. <u>Direct costs</u>	32,496	43,913	76,409	61.1
2.1 <u>West end subproject</u>	11,159	23,280	34,439	27.5
2.1.1 Treatment plant	11,159	6,460	17,619	14.0
2.1.2 Sewers (Group I)	-	16,820	16,820	13.5
2.2 <u>East end subproject</u>	21,337	20,633	41,970	33.5
2.2.1 Treatment plant	5,349	2,367	7,716	6.1
2.2.2 Pressure pipe	14,706	1,634	16,340	13.0
2.2.3 Pumping plant	1,282	3,680	4,962	3.9
2.2.4 Sewers (Group II)	-	6,551	6,551	5.2
2.2.5 Sewers (Group III)	-	6,401	6,401	5.1
3. <u>Associated costs</u>	2,205	5,538	7,743	6.2
3.1 Land and buildings	-	3,082	3,082	2.4
3.2 Laboratory and training equipment	805	756	1,561	1.2
3.3 Studies (Stage III and complementary)	1,400	1,700	3,100	2.5
4. <u>Unassigned</u>	8,062	17,013	25,075	20.1
4.1 Contingencies	3,989	5,592	9,581	7.6
4.2 Escalation	4,073	11,421	15,494	12.5
5. <u>Financial costs</u>	7,237	1,170	8,407	6.7
5.1 Interest	6,737	-	6,737	5.4
5.2 Credit fee	-	1,170	1,170	0.9
5.3 Inspection and supervision	500	-	500	0.4
TOTAL	50,000	75,000	125,000	100.0
PERCENTAGE	40.0	60.0	100.0	

2. Cost analysis

- 3.11 The direct costs for the civil engineering works were calculated by applying unit prices to the volumes of the different construction items, which in turn were obtained from the detail designs for the various project components. The unit prices used are based on those reported for similar sanitation projects now under way in Venezuela. Also used as guidelines when preparing estimates were the official standards of the Comisión Venezolana de Normas Industriales (Venezuelan Industrial Standards Commission - COVENIN) for the description of items and the price list approved by the Office of the Comptroller General of the Republic. For units of equipment, reference prices of recent construction projects and quotes from suppliers or their authorized agents in Venezuela were used. Prices have been updated to current May 1988 levels.

3. Use of the proceeds of the proposed loan

- 3.12 The proceeds of the Bank's loan would be used to defray the following project costs: (i) approximately 42.5% of Direct costs (US\$32,496,000), for the purchase of all of the imported equipment and materials needed for the treatment plants and pumping plant, and part of the construction work for those plants; (ii) US\$805,000 under the heading of Associated costs, to purchase laboratory equipment and vehicles, and US\$1,400,000 to finance studies for the third stage of the Comprehensive Environmental Sanitation Program for the Lake Valencia Basin; (iii) US\$3,989,000 and US\$4,073,000 for Contingencies and Escalation, respectively; (iv) US\$6,737,000 for Interest on the loan during the period of execution of the project; and (v) US\$500,000 for the Inspection and supervision charge.

4. Financing requested

(a) Amount of the proposed loan

- 3.13 In accordance with the request submitted, it is proposed that a loan for the equivalent of US\$50 million be approved to cover 40% of the total estimated cost of the project. The proposed financing is equal to the percentage provided for in the matrix for social infrastructure projects in countries in Group A, to which Venezuela belongs.

(b) Terms and conditions of the loan

- 3.14 The terms and conditions of the Bank's loan would be as follows:

	<u>Term</u>	<u>Financial conditions</u>
Disbursement	4 years	Variable interest rate, in accordance with the Bank's policy
Grace period	4 years	Credit fee: 1.25% of undisbursed balances
Amortization	25 years	Inspection and supervision charge: 1% of the total loan amount

3. Local contribution

- 3.15 Counterpart funding in conjunction with the proposed loan would be furnished by the Government of Venezuela, through annual budgetary appropriations which would be provided for in the law giving authorization for the loan agreement. This local counterpart, estimated at the equivalent of US\$75,000,000, would be used to finance the following: (i) the Engineering and administration costs of the project (US\$7,366,000); (ii) 57.5% of the Direct costs (US\$43,913,000), to defray the full cost of manufacturing and laying the sewerpipes, part of the civil engineering costs, and the cost of locally-sourced materials and equipment; (iii) under the heading of Associated costs, the equivalent of US\$5,538,000 to acquire land, train staff, and commission studies for the third stage of the Comprehensive Environmental Sanitation Program; (iv) under the heading Unassigned, US\$17,013,000 to cover a portion of contingencies and escalation; and (v) in the category of Financial costs, the equivalent of US\$1,170,000 for the Bank's credit fee.

G. Technical feasibility

- 3.16 The project is considered to be technically feasible and fully justified for the following reasons.
1. The various components that make up the project have been developed after a careful study of alternatives and in accordance with generally accepted technical criteria in the area of sewage collection and treatment. The technical alternatives selected thus are the least-cost options from the standpoint of economic cost.
 2. The designs for the project components are practically complete. A few remaining minor adjustments will be made by December 15, 1988. The estimated cost of the project was arrived at taking into account the designs and itemized budgets for each specific component as well as information from recent projects of a similar nature.

3. The MARNR has a great deal of experience as executing agency for civil works and environmental protection projects. Venezuela has contractors with the necessary capacity and experience, so the construction component should present no problem. No difficulties are expected in the timely procurement of local and imported materials and equipment. The project timetable is a realistic one that takes into account the nature of the works and the need to complete them without delay.

IV. EXECUTION OF THE PROJECT

A. The executing agency

1. Capacity of the MARNR to serve as executing agency

- 4.01 Since the Empresa de Aguas de la Región Central (EMPREDARSA) is still in the organizational phase, the Ministry of the Environment (MARNR) will assume responsibility for executing the project. The MARNR has a great deal of experience in carrying out projects of the same, or greater, technical and financial scope as the one proposed herein. It can be concluded from a review of the MARNR's construction program from 1985 to 1988, which entailed an outlay of the equivalent of US\$430 million in constant dollars, that with its current technical organization and staff it will be capable of executing the proposed project. In the area of environmental infrastructure, the MARNR has carried out construction projects of the same size as, or larger than, those envisaged here. Specifically, it has experience in reservoir construction, drainage works, well drilling, and flood-control works.

2. The executing unit

- 4.02 The executing unit for the project will report to the General Directorate of Environmental Planning and Management (POA). It will serve as general coordinator of all activities relating to construction work and the administration of the loan contract, in cooperation with the other departments and units of the Ministry. Since the unit is to perform this general coordination function, its staff will be recruited from those areas of the Ministry that are most closely involved with the project from a physical and financial standpoint, to keep training time to a minimum and ensure that the project will be completed by the scheduled date. However, provision has been made, in the form of a general expense item, for the hiring of professional or technical staff in specific instances as required over the course of execution of the project. The contract would contain the stipulation that, as a condition precedent to disbursement of the loan, the Bank would have to receive satisfaction evidence that the unit was operating, with the staff of the Technical and Tendering Sections assigned full-time to the project (see paragraph 8(c) of the Proposed Resolution).

B. Implementation arrangements

1. Construction contracts and supervision of the works

- 4.03 All of the construction work for the project would be contracted out to specialized construction firms. The work would be supervised by Venezuelan consulting firms, inasmuch as the country has a number of companies with the capacity to perform this inspection function. The chief elements of the supervisory work will be: technical inspection of civil works and quality assurance; supervising of materials and equipment delivered to the contractors; monitoring the quality of work of the contractors' employees; verifying the quantity of work completed by contractors; and monitoring the progress made on the construction work.

2. Supplementary activities

- 4.04 The industrial effluent control program will consist of the strengthening of two water-analysis laboratories and a study of rate levels for industrial users and industrial effluent control systems. For the first of those components, two calls for bids will be issued for equipment following the timetable shown below in section C. The study of industrial users will be conducted in three stages: a first stage, coinciding with the first six months of execution of the project, during which the MARNR will draw up the terms of reference for the study for approval by the Bank; a second stage lasting about two years, in which the study (covering all of the technical and economic aspects of the sewerage service will be commissioned and prepared; and a third stage lasting about six months in which the MARNR will begin a program to implement the study's recommendations (see Recommendation 3).
- 4.05 Contracts for the studies on the works envisaged in the third stage of the Comprehensive Environmental Sanitation Program will be let during the first year of the project. The terms of reference for these studies would have to be submitted to the Bank for approval within six months after the effective date of the contract. The studies and designs would have to be ready not later than 36 months after that same date. The proceeds of the Bank's loan would finance the following studies: feasibility study and design of works to control Lake Valencia water levels; study of agricultural pollution in the basin; and study of pollution and over-exploitation of groundwater. This decision was made because the services of international consultants will be needed for these more complex studies (see Recommendation 2(a)).
- 4.06 The training program provided for in the project would entail the development and training of the future professional staff of EMPREDARSA and hands-on training of the operations and maintenance personnel of the plants. For the first of these components, three EMPREDARSA employees would be given study grants to pursue sanitary

or environmental engineering studies at the Master's level. For the second component, an international expert in the operation of treatment plants like those called for in the project would be hired to direct a training program over the three-month "start-up" period of the plants.

3. Status of designs

- 4.07 The MARNR has final designs for the project at the construction drawing stage. It now has only to prepare the bid documents and make some adjustments in the designs for the Maracay-Taiguaiguay treatment plant, which it intends to complete by the beginning of December 1988. The designs were prepared by a Venezuelan consulting firm under the supervision of INOS, for some components, and the MARNR, for others. However, the MARNR has coordinated and assumed full responsibility for the studies. The Bank has found the final designs for the construction projects to be satisfactory. The designs submitted for the two subprojects are the least-cost alternatives, selected from among a number of technically feasible and functionally equivalent options for sewage collection, treatment, and disposal systems.

C. Timetable for calls for bids

1. Number of calls for bids

- 4.08 Three international calls for bids and two tender calls limited to Venezuela would be issued for the construction components of the project, as shown in the following table.

Timetable for calls for bids

<u>Item</u>	<u>Type of call for bids</u>	<u>Construction starting date or equipment delivery date</u>	<u>Estimated direct cost (US\$000)</u>
1. Equipment for the two treatment plants and the Camburito pumping plant	International	June 1990	5,072
2. Construction of La Mariposa and Maracay-Taiguaiguay treatment plants	International	Sept.1989	21,685
3. Supply and installation of pressure pipe from Camburito to Taiguaiguay	International	Sept.1989	16,340
4. Supply of sewer pipes (Groups I, II, III)	National	Sept.1989	14,387
5. Laying of sewers and construction of Camburito pumping plant	National	Sept.1989	<u>18,925</u>
		TOTAL	<u>76,409</u>

2. Capacity of local contractors and suppliers

- 4.09 Because of the huge civil works infrastructure that has been built up in Venezuela, the country has construction firms capable of carrying out the work envisaged in this project. The project has been organized into bid packages of a size that should prove attractive to both local and international firms. With respect to the supply of locally-sourced equipment, particularly concrete sewer pipes, it has been ascertained that the country has four pipe-manufacturing companies with the capacity to produce the items needed within the time frames specified in the project. Because transportation costs would make imported pipes very expensive, the call for bids for sewer pipes would be limited to Venezuela and would be financed with local counterpart funds. Local suppliers are competitive enough to ensure that prices will be reasonable.

3. Operation and maintenance of the sewer systems

- 4.10 The sewage collection and treatment systems to be built under the project will be operated and maintained by EMPREDARSA. At present, sewer systems are maintained by INOS, the agency that is also building the Los Guayos treatment plant and the network of sewers that

will carry wastewater to that plant. Once the works called for in the proposed project have been completed, there will be a need for a substantial increase in sewer maintenance activities. Special attention should be given to this element during the process of organizing EMPREDARSA.

- 4.11 To ensure that the works built under the project are properly maintained, it is recommended that the loan contract include the standard IDB maintenance clause, whereby EMPREDARSA would undertake to ensure that those works will be maintained in accordance with generally accepted standards, and would agree to submit for the Bank's consideration, within the first quarter of each calendar year for 10 years after construction is completed, a report on the state of repair of the works, including information on the efficiency of the plants (see Recommendation 6).

4. Advance of funds

- 4.12 It is recommended that an advance of the proceeds of the proposed loan be allowed, in an amount equivalent to actual expected payouts for a period of not more than 120 days, but in no case exceeding 10% of the loan amount. Advances would have to be accounted for within 180 days after they were received.

D. Technology to be used in the project

- 4.13 The works to be built for the project range in complexity from the laying of main and intercepting sewers to the construction of a treatment plant that is designed to remove nitrogen and phosphorous compounds (tertiary treatment) as well as organic matter and suspended solids. Nevertheless the treatment system envisaged in the designs for the plant is a flexible and economic one, incorporating elements of technology appropriate to developing countries. The design for the Maracay-Taiguaiguay treatment plant is appropriate for tropical countries because of its simplicity and efficiency.

E. Ecological and environmental considerations

- 4.14 The fundamental purpose of this project is to protect and restore the quality of the water in Lake Valencia. At present, this lake and the rivers that flow through city centers have high pollution levels because of the untreated sewage that is being dumped into them. Moreover, if no action is taken, the water levels of the lake will continue to rise and flood farmland and urban areas, with the ensuing economic losses. The proposed project would help resolve that problem as well. At its meeting on July 28, 1988, the Environmental Management Committee examined the project and expressed its support for it, stressing the importance of implementing the industrial effluent control program.

F. Land and easements

- 4.15 Arrangements for acquiring land, improvements, and rights-of-way for the project works are at different stages. According to the timetable drawn up, all of the land and rights-of-way would be acquired by March 1989. To judge from the MARNR's experience in this area, there should be no difficulty in obtaining this land in time. Most of it is untilled or state-owned and occupied by makeshift dwellings. In any event, before any call for bids could be approved, the Bank would verify that the MARNR was in possession of the land on which the project works were to be constructed or of the necessary easements or rights-of-way (see Recommendation 1(ii)).

G. Ex post evaluation

- 4.16 In order to obtain the information needed to prepare the ex post evaluation of the project and ascertain to what extent its objectives have been fulfilled, it is recommended that the borrower submit the following information to the bank, within the time periods specified: (a) 18 months after the effective date of the contract: (i) the baseline data; and (ii) a description of the system that is to be used to compile and process data for the annual comparisons with the baseline data; and (b) 36 months after the effective date of the contract and annually thereafter until three years after the date of the last disbursement of the loan, comparative data for the project in the same categories as the baseline data (see Recommendation 7).

V. THE BORROWER AND THE EXECUTING AGENCY

A. Participants in the project

1. General outline

- 5.01 The borrower would be the Republic of Venezuela, which also would furnish the local counterpart funding needed for the project. The executing agency would be the Ministry of the Environment and Renewable Natural Resources (MARNR), through an executing unit to be set up for this specific purpose. The sewage treatment systems would be operated by the Empresa de Aguas Regional del Centro, S.A. (EMPREDARSA), which was established in 1987 to take over the responsibility for water supply and sewerage systems in the Central Region. The Ministry of Finance advised the Bank on July 27, 1988, that once the project works are completed and in proper operating condition they will be transferred to EMPREDARSA, which will be responsible for their administration, operation, maintenance, and preservation.

2. The Ministry of the Environment

- 5.02 The Ministry of the Environment and Renewable Natural Resources (MARNR) was established as part of the reform of the central administration in 1976, which was formally instituted with the enactment of the Organic Law of the Central Administration. The Ministry began operations on April 1, 1977. According to Article 36 of the aforementioned Organic Law, the MARNR is responsible for the following: planning and carrying out activities approved by the Executive Branch aimed at improving the quality of life and the quality of the environment and renewable natural resources; designing and implementing programs to conserve, protect, improve, regulate, and develop water, forest, land, and soil resources; drawing up and maintaining a wildlife register and conserving, defending, improving, and regulating wildlife; national parks; and any activity relating specifically to the environment and renewable natural resources and its responsibilities in this area.

B. Operating agency

1. Establishment of EMPREDARSA

(a) Background

- 5.03 The Instituto Nacional de Obras Sanitarias (National Sanitation Administration - INOS) was established on April 15, 1943, and given national responsibility for studies, construction, repair, operation, and administration of water and sewer systems. Several years ago, the Venezuelan authorities came to the decision that this agency should be reorganized, to decentralize its activities and improve efficiency and performance particularly with respect to the operation and administration of water and sewer systems, in which INOS had some shortcomings. An Executive Decree of August 27, 1986, set forth the bases for reorganizing INOS and the sanitation sector, and authorized the agency to begin the process of phasing out, modifying, and regrouping its services and administrative units and setting up the water and sewer companies that would serve to decentralize activities in the sector. The Decree also stipulated that INOS was to make available to the companies so established the assets and property they needed to operate.

(b) Establishment of EMPREDARSA

- 5.04 The Empresa de Aguas Regional del Centro (EMPREDARSA) was established as part of the decentralization process provided for in the above-mentioned Decree. It came into being formally with its approval by the Venezuelan Congress on September 2, 1987. According to its by-laws, the company's purpose is to administer, operate, maintain, expand, and rebuild water supply systems and sewage collection, treatment, and disposal systems in the areas now being served by INOS's Central Region system. The company's maximum authority is its

Meeting of Shareholders. Its management is overseen by a Board of Directors, four of whom are elected by the shareholders and one by the company's workers.

2. Start-up of EMPREDARSA

- 5.05 The contract for loan 538/OC-VE, under which financing was made available for the Central Region water supply project, specified the action that was to be taken to ensure that EMPREDARSA would be able to start operating the Central Region system on January 1, 1991, and take delivery of the project works in 1992. Technical cooperation funding was approved in conjunction with the loan for hiring a consulting firm to organize EMPREDARSA and set up procedures for it to operate, maintain, and administer the system effectively. As of the date of the analysis mission (August 1988) the following steps had been taken in this connection: (i) EMPREDARSA was registered in the Register of Companies; (ii) its Board of Directors was appointed; (iii) the Chairman of the Board of Directors of EMPREDARSA was placed in charge of coordinating the transfer of assets to the new company and the start-up of its operations; (iv) a preliminary inventory was drawn up of the existing plant in the Central Region which would be handed over to EMPREDARSA for operation and maintenance, and this inventory is now being reviewed; and (v) the Board of Directors is studying the matter of hiring the consulting firm to organize EMPREDARSA and place it in operation.

3. Transfer of the project works

- 5.06 Once the project works have been finished and are operating, they will be handed over to EMPREDARSA. The loan contract should stipulate that the borrower undertakes to deliver over all of the project works to EMPREDARSA within six months after the completion of the project, so that they can be operated and maintained by that company (see Recommendation 2(b)).

C. Financial projections of EMPREDARSA

1. Projected revenues

- 5.07 Operating revenues over the years covered in the projection would rise from the equivalent of US\$18.2 million in 1991 to the equivalent of US\$31.8 million in 1997, an increase of 75%, owing mainly to an increase in billings based on metered consumption. At the outset, 62% of all residential customers would be billed on the basis of meter readings; by 1997 that figure would rise to 92%.

2. Costs

- 5.08 The costs of operating and maintaining the proposed project works and the Los Guayos treatment plant, on which construction is now under way, will account for an important share of EMPREDARSA's operating

costs. In the first year of operation of the project (1993) it will cost the equivalent of US\$6.1 million to operate and maintain these systems, i.e., 18% of the company's total operating costs that year. This serves to underscore the importance of the study being recommended to determine the charges that should be levied on industrial firms that discharge sewage into the system but are not subject to the regular rate system because they have their own water-supply systems, and thus do not help defray the operating and maintenance costs of the sewer system (see Recommendation 3).

D. Current rate system

1. Compliance with the Bank's rate policy

- 5.09 A review of the 1987 income statement for Central Region operations, which currently are the responsibility of INOS, shows that the region operating revenues were high enough to cover operating and maintenance costs, thereby satisfying the minimum requirements of the Bank's rate policy. According to the revenue and expenditure projections, with the schedule of rates now in effect, revenues in each year would be sufficient to cover the costs of operating and maintaining the water and sewer systems for which EMPREDARSA is to be responsible. Thus, the Bank's minimum rate requirement also would be satisfied during the period covered in the projections. However, the company would not have enough revenues to cover depreciation charges or its expansion program, or to service the debt associated with the assets and plant of the water supply project (loan 538/OC-VE) that are to be transferred to it by the government.

2. Rate levels

- 5.10 The following table shows the percentage adjustments that would be needed, over and above the current rate level, initially to cover all operating expenses, and the additional adjustments that would be needed to ensure that EMPREDARSA's internally-generated funds could also service the debt and finance a share of its expansion program.

	Rate adjustment indices					
	1992	1993	1994	1995	1996	1997
<u>Rate level to</u>						
<u>cover: a/</u>						
Operating costs	123.1	135.4	126.9	122.1	116.6	114.2
(incl.depreciation)						
Share of investment						
program and debt						
service	129.3	114.8	112.6	110.5	108.6	106.7
	152.4	150.2	139.5	132.6	125.2	120.9
	=====	=====	=====	=====	=====	=====

a/ Based on current schedule of rates. Base year 1991 = 100.

- 5.11 According to this table, rates would have to be increased by 52% in 1992 to cover the costs referred to above. On the other hand, the projection shows that as more users and more meters were added to the system, the required rate would slowly fall in real terms. The 1997 requirement, for example, would be 80% of the 1992 figure (120.9/152.4). The 1992 and 1993 rate level increases would be needed because in that period the Central Region waterworks and sewage treatment plants would begin to operate, thereby increasing operating costs. In addition, in 1992 EMPREDARSA would have to begin to service the debt deriving from IDB financing for the water supply project. For this reason, information on the rate levels to be applied by EMPREDARSA at the start of its operations is being requested (see Recommendation 3(d)(ii)).

3. Recommended rate clause

- 5.12 To avoid imposing the substantial rate adjustments that would be required in 1992, the government could ease the financial conditions for EMPREDARSA's payment for the works of the water supply project, financed in part with loan 538/OC-VE, that are to be transferred to the company. For this reason, it is recommended that the rate clause in the proposed loan contract be identical to the one in effect for that earlier loan. Under the terms of this clause, the revenues received by EMPREDARSA from the rates it applies on all of the systems it operates must cover at least all of its operating costs, including those relating to administration, operation, maintenance, and depreciation. If its rate revenues are not sufficient to ensure the timely servicing of all of its obligations and finance a portion of its construction program, the necessary measures are to be taken, including rate increases, to obtain the funds needed to satisfy that requirement. The percentage of the expansion program that is to be financed with rate revenues is at least 20% (see clause 8(e) of the proposed resolution and Appendix III, Section VI).
- 5.13 Because it is essential to ensure that enough internally-generated funds will be available for the future expansion of the water and sewerage systems and that the company's financial situation will be secure, the borrower also would be required to demonstrate, before the scheduled start-up of EMPREDARSA operations on January 1, 1991, that the necessary measures have been adopted to ensure that the company's debt service coverage will be at least 1.5 for a minimum of five years after that date (see Recommendation 5).

E. Institutional and financial feasibility

1. Institutional feasibility

- 5.14 The organization of the MARNR is suitable for purposes of the project, and the Ministry has in place the administrative, accounting, and internal control procedures needed to administer the project funds efficiently. Responsibility for operating, maintaining, and

administering the project works themselves would rest with EMPREDARSA, which was set up specifically for this purpose. Technical cooperation also is being provided as part of the Central Region water supply project to help organize EMPREDARSA and devise procedures that will enable it to administer the project works properly.

2. Financial feasibility

- 5.15 The government would have to provide a total of US\$668 million equivalent for operating and capital expenditures over the period of execution of the project. That sum includes the equivalent of US\$75 million in counterpart funding for the proposed project, which represents 11% of aggregate government funding to the MARNR in those years. Over the course of the project the government would make annual allocations varying from the equivalent of US\$148 million in 1989 to the equivalent of US\$154 million in 1990. These amounts are in line with those allocated and transferred to the MARNR for its operating and capital expenditures in previous years, and it is expected that the government will be able to furnish all of the funds needed by the Ministry from 1989 to 1992.

VI. SOCIOECONOMIC JUSTIFICATION

A. Internal economic rate of return

- 6.01 The quantifiable benefits of the project, as calculated in the socioeconomic analysis, total US\$84.81 million. When the economic cost of the investment and the incremental administrative, operating, and maintenance costs are deducted, the proposed project shows a net economic benefit of US\$28.7 million. The estimated internal economic rate of return (IERR) of 17.6% exceeds the Bank's minimum 12% requirement. According to the analysis, the sanitation components comprising the project would have returns exceeding that minimum even if considered separately. The project would generate benefits of various types, not all of them readily measurable. The only benefits taken into consideration were ones that could be quantified using traditional economic analysis techniques. The chief quantifiable economic benefits taken into account in the analysis were the following: (i) the increase in value of land bordering watercourses that currently are being polluted by the raw sewage that is being discharged into them; (ii) the averting or reduction of losses in agricultural production and infrastructure in areas that are vulnerable to flooding when Lake Valencia water levels rise; (iii) savings in resources when groundwater is replaced by treated sewage for farm irrigation purposes; and (iv) the increase in agricultural output that could be brought about if the irrigation system were made more efficient.

B. Sensitivity analysis

- 6.02 A sensitivity analysis was conducted to determine how the economic return of the project would be affected by changes in the major variables that had entered into IERR calculations. It was discovered that the variables most affecting the economic return are costs (investment costs and administrative, operating and maintenance costs), and the benefits that could be expected to accrue if flooding on the shores of Lake Valencia were averted. However, even changes of +50% and -55%, respectively, in those variables are not enough to disqualify the project. It thus can be affirmed that the proposed project is very sound from an economic standpoint.

C. Ability to pay

- 6.03 According to a household survey conducted as part of the socio-economic evaluation of the project to expand the Central Region water supply system, only 1% of families would spend more than 3% of their income (the maximum recommended by the Pan American Health Organization for low-income families) for combined water and sanitary sewer services. The minimum rate currently charged by INOS for 20 cubic meters a month is Bs.8.00, i.e., US\$0.552 a month. Even with the anticipated rate increases the majority of families should be able to pay for basic sanitation services.

D. Distributional effect of the project

- 6.04 Following IDB guidelines which call for measuring only the direct impact of the cost and benefit flows that would be generated by a project, it was calculated that the proposed project would yield benefits totaling US\$104.2 million for the private sector. Just under 50% of these benefits would accrue to low-income groups.

VII. RECOMMENDATION

- 7.01 For the reasons outlined above, the proposed project is considered to be feasible from a technical, economic, financial, institutional, and legal standpoint, and approval of the loan is recommended. To that end, the following normative documents are hereby submitted to the Board of Executive Directors for its consideration:

- Proposed Resolution
- Recommendations
- Description of the Project (Annex A to the Loan Contract)

PROPOSED RESOLUTION 1/

VENEZUELA. LOAN /OC-VE TO THE REPUBLICA DE VENEZUELA
(Waste Water Treatment Systems Project
for the Lago de Valencia Basin)

The Board of Executive Directors

RESOLVES:

That the President of the Bank, or such representative as he shall designate, is authorized, in the name and on behalf of the Bank, to enter into such contract or contracts as may be necessary with the República de Venezuela, as borrower, for the purpose of granting it a loan to cooperate in the financing of a waste water treatment systems project for the Lago de Valencia basin. This financing shall be subject substantially to the following conditions:

1. Amount and currencies: Up to US\$50,000,000, or its equivalent in other currencies (except that of Venezuela) which are part of the ordinary capital resources of the Bank, to pay for goods and services acquired through international competition in the member countries of the Bank and for such other purposes as may be specified in the loan contract. Payments of amortization and interest shall be made in the currency or currencies specified by the Bank, in a quantity equivalent to the corresponding amount owed, calculated in units of account in terms of dollars of the United States of America, in accordance with provisions to be included in the loan contract.
2. Source of funds: The ordinary capital resources of the Bank.
3. Guarantee: The general responsibility of the borrower.

1/ The provisions contained in this Appendix shall only be final when the Board of Executive Directors has approved the loan proposal.

4. Credit fee: 1-1/4% per annum on the undisbursed portion of the financing, commencing to accrue 60 days after the date of the loan

contract and payable in dollars of the United States of America on the same dates as the interest.

5. Amortization: The borrower shall amortize the loan in a period of 25 years from the date of the loan contract, by means of semiannual, consecutive and, insofar as possible, equal installments. The first installment shall be paid six months after the date scheduled for the last disbursement of the financing. The Bank may credit the amortization installments proportionally to the outstanding balance of each of the portions of the loan which accrue different rates of interest.

6. Interest: The borrower shall pay interest semiannually on the outstanding balances of the loan. The first payment shall be made six months after the date of the loan contract. During the disbursement period, the Bank: (a) shall determine the rate of interest to be applied as of the first day of January of each year and for the life of the loan to any amount disbursed during the ensuing year; and (b) may modify the interest rate, in accordance with the policy of the Bank, to be applied to disbursements of the loan made during the second half of the year. At the request of the borrower, resources of the financing may be used to pay interest during the period of disbursement thereof.

7. Disbursement: The term for disbursement of the financing shall expire 4 years after the date of the loan contract.

8. Special conditions:

(a) The resources of the loan shall be used in their entirety by the borrower, through the Ministerio del Ambiente y de los Recursos Naturales Renovables (hereinafter referred to as the "executing agency" or the "MARNR"). If modifications in the legal provisions or the basic regulations concerning the MARNR are approved which, in the opinion of the Bank, may substantially affect the project, the Bank shall have the right to require the borrower and/or the MARNR to provide explanatory and detailed information in order to determine whether such modification or modifications may have an adverse impact on the execution of the project. Only after hearing the borrower and/or the MARNR and assessing their information and clarifications may the Bank take such measures as it deems appropriate, in accordance with provisions to be set forth in the loan contract.

(b) The resources of the loan shall be used to participate in the execution of a project estimated at the equivalent of US\$125,000,000. Consequently, the loan contract shall contain such provisions as the Bank deems appropriate to ensure that

such additional resources as may be necessary, in addition to the loan, for the complete execution of the project shall be duly provided, in an amount estimated at the equivalent of US\$75,000,000, in accordance with a schedule of investments satisfactory to the Bank.

- (c) Prior to the first disbursement of the financing, the borrower shall present to the Bank, through the executing agency: (i) evidence that the Executing Unit for the project has been set up within the MARNR, attached to the Dirección General Sectorial de Planificación y Ordenación del Ambiente, and that the staff of that unit's Technical Section and Tendering and Contracts Section have been appointed; and (ii) the timetable for hiring staff for the Construction Project Monitoring Section of the Executing Unit.
- (d) In the acquisition of machinery, equipment, and other materials for the project, and in the awarding of construction contracts, the system of public bids shall be followed in each case in which the value of such acquisitions or contracts exceeds the equivalent of US\$200,000. The bidding shall be subject to the procedures to be included as an annex to the loan contract.
- (e) The borrower shall take appropriate measures acceptable to the Bank to ensure that the tariff rates for the water supply, sewerage and waste water treatment systems of the Empresa de Agua Regional del Centro, S.A. (EMPREDARSA) shall produce, beginning in 1992, revenues sufficient, at least, to cover all of the operating costs, including those relating to administration, operation, maintenance, and depreciation. If the application of the foregoing does not generate sufficient revenues to cover the timely service of all of EMPREDARSA's obligations and to finance a proportion of that enterprise's investment program, in accordance with the stipulations of paragraph 6.01 of Chapter VI of Appendix III, the borrower and EMPREDARSA shall adopt the necessary measures, which may include increases in the tariff rates, for EMPREDARSA to obtain the additional resources as may be required to achieve that purpose.
- (f) The Bank shall establish such inspection procedures as it deems necessary to assure the satisfactory execution of the project, and the borrower shall extend all cooperation required for the most effective accomplishment of this purpose. From the amount of the financing the sum of US\$500,000 shall be allocated for credit to the general income accounts of the Bank to meet expenses of general inspection and supervision.

RECOMMENDATIONS

- A. It is recommended that the following conditions, to be fulfilled to the satisfaction of the Bank, be included in the loan contract in addition to the conditions set forth in the proposed resolution:
1. Unless the Bank agrees otherwise, prior to each public call for bids or in the absence of bidding, prior to the initiation of works, the borrower, through the executing agency, shall submit to the Bank:
 - (a) the general plans, specifications, budgets, specific bidding conditions, and other documents necessary for the call for bids; and
 - (b) in the case of works, evidence of legal possession, easements, or other rights to the land on which the works of the project are to be built.
 2. The borrower, through the executing agency, shall submit to the Bank:
 - (a) (i) within six months after the date of the loan contract, the terms of reference for the feasibility studies and designs for the stage III of the Comprehensive Environmental Sanitation Program for the Lago de Valencia and the other complementary studies referred to in paragraph 2.01, 2(b) of Appendix III; and (ii) within thirty six months after the same date, the aforementioned studies and designs; and
 - (b) before January 1, 1992, a copy of the agreement signed by the MARNR and EMPREDARSA, stipulating: (i) that the project works shall be transferred to the latter within six months after the last disbursement of the loan; and (ii) that EMPREDARSA undertakes to fulfill the maintenance obligations arising out of the loan contract between the borrower and the Bank.
 3. The borrower shall undertake to submit to the Bank, through the executing agency:
 - (a) within six months after the date of the loan contract, the terms of reference for the study on tariff levels for industrial users and of control methods for industrial effluents;
 - (b) within 12 months after the same date, evidence that it has engaged the consulting services for carrying out the referenced studies;
 - (c) within 30 months after the same date, a report on the findings and recommendations of the study referred to in the foregoing subparagraph (a); and
 - (c) within 36 months after the same date: (i) a program of actions, approved by the Executive Branch of the Government, for the the implementation of the recommendations of the above-referred study; and (ii) the tariff levels which EMPREDARSA would apply when it begins to operate the water supply, sewerage and waste water treatment systems.

4. The borrower, through the executing agency, shall take the necessary steps to ensure that, by the completion date of the execution of the project: (a) the industrial firms operating in the Lago de Valencia basin whose liquid waste could jeopardize the effective operation of the sewage collection and treatment systems have built pretreatment systems in accordance with the provisions of MARNR Resolution 124 of December 27, 1984; and (b) the hog farms operating in the aforementioned basin have built treatment systems that conform to applicable legislation and, if any such farm does not have sufficient land for that purpose, that plans for its relocation are presented to the Bank. In both of the foregoing cases (a) and (b), the borrower shall, through the MARNR, provide to the Bank, during the execution period, with a progress report on the implementation of these measures, within the first sixty days of each calendar year beginning in 1990.
5. The borrower, through the executing agency, shall demonstrate to the Bank before the start-up of operations of EMPREDARSA that the necessary measures have been taken to ensure that, for at least the first five years of operation, EMPREDARSA's debt service ratio shall be 1.5.
6. The borrower shall: (a) undertake to ensure that the works completed under the project will be maintained in accordance with generally accepted technical standards; and (b) submit to the Bank for consideration, through the executing agency or EMPREDARSA, as the case may be, during the first quarter of each calendar year for 10 years after initiation of operations of the first of the works of the project an annual maintenance plan for the project works and equipment for that year and a report on the state of repair of those works and equipment as provided for in paragraph 7.01 of Chapter VII of Appendix III. If the inspections conducted by the Bank or the reports received by the Bank should indicate that maintenance is being carried out to a lesser standard than that agreed upon, the borrower, through the executing agency or EMPREDARSA, as the case may be, shall take the necessary steps to correct the deficiencies.
7. For purposes of the ex post evaluation report on the project, the borrower, through the executing agency or EMPREDARSA, as the case may be, shall submit to the Bank:
 - (a) within eighteen months after the date of the loan contract, the baseline data for the project, in the categories listed in paragraph 8.01(a) of Chapter VIII of Appendix III, and a description of the system to be used to compile and process the baseline data for the evaluation of the results of the project.
 - (b) within three years after the date of the loan contract and annually thereafter for three years following the date of the last disbursement of the financing, a comparison of the basic data for the year in question with the baseline data; and

- (c) within three years after the date of the last disbursement of the financing, an ex post evaluation report showing the socioeconomic results of the project, in accordance with the methodology outlined in paragraph 8.01(b) of Chapter VIII of Appendix III.
- 8. The financial statements for the project, during its execution, and those of EMPREDARSA, beginning its first year of operation and throughout the life of the loan contract, shall be submitted annually to the Bank, audited by an independent public accounting firm acceptable to the Bank, and in accordance with standards acceptable to the Bank.
- B. The loan contract shall include an annex substantially similar in content to Appendix III ("The Project").

THE PROJECT

(Annex A to the Loan Contract)

I. Objective

- 1.01 The objective of the project is to improve the quality of water in the Lago de Valencia and its main affluents, by building main and intercepting sewers and two treatment plants which will process approximately 70% of the household and industrial residual waters discharged into the lake.

II. Description

- 2.01 The project consists of the execution of the following construction work and complementary activities:

1. Construction work

- (a) At the western sector of the lake, a network of sewer mains and intercepting sewers, totaling 42 kilometers, for the cities of Valencia and Tocuyito, and a tertiary treatment plant with a capacity of 2.4 cubic meters per second, which will discharge treated sewage into the El Pafito marsh. The treated sewage will be extracted from the marsh for use in irrigation in the summer months; the rest of the year it will be returned to the Pao river watershed, which supplies the Central Region.
- (b) At the eastern sector of the lake, a network of sewer mains and intercepting sewers totaling 49 kilometers, a pumping plant, and a treatment plant with a capacity of 3.8 cubic meters per second which will discharge treated sewage from the city of Maracay and other urban centers into the Taiguaiguay reservoir, from which it will be taken for use in an existing irrigation system.

2. Complementary activities

(a) Programs:

- (1) Industrial effluent control program, which consists of the acquisition of equipment for the laboratories of MARNR and EMPREDARSA and a study on tariff levels for industrial users and of control methods for industrial effluents.

- (ii) Training program for professional and technical staff which will be operating and maintaining the plants.

(b) Studies:

- (1) Studies and designs for Stage III, which comprises the following:

- (1) Feasibility studies and designs of sewage treatment systems for the cities of La Victoria and Guigue.
- (2) Feasibility studies and designs of works to control Lago de Valencia water levels.
- (3) Feasibility study and design of the works needed to make optimum use of the El Paño marsh area as a cleansing area for additional treatment of effluents of the La Mariposa plant; and

(ii) Other studies:

- (1) Study of area-source agricultural pollution in the Lago de Valencia basin.
- (2) Study of pollution and overexploitation of groundwater in the basin.

III. Cost and financing

- 3.01 The total cost of the project is estimated at the equivalent of US\$125,000,000, in accordance with the following:

Total cost and financing plan

(equivalent in US\$ thousands)

<u>INVESTMENT CATEGORY</u>	<u>Bank loan</u>	<u>Local contribution</u>	<u>TOTAL</u>	<u>%</u>
1. <u>Engineering and administration</u>	-	7,366	7,366	5.9
1.1 Designs and engineering	-	1,528	1,528	1.2
1.2 Supervision	-	4,584	4,584	3.6
1.3 Administration	-	1,254	1,254	1.1
2. <u>Direct costs</u>	32,496	43,913	76,409	61.1
2.1 <u>West end subproject</u>	11,159	23,280	34,439	27.5
2.1.1 Treatment plant	11,159	6,460	17,619	14.0
2.1.2 Sewers (Group I)	-	16,820	16,820	13.5
2.2 <u>East end subproject</u>	21,337	20,633	41,970	33.5
2.2.1 Treatment plant	5,349	2,367	7,716	6.1
2.2.2 Pressure pipe	14,706	1,634	16,340	13.0
2.2.3 Pumping plant	1,282	3,680	4,962	3.9
2.2.4 Sewers (Group II)	-	6,551	6,551	5.2
2.2.5 Sewers (Group III)	-	6,401	6,401	5.1
3. <u>Associated costs</u>	2,205	5,538	7,743	6.2
3.1 Land	-	3,082	3,082	2.4
3.2 Laboratory and training equipment	805	756	1,561	1.2
3.3 Studies for Stage III and complementary studies	1,400	1,700	3,100	2.5
4. <u>Unallocated</u>	8,062	17,013	25,075	20.1
4.1 Contingencies	3,989	5,592	9,581	7.6
4.2 Escalation	4,073	11,421	15,494	12.5
5. <u>Financial costs</u>	7,237	1,170	8,407	6.7
5.1 Interest	6,737	-	6,737	5.4
5.2 Credit fee	-	1,170	1,170	0.9
5.3 Inspection and supervision	500	-	500	0.4
Total	50,000	75,000	125,000	100.0
	=====	=====	=====	=====
Percentage	40%	60%	100%	

IV. Procurement

- 4.01 Whenever the goods or services to be contracted are financed totally or partially by foreign exchange from the loan, the procedures and specific guidelines governing the bidding or other forms of acquisition or contracting shall allow for the free competition of goods and services, including those relating to any means of transportation, originating from member countries of the Bank. Consequently, those procedures and specific bases shall not include conditions that impede or restrict the supply of goods or services or the participation of contractors from those countries.

V. Consulting services

- 5.01 In the selection and contracting of consulting services to be financed totally or partially with the resources of the financing, no conditions or requirements may be imposed that would restrict or preclude the participation of consultants from the member countries of the Bank.
- 5.02 With respect to the consulting services to be financed with the resources of the local counterpart, the borrower shall submit for the approval of the Bank, prior to the contracting of the consulting services, the names of the consulting firms or individual consultants selected, the terms of references of the consultants and the fees agreed upon.

VI. Rates

- 6.01 The percentage of the expansion program investment plan that is to be covered by EMPREDARSA's rate revenues, referred to in paragraph 8(e) of Appendix I, must be at least 20%. This share will be calculated by taking net internally-generated funds as a percentage of the total construction program, including financial expenses. "Internally-generated funds" will be understood to mean total income less operating expenses, before any deduction for depreciation and amortization, financial expenses, or nonoperating items.

VII. Maintenance

- 7.01 The annual maintenance reports referred to in paragraph A.6(b) of Appendix II must be submitted to the Bank within the first quarter of every calendar year. They must contain at least the following information:
- (i) the organization responsible for maintenance;
 - (ii) the human, financial, and physical resources needed for the maintenance work scheduled each year;
 - (iii) the follow-up mechanism to be used, indicating the purpose, frequency, and scope of the visits scheduled.

- (iv) in the second and subsequent annual reports, an evaluation of the execution of the previous year's maintenance plan; and
- (v) in the second and subsequent annual reports, monthly averages of the plants' main efficiency indicators, including data on the concentrations of contaminants agreed upon by the MARNR and the Bank, measured at the point of intake and point of discharge of the plants and in sludge generated as a by-product of treatment.

VIII. Ex post evaluation

8.01 The baseline data and methodology to be used for purposes of the reports referred to in paragraph A.7 of Appendix II, are as follows:

(a) Baseline data

- (i) Population, number of connections, and percentage of the project-area population served by the sanitary sewer system.
- (ii) Costs of operating and maintaining the sanitary sewer and waste water treatment systems.
- (iii) Sewage generated by major user classes (residential, commercial, industrial, public sector and institutional).
- (iv) Water supply, sanitary sewer and waste water treatment rates broken down for each major class of user, and within the industrial sector, according to type and quantity of contaminants.
- (v) Total cost of producing potable water, by source, showing separately the cost of chemicals used in treatment and the cost of electric energy used to pump water from sources to treatment plants.
- (vi) Operation efficiency level of the treatment plants, measured quarterly by contaminant removal in terms of biochemical oxygen demand, suspended solids, and fecal coliform content.
- (vii) Pollution levels in the Guataparo reservoir and in the Lago de Valencia and watercourses affected by the sanitation project, measured in the dry and rainy season, to show biochemical oxygen demand, dissolved oxygen, suspended solids, and fecal coliform content.
- (viii) Annual maximum and minimum levels of the Lago de Valencia, and losses in production areas and infrastructure because of rises in the water level.

- (ix) Areas irrigated in the Taiguaiguay irrigation system and the La Mariposa area.
- (x) Volume of treated sewage used for farm irrigation.
- (xi) Number of families affected by pollution of the watercourses in the project area.
- (xii) Projections of population numbers and sanitary sewer connections.

(b) Methodology

- (i) Data in the same categories shown for the baseline data shall to be submitted each year after the project is put into operation. In the case of item (vi) of section (a) above, these data shall be required each year after the start-up of the two treatment plants. Data for those categories in which yearly updates would not be relevant shall be submitted whenever a substantial change occurs, and for the last year of the evaluation period.
- (ii) The data shall refer to the specific area of the project. The data required on families affected by water pollution shall be gathered through statistically-representative surveys of families living alongside the watercourses (up to 700 meters on either side).
- (iii) The ex post evaluation report shall be prepared using the same methodology that was used for the ex ante appraisal. The evaluation report shall contain: (1) a cost-benefit analysis of the project; (2) an analysis of the project's distributional effect; (3) information on other important sociocultural effects; and (4) conclusions and recommendations.