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**ADDITIONAL FINANCING FOR THE FIRST PHASE OF THE
DAULE-PERIPA MULTIPURPOSE PROGRAM**

(EC-0099)

PROJECT REPORT

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I. INTRODUCTION

- 1.01 The financing presented for consideration in this document will provide additional external resources for the construction of the First Stage of the Daule-Peripa Multipurpose Program. In general terms, this program will regulate the water resources of the Guayas Basin and make full use of them for agricultural development, electricity generation, human consumption, flood control and control of brackish water flowing into the river's mouth.
- 1.02 The First Stage, now in execution, consists of the construction of a dam and an irrigation and drainage system covering 17,000 hectares. This program already has resources from IDB loans granted in 1979. ^{1/} The financing of this program would modify the financial scheme in effect to suit Ecuador's present economic needs but not alter the scope or goals set in 1979 for this stage.

A. Background of the Project

- 1.03 On December 20, 1979, the IDB granted to the Republic of Ecuador loan 610/SF-EC for the equivalent of US\$70 million. These resources, all in foreign exchange, were charged to the Fund for Special Operations. Loan 32/VF-EC for US\$25 million, chargeable to the Venezuelan Trust Fund, and a complementary line of credit (CLC) for US\$70 million (58/IC-EC), were also included in the financial package for the first stage of the Daule-Peripa multipurpose program. The total cost of this program was estimated at US\$351.7 million. Another component of the financing was a nonreimbursable technical cooperation (ATN-SF-1810-EC) for US\$1.4 million. This technical cooperation, chargeable to the net proceeds of the Fund for Special Operations, was for the preparation of a regional development plan.
- 1.04 Since the original CLC was arranged, US\$20 million has been cancelled. This reduced the amount of resources of loan 58/IC to US\$50 million. Bearing this in mind, the financing scheme for the project, in terms of its original cost, ^{2/} is as follows:

<u>Financing</u>	<u>Original Cost</u>	
	<u>Amount</u> <u>US\$ millions</u>	<u>%</u>
Loan 610/SF	70.0	19.9
Loan 32/VF	25.0	7.1
CLC 58/IC	50.0	14.2
Local contribution	206.7	58.8
Total	351.7	100.0

^{1/} See document PR-969 and PR-969-A.

^{2/} The updated cost, not including interest on a new loan (see Section C, Chapter III), now comes to US\$373.7 million.

- 1.05 The following were the reasons for this financing scheme: (i) Ecuador's capacity to generate local counterpart funds was overestimated at the time the loan was approved in consideration of the particularly favorable outlook for Ecuador at that time because of international oil prices and the country's possibilities of exporting oil; (ii) the IDB had resources available; and (iii) national authorities decided to allocate a limited amount of IDB resources to different projects and sectors that needed financing from international agencies at that time.
- 1.06 The contracts for loans 610/SF-EC and 32/VF-EC were signed on April 15, 1980, and the contract for loan 58/IC-EC, on June 16, 1980. As of September 30, 1984, US\$13.5 million had been disbursed out of loan 610/SF-EC (19.3%), US\$168,000 out of loan 32/VF-EC (0.67%) and US\$50 million out of loan 58/IC-EC (100%). The current date for final disbursement of the loans pending disbursement is April 15, 1988. ^{1/} According to the provisions of the CLC contract (58/IC-EC), this line of credit had to be disbursed before June 16, 1983. As a result, these resources were placed first. This explains the imbalance between its percentage of disbursement and those of loans 610/SF-EC and 32/VF-EC.
- 1.07 For reasons explained more fully in Appendix II-1 of this document, the country has been experiencing, particularly since 1980, a financial crisis that affects its capacity to generate enough resources to meet its investment requirements for both projects currently in execution and those to be executed in the future. In addition, this situation has surfaced at a time when international capital markets are contracting because commercial banks are reluctant to expand their operations and extend credits granted. As a result, Ecuador has had troubles securing resources to supplement its internal financing for projects that could contribute to the economic and social development of the country.
- 1.08 Since the IDB was aware of the situation described in the preceding paragraph, it decided twice in 1983 to take flexible measures to alleviate Ecuador's local counterpart burden and avert a later halt or slowdown of project execution. The first of these flexible measures was adopted in August. The purpose was to modify the pari-passu arrangement for the Daule-Peripa project. The second was taken in October when the pari-passu arrangements for other projects were changed. These projects had the highest percentage of local counterpart funding of all projects receiving partial financing from IDB loans. In addition, the resources for this funding came out of the national budget (see document PR-1302).
- 1.09 The first flexible measures adopted were for Daule-Peripa. This project exerted the strongest effect on the total amount of local counterpart

^{1/} This date has been extended by two years. Originally, it was April 15, 1986. This extension is explained in Section B of Chapter IV, Execution of the Project.

funding in Ecuador for the years 1983 to 1985 (approximately 50%). The pari-passu of this project was changed from 33% of external financing and 67% of local funding to 75% external and 25% local, for that period.

- 1.10 If the present pari-passu is maintained and no additional financing is granted, the resources of the IDB and the Venezuelan Trust Fund loans will run out in early 1986. This can be seen in the following table.

(Amount in equivalent of US\$ millions)

Source	1984 1/		1985		1986		1987		1988		Total 2/	
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
External source	72.4	70.7	67.8	77.8	4.8	6.6	-	-	-	-	145.0	38.8
Local contribution	30.0	29.3	19.3	22.2	79.1	93.4	73.4	100.0	26.9	100.0	228.7	61.2
Total	102.4	100.0	87.1	100.0	83.9	100.0	73.4	100.0	26.9	100.0	373.7	100.0

- 1.11 The national authorities emphasized to the Programming Mission that visited Ecuador in February of 1984 the tight funding situation for this project, and the impact that it is having on the economy as a whole. They stated they were interested in turning to the IDB to allay this situation. This statement was confirmed by the new government on October 15 of this year.

B. The Request

- 1.12 The request from the Republic of Ecuador for a loan to provide additional financing for this project was submitted to the IDB by the Minister of Finance and Public Credit, on behalf of the government, in a letter dated July 3 of this year. Later on, in October, the new authorities confirmed this request and the priority of the project.

C. Missions

- 1.12 In March and May of 1984, an orientation mission and a special mission went to Ecuador to inform CEDEGE officials of the bases for the preparation of the loan request. Between August 20 and September 7, an analysis mission was in Ecuador. During this mission the basic aspects and details of the request which constitute the framework for execution of the project were agreed. This information is discussed in the following chapters. A negotiation mission was held between November 1 and 4.

1/ Includes amount accumulated to the end of 1984.

2/ Total updated cost, not counting interest (see Section C, Chapter III).

II. FRAME OF REFERENCE 1/

A. Agriculture-Livestock Sector

1. General aspects

- 2.01 At this time agriculture accounts for 12% of Ecuador's GDP and approximately 35% of its total export earnings . In addition, the sector absorbs almost 50% of the economically active population. Between 1970 and 1981, the production of major crops expanded at an average real rate of 2% per year.
- 2.02 External factors, linked with the cycles of unfavorable weather conditions, price and trade policies, an overvalued exchange rate and structural deficiencies in this sector worked together to stifle growth during the aforementioned period. This increased even more the country's dependence on food imports.
- 2.03 Despite this, efficient substitution of imports of selected products could eventually lead to the production of surpluses for export. The most promising crops of this type are feed corn and rice. Indicative estimates of comparative advantages show that Ecuador could raise cotton and soybeans as efficiently as rice and feed corn.
- 2.04 Ecuador is believed to have sufficient land resources to produce large quantities of rice and corn for export to the region in the next several years. Because of its proximity to Peru, it could have a comparative edge in that market for feed corn. Peru imported approximately 455,000 tons of this commodity in 1981. In addition, Ecuador has strong possibilities of exporting rice to other countries of the region since these countries imported more than 600,000 tons of this product in 1981. Of the principal remaining crops, cotton and soybeans have great potential for export since many parts of Ecuador's coastal areas are suited for these crops. As for cotton, medium staple could be competitive in external markets.
- 2.05 At this time Ecuador is using approximately 44% of its tillable land for crops and approximately 62% of its pasture land for animal production. Between 1971 and 1980, the total area planted to the 20 major crops, which accounted for approximately 95% of total crop output, fluctuated between 1.3 and 1.5 million hectares. During this period, an important change of resources took place between the different groups of basic commodities. Crops formerly raised for domestic consumption were abandoned in favor of high value crops for export and the scene of the production shifted from the mountains to the coast.

1/ A summary of Ecuador's economic situation from the date of approval of the current loans in 1979 to 1984 appears in Appendix II-1.

- 2.06 The three farming areas of Ecuador are the mountain area, the coastal area and the east. The first two are important regions for agriculture while the east has long-term potential. Because of the diversity of weather and ecological conditions, their products and specialties are different. The mountains produce most food crops (except rice) while the east raises export crops and other high value commodities.
- 2.07 In the 1970s, the amount of mountain area land in food crops declined steadily while coastal region lands expanded their output significantly. From 1970 to 1981, approximately 250,000 hectares of mountain area land were taken out of crop production. This resulted in an annual average decline of 3.9% in total area planted. Meanwhile, the area of coastal lands in crops rose by approximately 200,000 hectares or 20%. These changes were the result of the farm price policy in effect during those years. The policy discouraged crop production in areas where yields were marginal or soils were better suited for crops with lower profit margins.
- 2.08 Because the two regions complement each other and have different comparative advantages, Ecuador's farm policy has given priority attention to both regions. It has concentrated on eliminating their major constraints and developing their agricultural potential. The coastal area with its low and very fertile tropical lands, is the leading agricultural resource of Ecuador. It has great potential to produce nontraditional exports, corn and rice in particular, as well as traditional exports such as coffee, cacao, bananas and sugar cane. The region also has the potential to produce enough soybeans to replace all of the country's soybean imports and even, over the longer term, to generate a surplus for export. However, its potential is limited by its irrigation infrastructure which, if developed, could boost productivity and expand planted area.

2. Major aspects of the current farm policy

- 2.09 The two principal lines of the farm policy that have been made public at this time by the new Ecuadorian authorities are oriented toward: (i) expanding farm sector exports, primarily by paying special attention to exchange policy considerations; (ii) to supplement the foregoing, offering incentives to substitute imports of food products and relieving thereby the pressure on the country's monetary reserves; (iii) establishing a realistic domestic price policy that ensures, both an adequate market supply and a reasonable return to producers and middlemen; (iv) also to supplement the foregoing, making efforts to improve farm product marketing by building wholesale markets and boosting storage capacity of farm products; (v) establishing a credit policy designed to benefit selected sectors for the objectives set out in (i) and (ii), including an interest rate policy that seeks to be positive in real terms and, simultaneously, offers incentives to producers; and (vi) strengthening the institutional capacity of the sector to offer better support services and raise the execution capacity of sector projects.

3. Rice Production in Ecuador ^{1/}

(a) Present and projected production volumes

2.10 Since 1979 Ecuador has become a net importer of hulled rice even though it has many lands adapted to this crop. Between 1979 and 1983, purchase in the external market rose to 128,200 tons, and an outlay of foreign exchange of US\$45.8 million. If rice production remains at the present level, by 2000 Ecuador's imports of hulled rice will come to an estimated 200,000 tons per year.

2.11 Rice production is concentrated in two provinces, Guayas and Los Rios. These two provinces also have the largest capacity for hulling and storing rice. The following table shows recent changes in area planted, yield and output:

Year	Area	Production	Yield	Hulled Rice		Dif- feren- ce
	Harvested (thousands of Ha.)	of rough rice (thousands of tons)	(Tons/Ha.)	Prod.	Consum.	
1970	76.0	230.1	3.0	138.1	s/d	s/d
1975	135.4	377.9	2.8	226.7	226.7	-
1980	126.5	380.5	3.0	228.3	250.6	22/3
1983	107.5	270.2	2.5	162.3	265.2	102.9

2.12 Much of the rice crop is marketed by hulling companies which buy rice mainly from small producers. Generally speaking, large producers have their own hulling facilities which they frequently sublet.

2.13 At this time seven large projects that would raise national rice production significantly have been identified. These are: Daule-Peripa, Babahoyo, Chilintomo, Banco de Arena, Inés Marfa, Catarama and Samborondón. At this time, these projects are in different stages of progress. Babahoyo is partly executed, Daule-Peripa is ready to start its first stage in which 17,000 hectares of rice can be planted, and the others are still being studied.

2.14 Accordingly, and considering that these projects will come into production in different years, the future outlook points to a surplus for export. This can be seen in the figures of the following table. ^{2/}

^{1/} Since rice is the crop that will be produced in the area to be irrigated under this project, particularly in the case of the First Stage, it has been considered wise to give more detailed information about this crop.

^{2/} Projection based on present consumption levels and assumptions regarding income growth in Ecuador. Details are in Section C.2, Chapter VI.

<u>Year</u>	<u>Hulled Rice</u> (in thousands of tons)		
	<u>Production</u>	<u>Consumption</u>	<u>Difference</u>
1987	270,5	303,0	-32,5
1990	407,0	338,0	69,0
1995	571,0	402,0	169,0
2000	580,0	478,0	102,0

(b) Price policy and marketing margins

- 2.15 In recent years, and until the first half of 1984, the government's price policy for rice was based on official prices estimated at the farm gate level. These prices were determined by production costs, following a legally established method. Since these official prices were not reviewed regularly or made public at the start of rice planting, their effects were negative. The upshot of this policy was that Ecuadoran rice was priced substantially lower than the same product in international markets. Despite this, rice production has increased more in the last five years than in the previous five because more hectares of rice have been planted.
- 2.16 The new price policy seeks to correct these flaws. It uses farm support prices and maximum retail prices and attempts to make them realistic and review them periodically. At the same time, the National Marketing Enterprise (ENAC) will play a very active role in supplying adequate amounts of this product to Ecuadoran consumers and implementing the maximum price policy at that level.
- 2.17 The table below shows the growth of prices of both rough and hulled rice during the period 1980-1983. It also includes wholesale and retail marketing margins. With the new policy mentioned before, it is possible to expect an important change which will result in a lower percentage of hulled rice marketed.

Changes in Rough and Hulled Rice Prices
(Suces per Kilogram)

<u>Year</u>	<u>Rice Prices</u>			<u>Price Index (1971 = 100)</u>		
	<u>Rough, at Production (MAG)</u>	<u>Hulled, Wholesale</u>	<u>Hulled, Retail</u>	<u>Rough Rice, producer land</u>	<u>Hulled Rice, wholesale land</u>	<u>Retail Price</u>
1980	5.63	12.34	13.08	273.00	294.00	296.00
1981	6.79	13.10	15.00	330.00	312.00	338.00
1982	7.62	15.10	17.00	370.00	360.00	383.00
1983	s/d	26.00	30.27			

- 2.18 The total number of hullers in the provinces of Guayas and Los Rios is approximately 1,200. Hulling plant capacity per hour in Guayas is 403 tons and in Los Rios, 220 tons. Storage capacity is 100,000 tons in

Guayas and 38,000 tons in Los Ríos. This capacity will have to be increased in the future when the new projects being planned begin to raise total production.

(c) Technical assistance and credit

- 2.19 Average rice yields in Ecuador vary greatly, by as much as 3 tons per hectare, depending on cultivation methods and technology. Rice that is irrigated, in paddies, with water control, improved seeds and fertilizer, weed control and other cultural practices included in a modern technology package, can yield as high as 7 tons per hectare.
- 2.20 Currently available technology was developed mainly through the efforts of the National Agricultural-Livestock Research Institute (INIAP) and the National Rice Program (PNA). Until a short time ago, the technology focused on irrigated rice in commercial agriculture operations which used high yield, long grain varieties. Recently, the research program has turned toward small producers and the technology requirements of their production system. It is estimated that the PNA provides some type of assistance to about 60% of the area planted to rice.
- 2.21 With adequate water management, it is possible to obtain two crops of rice per year from the same field in a number of areas of the country. This is the case of the areas of Samborondón and Daule. Furthermore, more and more certified seed is being used. Available information leads to the conclusion that approximately 47,000 hectares, approximately one third of the area in rice, used certified seed developed from the registered seed that INIAP produces.
- 2.22 One important restriction on rice production relates to the land tenure system of rice production lands. There are very many small rice producers who, in fact, do not even have title to the land they work. For this reason they cannot get bank credit and have to go to the informal market, made up mainly of hullers, to get the resources they need.

B. The Irrigation Subsector

1. Organization of the subsector and objectives

- 2.23 The National Institute of Water Resources (INERHI) is the national agency responsible for administering water resources. It also regulates and limits the use of waters, formulates national policy in this area, defines programs and plans and executes and inspects projects relating to the development and conservation of these resources. It is responsible for all water resources, both surface and underground water, as well as the hydrographic basins of the largest rivers.
- 2.24 To accelerate and expand the regional decentralization policy of Ecuador, national authorities have proposed the establishment and

strengthening of regional agencies having jurisdiction over certain geographical areas of the country. These offices are delegated the functions of identifying, promoting and eventually executing regional development projects. These organs have to coordinate their activities with other regional and even national organizations. In this way their activities will unfold within the framework of national agricultural and rural development programs.

- 2.25 A few of these are the Guayas River Basin Studies Commission (CEDEGE), the Regional Southern Development Program (PREDESUR), the Manabi Rehabilitation Center (CRM) and the Economic Reconversion Center of Azuay, Cañar and Morona (CREA). According to current law, INERHI is to help these agencies execute development programs by giving them the cooperation and support they need to have their projects achieve the desired objectives.
- 2.26 In promoting and executing projects in the irrigation subsector, the government attempts to extend the farm frontier to areas where crops are not raised today, and to make more efficient use of land and water resources in areas now planted to different crops. Actions aimed at advancing development, research, extension, credit and marketing programs, improved land distribution and local rural organizations supplement the agricultural infrastructure projects. These efforts are aimed at increasing both production and productivity and creating more opportunities of diversified and permanent employment in the farm sector. In the final analysis, the goal is to raise the standard of living in rural zones.

2. Land and water policies and regulations

- 2.27 The basic legislation for this subsector is Supreme Decree No. 1551 of 1966, which defines the principle of the national water policy, and the National Waters Law, of May 30, 1972, which is part of Supreme Decree No. 369. This law created INERHI as a national institution responsible for administering these resources and regulating the use of surface and underground water, including aquifers, lagoons, lakes and rivers, of whatever origin. Water is considered a national asset and, therefore, is for the use of the public at large. The state is the sole owner of water resources.
- 2.28 The law also provides that the state shall recover the value of any investments it makes to develop water resources from the beneficiaries. To this end, it charges water fees which cover operating expenses, maintenance and depreciation of the investment, wherever possible. In addition, it sets the following priorities for water uses: drinking water, water for other domestic uses and animals, agriculture and livestock, energy, mining and industry and, finally, other uses.
- 2.29 The Agrarian Reform Law, for lands expropriated by the state, was passed on July 18, 1978. Its current codification is published in Official

Register 877 of July, 1979. As stated in its text, the policies that will be followed in executing the agrarian reform shall be formulated by the President of the Republic, through the Ministry of Agriculture and Livestock. The Ecuadoran Agrarian Reform and Settlement Institute (IERAC) is the national agency responsible for putting these policies into practice. In addition, since it relates to the specific project in study here, mention should be made of Decree 1001 of December, 1970, which regulates the precarious system of rice production and Decree 941, of September, 1974, which contains the general regulations for application of the Agrarian Reform Law.

- 2.30 According to the law, as soon as an area is declared usable for agrarian reform and technical agricultural production, that is, it is declared an intervention area, IERAC has to adopt all necessary measures to prevent any change in the system of possession of the properties designated in this category. Any expropriation payment that is decided shall be the responsibility of IERAC.

3. Situation of the irrigation subsector

(a) National

- 2.31 Ecuador has a water potential that will enable the farm sector to grow considerably as the country builds works to harness, develop and promote this resource. The estimated water potential of the country as a whole, subdivided into the eastern and western slopes, is a drainage of 110,000 x 10⁶ m³/year in an area of approximately 96,000 km² in the western slope watershed. The eastern slope watershed, with an area of 93,000 km², has a drainage of 108,000 x 10⁶ m³/year.
- 2.32 Compared with this water potential, the irrigation infrastructure is still limited. The total irrigation system now covers approximately 200,000 hectares. Of this total, more than 75% is in private hands. In addition, the construction of water systems and works has been stimulated heavily by the need to meet situations that arise from droughts or floods. This has prevented any systematic action and, in some cases, has resulted in a duplication of resources. Even national and regional institutions working in the water area have developed and executed their programs by focusing on objectives of a circumstantial nature rather than on organically structured plans with long term objectives.

(b) Status of the Guayas Basin

(i) Characteristics of the basin

- 2.33 The Guayas River Basin ^{1/} is a hydrographic system that covers an area defined by the subsystems of the Daule, Vinces and Babahoyo rivers, to

^{1/} CEDEGE has, according to its statutes, jurisdiction over the entire Guayas basin.

the north of Guayaquil. This water basin has an area of 34,000 km² or approximately 13% of the total area of Ecuador. The Guayas plain is approximately 10,000 Km². It is made up largely of flat lands located at sea level with poorly drained clayey soil.

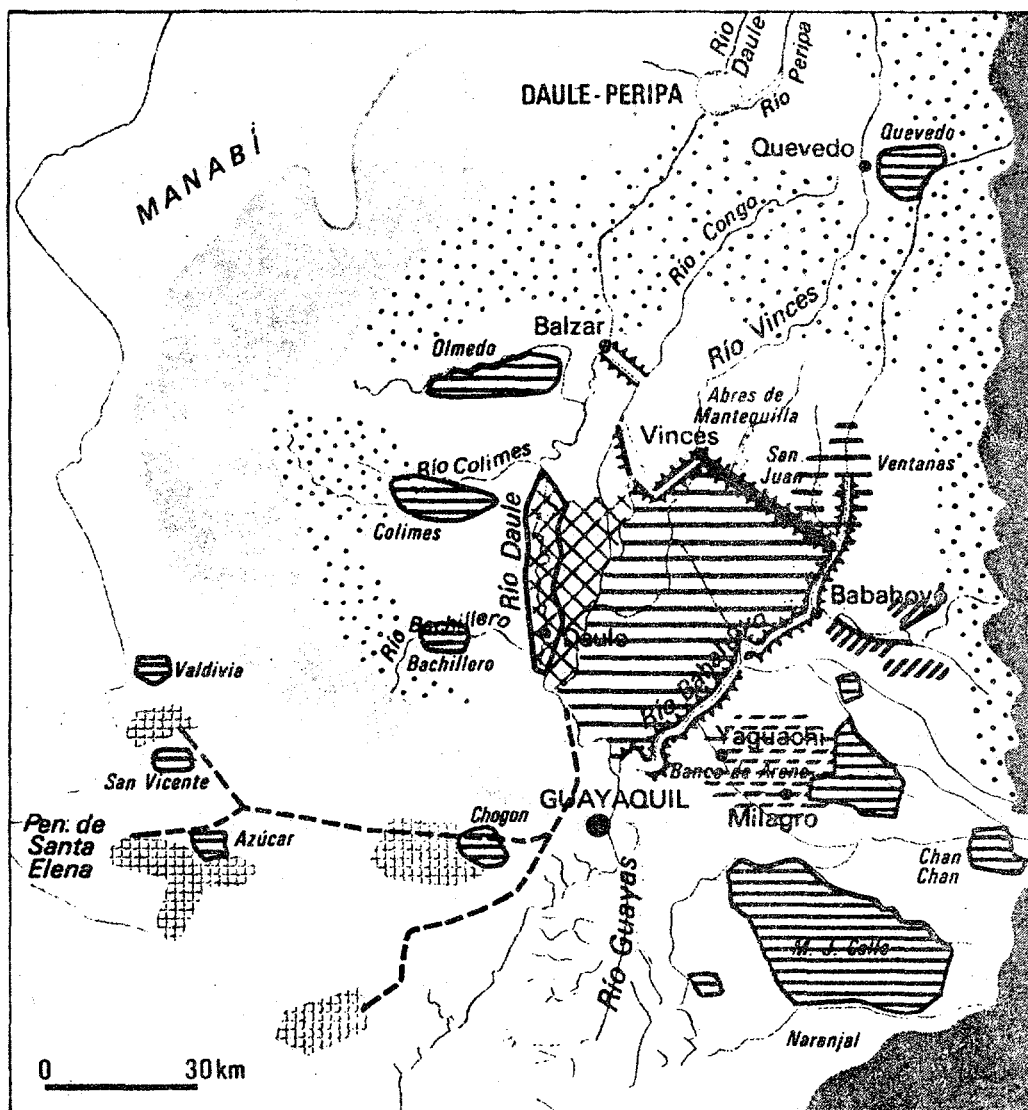
- 2.34 The Guayas basin is an important producer of agricultural crops for Ecuador. It produces 90% of the rice and approximately 50% of all bananas, coffee and cacao. Even though 2.6 million hectares of land are tillable, only 30% of the area has been brought to an acceptable degree of productivity due in large part to the fact that only 160,000 hectares (5.7% of the tillable total) are irrigated.
- 2.35 The following table shows the areas of land available for irrigation in each one of the subbasins. As pointed out in the preceding paragraph, 160,000 hectares are now irrigated.

	Hectares		<u>%</u>
	<u>Irrigable</u>	<u>Total</u>	
Babahoyo	364,300	782,800	47
Vinces	456,700	642,000	71
Daule	404,900	1,205,800	34
Total	1,225,900	2,630,600	47

- 2.36 As indicated above, this region has a vital importance for the agricultural development of Ecuador. However, its expansion and development has stumbled over difficult hydrological problems which can be summarized as follows: (a) 80% of the yearly rainfall comes during the first four months of the year and produces serious flooding; (b) the very clayey soils of this region are subject to periodic flooding and have deficient drainage and inadequate irrigation during the dry season; (c) tidal effects are felt as far as 80 kilometers north of Guayaquil during the dry season and to 40 kilometers during the rainy season; and (d) there is an imbalance in water availability between the different water basins, with some having surpluses and others deficits, during summer.
- 2.37 To date CEDEGE has concentrated its efforts on developing solutions for the problems of the Guayas basin in general and for the Babahoyo ^{1/}, Vinces and Daule watersheds in particular. The Daule-Peripa project is the first step of a global approach to controlling the water resources of the entire Guayas basin. The dam on the Daule river (which is one of the major tributaries of the Guayas) will regulate a high percentage of the water that goes to Guayaquil to dump into the sea (30 billion m³/year).

^{1/} See Chapter VII. Evaluation of loan 377/SF-EC.

Ordenamiento de la Cuenca del Guayas



- | | |
|--|---|
| Cordillera litoral (300m) | Colinas (100-300 m) |
| Cordillera andina (1.000 m) | Llanura |
| Perímetro de regadíos de la Comisión de Estudios para el Desarrollo de la Cuenca del río Guayas (CEDEGE) | |
| Proyecto Guayas | Canales |
| Proyecto América | Derivaciones |
| Proyecto Babahoyo | Diques |
| Presa y central hidráulica | |
| Trasvase de aguas del Río Daule a la península de Santa Elena | |
| Perímetro de regadíos (proyectos) | |
| Acueducto (175 km) | |
| Perímetro de regadíos del Instituto Ecuatoriano de Recursos Hidráulicos (INERHI) | |
| Proyectos realizados parcialmente | Utilización de aguas subterráneas (estudio) |

4. Hydraulic plan for the basin 1/

- 2.38 The balance between national supply and demand of water for farm and domestic uses shows imbalances both in terms of annual cycles and in spatial terms. There is great concentration of a natural supply of water during the first few months of the year. The possibility of changing these imbalances to expand farm production by irrigation depends basically on storage capacity for surface water resources.
- 2.39 The multiyear average natural supply of water is 22,849,000,000 m³. The many dam projects that could be executed in the Guayas river basin, made up of the Babahoyo, Vinces and Daule watersheds, come to 39, with a gross total storage capacity of approximately 16.8 billion m³. These projects were identified by consultants who carried out technical cooperation ATN/SF-1810. Of these, CEDEGE has selected 20 in principle which, together, could store 11,434,000,000 m³ (66% of the total). The criterion used to make this initial selection was granting priority to the largest storage reservoirs. This is particularly the case of the Daule-Peripa dam which would control approximately one third of the available volume in the Guayas basin and almost half of the amount proposed for the water plan. The following table shows the storage reservoir potential of the Guayas basin and the proportion to be used.

River Watershed	Total of Inventory		Usable According to Water Plan Recommendation	
	Number of Dams	Volume (Hm ³)	Number of Dams	Volume (Hm ³)
Babahoyo	8	1,652	6	1,342
Vinces	18	4,007	9	3,137
Daule	13	11,140	5	6,955
Total	39	16,799	20	11,434

- 2.40 To execute these dam projects, the plan recommends subdividing their construction into two phases. The first would include a total of seven dams, with a gross total capacity of approximately 8.5 billion m³ of stored water. This is 75% of the total plan. 2/ Execution of the investments to build these 7 dams will take 15 years, and cost of approximately US\$500 million. The second phase would incorporate approximately 3 billion m³ additional, through the construction of the other 13 dams.

1/ This plan is a CEDEGE proposal based on the findings of the ECLA/ILPES study (Technical Cooperation ATN/SF-1810-EC) which was finished in late 1983 after the project got under way.

2/ Daule-Peripa is included in this stage. Its gross capacity is 6 billion m³.

- 2.41 Since the water supply during the winter cycle is sufficient to cover demand, water regulation is a basic need to supply summer demand. The following table shows the demand for water and the regulated supply in summer for each of the three watersheds:

(In millions of m3)								
Watersheds							Total of Watersheds	
	Daule		Vinces		Babahoyo			
	Hm3	%	Hm3	%	Hm3	%	Hm3	%
Total Demand	3,512.3	37	3,761.0	40	2,125.7	23	9,399.0	100
Water Supply	5,415	58	2,676	28	1,308	14	9,399	100

- 2.42 Of the total demand figures given above, 3,240 Hm3 (34%) are for agricultural irrigation water needed by the different area projects. The 40,000 hectares in the three river watersheds that are now irrigated would have top priority. Following these lands in priority would be later agricultural projects which, it is believed, would be executed in upcoming years or are now being executed: Daule-Peripa, Babahoyo, Santa Elena Peninsula (Diversion), Carrizal-Chone (Manabi Diversion), Samborondón, Catarama, Azucarero Vincés.

C. The Daule-Peripa Multipurpose Program

1. Selection of the program

- 2.43 The program was identified in the detailed study resources of the region's resources and possible ways of developing them. This study was started in 1968 by the Organization of American States and taken up later by CEDEGE. These studies identified the Daule-Peripa multipurpose program as the most attractive since it dealt simultaneously with three restrictions standing in the way of higher crop production in the region, namely: irrigation, drainage and flood control.

- 2.44 After the Ecuadorian government reviewed this project and compared it with other possibilities that offered advantages for agricultural development, it confirmed the earlier conclusion by stating in 1978 that highest national priority was to be given to the long-term Daule-Peripa program. The most important reasons for the program were that it would advance other national development priorities by boosting large scale production of foods, providing work opportunities in rural areas and enabling the use of other resources of the area (energy) and also because it would help to meet important water needs in Guayaquil. For these reasons, the Ecuadorian government decided that the Daule-Peripa program would be the central project involving future efforts on behalf of agricultural development in the entire region.

2. Objectives and description of the program

(a) General objectives

- 2.45 The purpose of the Daule-Peripa Multipurpose Program is to harness the available resources of the Guayas river basin for agriculture, energy

and sanitation (drinking water). The agricultural production that will be obtained from the program will be for both domestic supply and export. Hydroelectric energy would be incorporated into the national interconnected system and regulation of the river will make for a steadier supply of treated water to the city of Guayaquil.

(b) Description and goals of the program

2.46 The program encompasses the following activities:

- Construction of a dam and reservoir with a capacity of 6 billion m³ of water.
- Construction of an irrigation and drainage system for approximately 50,000 hectares on the flat plain of the Daule river, an area subdivided into 17,000 hectares along the right bank of the river and of 33,000 along the left, mainly for rice production.
- Construction of a hydroelectric power plant, with a capacity of 130 MW of installed power, at the base of the dam, to produce 510 million kilowatt hours per year.
- Construction of an irrigation and drainage system on the Santa Elena peninsula, to bring approximately 50,000 hectares of land under irrigation by means of a diversion system from the Daule river.
- Construction of diversion works to provide additional water for the Poza Honda and La Esperanza reservoirs in the Province of Manabí. 1/
- In addition, as a consequence of construction of the dam, other benefits would be: (i) regulation of the river to supply water for urban consumption to Guayaquil and the river-bank cities of the Daule river, and maintenance of the necessary flow to control salinity and decrease in contamination of the river; and (ii) retention of a volume of water equal to flooding levels of 25 years of recurrence for the purpose of controlling flooding in the lower Daule valley.

3. Program stages

2.47 Given the magnitude of the program, both as concerns the resources required to be carried out, and the execution capacity needed, CEDEGE has subdivided the activities of this program into three stages. These are: first stage, construction of (i) the Daule-Peripa dam and (ii) the irrigation and drainage system for 17,000 hectares along the right bank of the Daule river. These two components of the first stage are the purpose of this financing. The second stage is the construction of the 130 MW hydroelectric plant while the third stage is the construction of the irrigation and drainage system for the 33,000 hectares on the left bank of the Daule river.

1/ To be executed by the Manabí Rehabilitation Center.

2.48 At this time the program is in first stage of construction. In this document, this first stage will be the "project". The project and details of its characteristics and status of execution are explained in the following chapters. The timetable of future program stages are subject to change, depending on the availability of financial resources and the completion of any new studies needed.

2.49 As for the second stage, which involves the construction of the hydroelectric plant at a direct cost of approximately of US\$120 million, its final designs are being completed at this time. These designs are the responsibility of the Hydroservice-Astec-INELIN Consortium (see details in Appendix II-2). Construction of the irrigation infrastructure for the 33,000 additional hectares in the Daule valley, whose direct cost in principle is estimated at US\$110 million, is scheduled to be started in 1987 and completed in 1991. Its basic additional studies and preparation of the designs will be let out on contract in 1985. 1/ The part for the additional 50,000 hectares on the Santa Elena peninsula, whose total direct cost is estimated at US\$300 million, and whose predesigns have been done by the Centro de Estudios Hidrográficos of Madrid (considered in principle as Stage IV), still has no tentative timetable (see details in Appendix II-3). The same is true of the Poza Honda and La Esperanza diversion (preliminary cost estimated at US\$160 million). The feasibility studies for this part of the project are out on contract and should be finished by the end of 1985.

D. Crop and Livestock Production in the Daule Area

2.50 The Daule river watershed constitutes approximately 40% of the entire Guayas river basin. Included in it are the affluents of the Puda, Colimes and Magro rivers. The Daule river valley, which has approximately 60,000 hectares, is a homogeneous plain with low permeability, slightly rolling alluvial, soils very well suited for the production of rice. 2/ In addition, certain areas have better drained soils of a sedimentary type which have characteristics better suited for corn, beans, soybeans, sorghum, castor beans, cotton and other crops. Rainfall in the area is approximately 2,000 mm per year, on the average, although this figure may vary widely in different years. Also, the monthly distribution is such that almost 80% of this rainfall comes during first four months of the year.

1/ These studies have been incorporated for financing under this additional loan (see Section B.3 of Chapter III and Appendix III-1).

2/ Approximately 80% of the soils belong to classes 3 and 4, which are appropriate for rice. Only 9% are in class 2 which could produce a greater variety of crops. The remaining lands are in classes 1, 5 and 6.

- 2.51 Of the 60,000 hectares in the Daule valley, 50,000 are suited for crop production under irrigation and drainage. Up to two crops could be raised every year if the water flow of the river were regulated and irrigation and drainage works were available. The 50,000 hectares of land located between the town of Petrillo and Colimes (30 and 90 kilometers to the North of Guayaquil, respectively) are divided into 17,000 hectares on the right bank of the river 1/ and 33,000 on the left.
- 2.52 More than 60,000 persons live in the Daule valley, according to the 1974 census data. Of these, more than 80% live in the country. Generally speaking, education and health services exist but their quantity and quality could be better. The roads infrastructure and electric system should be expanded and completed to encourage more agricultural development of the area.
- 2.53 At this time, agricultural production in the Daule valley falls far short of its potential. This is because the flow of the river is not regulated and the area lacks an adequate irrigation and drainage system. The following table shows areas planted to different crops at this time, in hectares per crop, and yields:

<u>Crop</u>	<u>Area Planted (ha)</u>	<u>Yield (Kg/ha)</u>	<u>Production (MT)</u>
Rice	15,374 <u>2/</u>	4,500	69,183
Coffee	366	320	117
Cacao	72	430	31
Corn	828	2,500	2,070
Soybeans	<u>151</u>	1,820	275
Total Area	<u>16,791</u> =====		

- 2.54 As for crop and animal production support services, the marketing system consists basically of private companies engaged in the work of hulling rice for sale to consumers. The government participates in this process through ENAC (the National Storage and Marketing Enterprise) and the National Rice Program (PNA). Private technical assistance virtually does not exist. Official assistance is given by CEDEGE, which will support primarily the producers (cooperatives in particular) who will be beneficiaries of the first stage of the program. Results of this assistance to date have been good.
- 2.55 INIAP (National Agriculture-Livestock Research Institute) performs applied agricultural research. At this time INIAP is developing a good

1/ The 17,000 hectares on the right bank are part of the first stage of the multipurpose program.

rice program consisting of adaptability tests on exotic varieties and the later process of propagating good quality seed for sale to farmers. Agricultural credit comes from two sources: official banks (Banco Nacional de Fomento) and private lenders (the extrabank market). When agriculture in the zone is more developed, financial intermediation mechanisms which channel necessary resources into farm activities will have to be improved. This subject has been discussed with BNF authorities who are willing to take necessary steps and move gradually toward meeting these requirements.

- 2.56 As for the agrarian production structure and forms of land tenure, the most predominant types are small and medium size properties in the hands of independent farmers and rural organizations (cooperatives, associations and others). This can be seen in Appendix II-4 1/. Generally speaking, three levels of farm production technology which bear some relationship to land tenure structure can be differentiated. These are large producers, cooperatives and other associations, and small producers. The differences that were mentioned relate primarily to extended use of capital and labor production factors. At this time, small differences can be seen between the productivities of the different types of technology. Similarly, possibilities of raising crop yields exist whenever water, plant and soil factors are is controlled at the field level.2/

E. The Energy Sector

- 2.57 The chief objectives of the electricity sector in recent years have been: (i) increasing the use of Ecuador's hydroelectric energy resources; (ii) reducing fuel consumption for electricity generation and replacing thermal energy by hydroelectric energy; (iii) raising the coverage of population served to 55% in 1985; and (iv) developing a master electrification plan for a period of approximately 20 years to guide future investment efforts.
- 2.58 Before the start of operation of the Paute hydroelectric plant (phases A and B) in 1983, the generating capacity of the Ecuadorian electric system was represented mainly by thermoelectric energy. Out of a total of 4,135 GWH, 78% was produced by this type of energy and only 22% by hydroelectric power. The start of operations of Paute A and B which, when operating at full capacity, will incorporate approximately 3,500 GWH into the system, amounts to a significant shift in the proportions of these two types of energy. By 1985, hydroelectric energy from

1/ Appendix II-4 deals exclusively with the land tenure structure on the 17,000 hectares of irrigated land on the right side of the Daule river. Available information about the 33,000 hectares of the left bank points to similar patterns.

2/ It is expected that when the water management restriction is resolved, there will be greater differences in productivity owing to the different technology patterns, with minimum influence exerted by economies of scale.

the Pisayambo, Paute A and B and regional system plants will come to 4,500 GWH per hour. This will represent 83% of the total expected amount of generating capacity at that time (5,400 GWH).

- 2.59 At this time, the boards of directors of INECCEL and CONADE are close to adopting a decision on the revised expansion and generation plan for the year 1995. For this reason, it is not possible to furnish definitive information about the starting date of operation of the different plants which will constitute the expansion plan in effect until that year. However, it is possible to identify the plants that have been selected for the plan during this period: Paute C (500 MW); Paute-Mazar (157 MW); Agoyán (156 MW) and Daule-Peripa (130 MW). In addition, the findings of the present studies indicate that the starting date of operation of the Daule-Peripa hydroelectric plant would be between 1991 and 1993.

F. Guayaquil Water Supply

- 2.60 The area of influence of the Guayaquil water system is supplied by two major sources, La Toma and Lolita. Together, these sources have a production capacity of approximately 3.43 m3/sec. (296,000 m3/day). The distribution system is made up of approximately 1,000 km of water lines. For distribution purposes, the city is subdivided into nine sectors. Five of these are located within the city proper and four are in outlying cities. In March of 1984 the population having water service was estimated at approximately 955,000 persons, for a coverage of 61.4%.

- 2.61 The forecasts of peak daily demand in the master plan are as follows:

<u>Year</u>	<u>m3/day</u>	<u>m3/sec</u>
1980	344,862	3.99
1990	695,197	8.05
2000	1,184,211	13.71

- 2.62 The master water plan foresees that the Daule river will be the future major source of water for Guayaquil. The first stage of the Daule-Peripa project would provide the necessary regulation of the flow of the river to prevent the water immediately around La Toma from becoming brackish. This intrusion of brackish water occurs during drought periods and high tides.
- 2.63 The lower section of the Daule river, which is where the Guayaquil water intake is located, receives an inward flow of brackish water caused by tides. Consequently, in times of severe low water, the chlorine content of the water at the intake point has reached levels that are too high for the water quality standards adopted by Ecuador. This has forced the municipal water company to take emergency steps of raising the intake

temporarily or relocating it to the Pula river, upriver from confluence with the Daule river.

- 2.64 Besides the salinity problem, and even though the water's chemical composition is treatable by conventional drinking water methods, the water has high levels of pesticide contaminants. These contaminants come from irrigation return ditches in agricultural areas now in operation. This area is relatively small compared with the potential that the water basin has for this activity. It is foreseeable, therefore, that over the long run, as agriculture continues to expand in the zone, pollution caused by farm chemicals will increase and, in extreme cases, exceed allowable limits for water quality standards unless preventive measures are taken.
- 2.65 The Daule-Peripa project, which plans to incorporate 50,000 hectares of land into crop production in the Daule basin, will bring about an increase of that pollution but at the same time will attenuate it by regulating the river's flow. It will have this effect because the regulated flow of the river will be greater than the low-water flow without the project. It should also be pointed out that the amount of farm chemicals used in the anticipated crop production patterns in the project area, rice in particular, is considerably lower, both quantitatively and qualitatively, than those of other crops raised in the area such as bananas, corn and soybeans.
- 2.66 Under the Daule-Peripa project, it is foreseeable that the induced pollution will be offset or at least attenuated by regulating the flow of rivers which will increase the dilution of contaminants. In the extreme case, assuming that the contamination after dilution still exceeds allowable levels, the project itself has the ability to dilute the contaminants even more by discharging a greater flow into the river. This would keep water quality within permissible limits.
- 2.67 In addition, since the project promotes better organized farming activity, pesticide control and management measures can be implanted. These preventive and corrective measures will give reasonable assurance that the project will be able to guarantee that water quality for drinking purposes can be kept within the aforementioned standards.
- 2.68 As for the problem of intrusion of brackish water into the Daule river and the water intake for the water supply to Guayaquil and other cities, the project's regulation of the river's flow will contain that intrusion and have a beneficial effect.

III. THE PROJECT (Phase I of the Program) 1/

A. Objectives and Goals

- 3.01 The project, which is Phase I of the Daule-Peripa Multipurpose Program, consists, as previously indicated, in the construction of a storage dam with a capacity of 6 billion m^3 and the construction of an irrigation and drainage system that will bring 17,000 hectares of land into agricultural use. The amount of land to be added to the country's farmland is equal to 42.5% of the total area at present under irrigation in the three sub-basins (40,000 ha), and the storage capacity represents 52% of the capacity expected to be utilized under the water plan (11.4 billion m^3).

B. Description of Project

- 3.02 The following description of the project is similar to that contained in Document PR-969, the changes made therein being explained by more-precise calculations that were determined as construction progressed and definitions adopted after the approval of Loans 610/SF, 32/VF and 58/IC. The only additional component included in this document is that of the studies pertaining to the environmental plan, to the final designs for construction of the irrigation and drainage system for the 33,000 ha that will constitute Stage III of the program, and to a component for designing a multivariant simulation model for the reservoir.

1. Dam and reservoir

- 3.03 The dam is being constructed approximately 10 km downstream from the confluence of the Daule and Peripa rivers and 140 km north of the city of Guayaquil. The principal elements making up the retention structure for a maximum storage volume of 6 billion m^3 are: (a) a zoned dam of granulated material with a waterproof core 78 m high and approximately 4 million m^3 of fill; (b) discharge and diversion facilities, consisting of two tunnels 9 m in diameter, of which one (Tunnel 1) will have a length of 531 m and will serve in the future for permanent regulation of the flow of the Daule river and the other (Tunnel 2) will be 490 m long and will supply water to the Daule-Peripa hydroelectric station; (c) an overflow spillway to surplus water from external flooding and to consist of a structure with three 8x17 m radial gates, with a discharge capacity of up to 3,600 m^3/s ; (d) intake facilities, consisting of a concrete tower 77 m high with intake gates and protective grills at certain levels and a ramp and a sliding gate for generation extractions; (e) a lateral dike, 21 km long, with a height ranging from 5 to 15 m, to contain the water from the dam at an altitude of 85 meters above sea level; and (f) an emergency spillway on lateral dike with a capacity of 500 m^3/s .

1/ The following chapters, with the exception of VII, refer to Phase I of the program, which is the subject of this financing.

- 3.04 Construction of the dam will also involve the following additional work: (i) an operating-personnel community, including the construction of 14 houses and a 34-room dormitory; (ii) roads to provide access to site of the dam, totaling approximately 16 km and designed for heavy construction traffic.

2. Irrigation and drainage system

- 3.05 The irrigation and drainage system for a total of 17,000 ha located between Colimes and Nobol on the right bank of the Daule river will consist of five mutually independent subprojects: San Jacinto (2,450 ha), Higuerón (3,236 ha), Mate (2,563 ha), América (5,836 ha), and Lomas (2,915 ha). Each subproject consists of a structure to take in water from the river by direct pumping, a system to distribute the water through lined canals, and a system of drainage-water collectors. 1/ The clearing of land for small and medium-scale farmers and cooperatives is also contemplated as part of the work to be carried out under Stage I. Other producers will be expected to finance this item themselves, for which purpose they may utilize, inter alia, the lines of credit available at BNF 2/ or at private banks.
- 3.06 In sum, the works to be constructed are: (i) 225 km of irrigation canals; (ii) 170 km of drainage canals; (iii) 263 km of gravel roads; (iv) art works, including, inter alia, 416 intakes, 258 retaining walls, and 57 culverts; and (v) 10 pumping plants with a combined capacity of 32 m³/s in irrigation and 35 m³/s in drainage.

3. Other activities

- 3.07 The project also includes the following activities: (a) engineering and supervision of civil works; (b) final designs for construction of the dam and the irrigation district; (c) technical and institutional strengthening of CEDEGE, including the project executing unit, in the following areas: (i) highly skilled experts to advise on the construction of the dam (board of consultants); (ii) systems for monitoring and evaluating the project, which was prepared by IICA, the Bank having approved it at the end of 1981; (iii) financial administration and information systems; and (iv) regional development plan; (d) preliminary project environmental impact study, which was prepared by individual consultants and recommendations of which led to the activities described in (b) of the following paragraph; (e) agricultural development activities, consisting in promoting the project among farmers to encourage the establishment of cooperatives and of basic community services for

1/ In some cases pumping will be used downstream to evacuate the drains.

2/ BNF has recently received several loans from the IDB to finance global credit programs compatible with the type of investments required by farmers under this project. This includes loans 717/SF-EC, 463/OC, 464/OC and 743/SF-EC.

improving the technological level of farm production in the area; (e) program for the relocation of people affected by construction of the dam and filling of the reservoir; (f) land redistribution program in the irrigation district; and (g) procurement of the necessary equipment and vehicles for the operation and maintenance of the 17,000 ha irrigation system and the dam.

3.08 In addition the following activities have been included under this new loan operation:

- (a) Preparation of the studies for construction of the irrigation and drainage system for the 33,000 ha located on the left bank of the Daule river. The studies will consist of designs to the construction level, including plans, details, technical specifications, costs, and bidding documents in order to contract for the civil works and for the manufacture and installation of the necessary equipment for the pumping stations and electric power distribution line of the system (see terms of reference and details in Appendix III-1);
- (b) Complements to the environmental studies already made, consisting of an environmental plan comprising:
 - (i) a study of water quality and hydrobiological resources, with three principal objectives: (a) to determine the resulting quality of the water in the dam reservoir, which will be affected by nutrients and contaminants, particularly in view of the possible process of eutrophication; (b) to determine changes in the quality of the water in the dam and the Daule river and their impact on the water for human consumption (Guayaquil water supply system) and on the development of hydrobiological resources; and (c) to examine the possible impact of agrochemicals as a result of irrigation on the quality the water supply and on the hydrobiological resources. The activities to be carried out will consist of field and laboratory work, development of the toxic-substances model and additional studies including the preparation of regulations for the use of agrochemicals, with the dual purpose of maximizing farm and hydrobiological production and minimizing the environmental impact (see terms of reference, Appendix III-2);
 - (ii) scheme for use of the space in the hydrographic system, including studies on the management and conservation of renewable natural resources of the hydrographic system of the basins, taking into account that: (a) it will be necessary to relocate the population at present residing in the area of the reservoir and to clear and burn over approximately 10,000 ha; (b) effects associated with the entry of sediments and macrophytes, as well as epidemiological vectors, may occur during the operation of the reservoir; and (c) the risk of eutrophication will increase. Depending upon the results of

this assessment, the studies, which will be taken to the feasibility level, will refer to: natural-resource management in the contributing basin, management of floating macrophytes, control of epidemiological vectors, and improvements in human health, and the salvaging of fauna (terms of reference and details in Appendix III-3).

- (c) Study of a multivariant probabilistic-simulation model for the reservoir. In view of the fact of the reservoir model currently available is bivariant, it is considered necessary to institute a multivariant model in order to generate stochastic series for rain flow and demands correlated with volumes. Once the model has been designed it will be possible to replicate the simulations which have been run up to now or to produce others that may become necessary to optimize the management of the reservoir.

C. Total Cost and Financing

1. Total cost

- 3.09 The table on the following page shows the total updated cost of the project, which is US\$403 million or US\$51.3 million more than the original estimated cost. The table indicates the original estimates of cost (1979) and the present estimates at financial values. The comparison of costs for the direct investment categories, at constant June 1984 values, appears in Section D of this chapter.

Present Cost of Project 1/

	Original Cost	Present Cost 2/	Differences Total	%	Present Cost 3/ Incurred To be to June 1984	incurred
1. <u>Engineering, Administration and Supervision</u>	14.90	33.42	18.52	124.3	11.43	21.99
1.1 Engineering and Administration	5.40	14.96	9.56	-	5.94	9.02
1.2 Studies for the Dam	3.90	2.34	(1.56)	-	1.50	0.84
1.3 Irrigation Studies	1.10	0.10	(1.00)	-	-	0.10
1.4 Supervision of Dam Construction	2.20	12.19	9.99	-	3.86	8.33
1.5 Supervision of Irrigation Works Construction	1.50	3.16	1.66	-	-	3.16
1.6 Board of Consultants	0.30	0.30	-	-	0.09	0.21
1.7 Consultants for the Executing Unit	0.30	0.04	(0.26)	-	0.04	-
1.8 Consultants in Financial Administration	0.20	0.33	0.13	-	-	0.33
2. <u>Direct Costs</u>	135.70	204.36	86.66	50.6	56.60	147.76
2.1 Roads, Camps and Miscellaneous	10.30	11.08	0.78	-	4.84	6.24
2.2 Tunnels	21.90	18.53	(3.37)	-	14.82	3.71
2.3 Intakes and Accessories	12.00	19.40	7.40	-	16.26	3.14
2.4 Dam	17.80	41.41	23.61	-	8.38	33.03
2.5 Spillway	29.90	32.02	2.12	-	7.70	24.32
2.6 Dikes and Emergency Spillway	15.70	33.84	18.14	-	4.60	29.24
2.7 Pumping Station for Irrigation	5.10	8.74	3.64	-	-	8.74
2.8 Pumping Station for Drainage	1.40	4.59	3.19	-	-	4.59
2.9 Irrigation and Drainage Canals	20.10	30.62	10.52	-	-	30.62
2.10 Supplementary Works	1.50	4.13	2.63	-	-	4.13
3. <u>Equipment and Machinery</u>	1.10	2.86	1.76	16.0	0.15	2.71
3.1 Vehicles-Operation and Maintenance	0.20	0.26	0.06	-	0.15	0.11
3.2 Maintenance Operations and Equipment	0.80	2.50	1.70	-	0.15	2.50
3.3 Vehicles-Supervision of Construction	0.10	0.10	-	-	-	0.10
4. <u>Land Preparation at Farm Level</u>	6.80	6.80	-	-	-	6.80
5. <u>Concurrent Costs</u>	21.30	22.93	1.63	7.7	2.50	20.43
5.1 Land	3.30	2.30	(1.00)	-	0.80	1.50
5.2 Relocation Program	10.90	18.40	7.50	-	1.70	16.70
5.3 Relocation Irrigation District	7.10	2.23	(4.87)	-	-	2.23
6. <u>Financial Costs</u>	46.00	91.40	45.40	98.7	10.50	80.90
6.1 FSO Interest	1.50	2.40	0.90	-	0.01	2.39
6.2 VTF Interest	4.70	7.13	2.43	-	0.02	7.11
6.3 FSO Credit Fee	1.40	1.42	0.02	-	1.42	-
6.4 VTF Credit Fee	1.20	1.08	(0.12)	-	1.08	-
6.5 Interest and Fees 58/IC	36.20	42.80	6.60	-	7.40	35.40
6.6 FSO Inspection and Supervision	0.70	0.70	-	-	0.42	0.28
6.7 VTF Inspection and Supervision	0.30	0.25	0.05	-	0.15	0.10
6.8 IC Interest (new loan)	-	29.06	29.06	-	-	29.06
6.9 IC Credit Fee	-	4.81	4.81	-	-	4.81
6.10 IC Inspection and Supervision	-	1.75	1.75	-	-	1.75
7. <u>Costs without Specific Allocation</u>	125.90	41.23	(84.67)	(67.3)	-	41.23
7.1 Contingencies	27.00	17.56	(9.44)	-	-	17.56
7.2 Escalations	98.90	23.67	(75.22)	-	-	23.67
TOTAL	351.70	403.00	51.30	14.6	81.18	321.82

1/ In order to facilitate comparisons this table of costs has been prepared at a level of detail similar to that of the table in the original Project Report and Loan Proposal (Documents PR-969 and 969-A). The table refers to the present financial cost as of June 1984.

2/ The amounts for contingencies and escalation are reflected in this column in the figures for the corresponding categories.

3/ The sum of the two columns is equal to the present cost of the project.

2. Bases for the calculation of costs

(a) Engineering, administration and supervision (US\$33,420,000)

3.10 The cost of the engineering, administration and supervision category (see Appendix III-4), was calculated as follows:

- (a) Executing unit: the historic portion of this component was based on the costs already incurred and the future portion on current salaries and wages;
- (b) Studies and consulting services already contracted: the cost was based on the amounts of the contracts, both in the case of studies already made and in the case of the study on institutional strengthening of CEDEGE, for which a contract was recently signed although the study is yet to be started;
- (c) New studies and consulting services: the cost was based on the experience with consulting contracts for similar services. Detailed information on the estimated cost of the study for the design of the 33,000 ha dam will be found in Appendix III-1, for the environmental plan in Appendix III-2, and for the reservoir simulation model in Appendix III-3. It should be noted that the cost of these studies (US\$1.9 million, US\$730,000 and US\$22,000, respectively) was included in subcategory 1.1 so as not to start additional subcategories.

(b) Direct costs (US\$204,360,000)

3.11 To estimate the cost of the dam, the value of the contract with Agromán Empresa Constructora S.A., was utilized in view of the fact that this was a job already under construction. The values have been updated to June 30, 1984, for which purpose the original cost was adjusted to include escalation in accordance with the price adjustment formula set forth in the contract. To this was added the cost of the work yet to be done, updated to 1984. A similar procedure was followed in calculating the cost for the operating workers village and the access road, jobs which are now under construction and very close to completion (see Appendix III-5).

3.12 As far as the irrigation district is concerned, the costs used were those of the civil works of the irrigation and drainage systems and roads as reflected in the reference budget developed by CEDEGE for the purpose of bidding and construction, these figures being updated to 30 June, 1984. To these were added the costs for the electromechanical equipment for the irrigation and drainage pumping stations, including provision and installation. The resulting costs were increased to reflect price escalation at the rate of international inflation foreseen for the construction period (see Appendix III-5).

(c) Equipment and machinery (US\$2,860,000)

- 3.13 The costs of the vehicles for operation and maintenance and for construction supervision and those of the equipment for operation and maintenance were calculated on the basis of current price quotations and of experience with vehicles already acquired (see Appendix III-6).

(d) Land preparation at farm level (US\$6,800,000)

- 3.14 The costs for the category of land preparation at farm level were estimated on the basis of experience with the Babahoyo project, in which work was done which is fairly similar to that to be accomplished in the case of the 17,000 ha on the left bank of the Daule river.

(e) Concurrent costs (US\$ 22,930,000)

- 3.15 The estimate of the cost for land acquisition was based on values for recent acquisitions in the reservoir area and on the cost of relocating the population residing in that area. For the relocation in the irrigation district, the costs were estimated on the basis of IERAC's experience in this field.

(f) Costs without specific allocation (US\$41,230,000)

- 3.16 The percentages estimated for contingencies depended on the nature of the category and on existing information on the various works components, including unit prices and work volumes for each category. Thus, contingencies for the categories of engineering and administration, land preparation and concurrent Costs were estimated at 5% and those for direct costs and equipment and machinery at 10%. For escalation, percentages were applied which were consistent with the relevant rates estimated by the Bank's technical units: 4.3% for 1984, 5.5% for 1985, 6.1% for 1986, 5.4% for 1987, and 5.1% for 1988.

3. Financing

- 3.17 The additional IDB financing would be provided entirely in foreign exchange from the inter-regional capital and would amount to US\$175 million, which, added to the US\$70 million lent in 1979, would raise the total IDB contribution with funds of its own to US\$245 million, - 60% of total present cost - which is less than the percentage established in the matrix for lending to group D countries in the agriculture and rural development sector (75%).
- 3.18 The amount recommended for the new financing is a result of: (i) an updating, in financial terms, of the total cost of the project; (ii) the financial scheme at present in effect, which would imply a local counterpart contribution of US\$228.7 million over the next four years; (iii) the country's prospective ability to make available an amount of this size for completing the project; (iv) the criterion according to

which the loan amount should be consistent with the objectives of ensuring completion of the project within a realistic and appropriate financial scheme, and (v) the anticipated disbursement timetable.

3.19 The detailed table of financing would be as follows: 1/

Table of Financing

(in US\$ millions)

	<u>External Financing</u>			<u>Total Ex-ternal</u>		<u>Local contri-bution</u>	<u>Total</u>
	<u>58/IC</u>	<u>32/VF</u>	<u>610/SF</u>	<u>New IC</u>			
1. <u>Engineering, Administration and Supervision</u>	4.15	-	8.90	5.06	18.11	15.31	33.42
2. <u>Direct Costs</u>	43.95	15.50	37.50	97.55	194.50	9.86	204.36
2.1 Roads, camps, etc.	4.45	-	-	2.49	6.94	4.13	11.07
2.2 Dam	39.50	1.1	36.80	62.07	139.47	5.73	145.20
2.3 Irrigation district	-	14.40	0.70	32.99	48.09	-	48.09
3. <u>Equipment and Machinery</u>	0.25	0.10	0.90	1.56	2.81	0.05	2.86
4. <u>Parcel Systematization</u>	-	-	-	6.80	6.80	-	6.80
5. <u>Concurrent Costs</u>	1.65	-	-	-	1.65	21.28	22.93
6. <u>Financial Costs</u>	-	5.00	2.20	52.59	59.79	31.61	91.40
6.1 Interest	-	4.70	1.50	50.84	57.04	23.79	80.83
6.2 Commitment fee	-	-	-	-	-	7.10	7.10
6.3 Inspection and supervision charge	-	0.30	0.70	1.75	2.75	0.72	3.47
7. <u>No Specific Allocation</u>	-	4.40	20.50	11.44	36.34	4.89	41.23
7.1 Contingencies	-	2.50	3.90	9.13	15.53	2.03	17.56
7.2 Escalation	-	1.90	16.60	2.31	20.81	2.86	23.39
Total	50.00	25.00	70.00	175.00	320.00	83.00	403.00
	=====	=====	=====	=====	=====	=====	=====
Percentages	12	6	17	43	79	21	100

1/ The table of financing at present in effect is shown in Appendix III-3.

3.20 The proceeds of the new financing would be used to increase the Bank's contribution under the categories of engineering and administration and direct costs, both of which would be financed almost in their entirety, and under the categories of equipment and machinery and land preparation. In addition, Bank resources would be used to finance the corresponding contingency and escalation provisions, as well as the interest during project execution on loans 610/SF, 58/IC and the new IC financing.

3.21 The Bank's financing would come from the inter-regional capital and be subject to the following terms and conditions:

(i)	Interest	Variable
(ii)	Credit fee	1-1/4%
(iii)	Inspection and supervision charge	1% of the loan
(iv)	<u>Periods</u>	
	- For repayment	20 years
	- For disbursement	4 years
(v)	Grace period	4 years

3.22 The local contribution, amounting to the equivalent of US\$83 million, would come from the following sources: (i) US\$30 million will be disbursed up to the end of December 1984; (ii) the BEDE made a loan of S/1.5 billion (equivalent to approximately US\$24 million) to the Ministry of Finance and Public Credit, to be transferred to CEDEGE as a capital contribution, for use in financing the local contribution for the years 1984 and 1985, of which US\$5 million have been incorporated into the US\$30 million referred to in (i), leaving US\$19 million to be disbursed; and (iii) the balance of the funds, approximately US\$34 million, will be supplied by the government.

D. Comparison between the Original and the Updated Costs

3.23 The following table compares, in constant June 1984 values, the original and the updated costs, exclusive of financial costs and escalation. The bases for the calculation will be found in Appendix III-7.

Category	Original 1/	Present 2/	Difference	
			\$	%
1. <u>Engineering, Administration and Supervision</u>	<u>23.45</u>	<u>35.28</u>	<u>+11.83</u>	<u>+ 50</u>
1.1 Engineering and administration	8.51	15.83	+ 7.32	+ 86
1.2 Studies for dam	6.14	2.56	- 3.58	- 58
1.3 Irrigation studies	1.74	0.09	- 1.65	- 95
1.4 Supervision of dam construction	3.45	12.74	+ 9.29	+269
1.5 Supervision of irrigation facilities construction	2.36	3.33	+ 0.97	+ 41
1.6 Board of consultants	0.47	0.35	- 0.12	- 26
1.7 Consulting services, project executing unit	0.47	0.05	- 0.42	- 89
1.8 Consulting services, financial administration	0.31	0.33	+ 0.02	+ 6
2. <u>Direct Costs</u>	<u>156.26</u>	<u>215.97</u>	<u>+59.71</u>	<u>+ 38</u>
<u>Dam</u>	<u>128.24</u>	<u>163.22</u>	<u>+34.98</u>	<u>+ 27</u>
2.1 Roads, camps, etc.	16.23	13.85		
2.2 Tunnels	25.21	18.88		
2.3 Intakes and accessories	13.82	19.33		
2.4 Dam	20.48	43.09		
2.5 Spillway	34.41	33.06		
2.6 Dikes and emergency spillway	18.09	35.01		
<u>Irrigation District</u>	<u>44.25</u>	<u>52.75</u>	<u>+ 8.50</u>	<u>+ 19</u>
2.7 Irrigation pumping station	8.03	9.61		
2.8 Drainage pumping station	2.21	5.05		
2.9 Irrigation and drainage canals	31.66	33.55		
2.10 Supplementary works	2.36	4.54		
3. <u>Equipment and Machinery</u>	<u>1.75</u>	<u>3.14</u>	<u>+ 1.39</u>	<u>+ 79</u>
3.1 Operating and maintenance vehicles	0.32	0.28		
3.2 Maintenance machinery	1.27	2.75		
3.3 Construction supervision	0.16	0.11		
4. <u>Land Preparation at Farm Level</u>	<u>10.72</u>	<u>7.13</u>	<u>- 3.59</u>	<u>+ 33</u>
5. <u>Concurrent Costs</u>	<u>33.57</u>	<u>24.98</u>	<u>- 8.59</u>	<u>- 25</u>
5.1 Land	5.20	2.52		
5.2 Relocation program from flooded zone	17.17	20.00		
5.3 Relocation, Irrigation District	11.20	2.46		
Total Direct costs	<u>225.75</u>	<u>286.50</u>	<u>+60.75</u>	<u>+ 27</u>

1/ Applying factors for cost adjustment to June 84 dollars.

2/ The 1980-1984 investments were adjusted to June 1984 prices and include the corresponding contingencies.

- 3.24 Category 1.1, engineering and administration, shows an increase of US\$7.32 million because: (i) the cost of the studies for the preparation of the final designs for the 33,000 ha corresponding to the Phase III of the program, the value which at June 1984 prices was US\$3 million, is now being included in this category; (ii) also included in this category are items of US\$700,000 for technical assistance to farmers and US\$863,000 for environmental and water quality studies and for the simulation model, none of which were originally foreseen; (iii) the studies for the development of the designs for the 17,000 ha irrigation system were not contracted externally as originally foreseen but were prepared directly by the executing unit at a cost of US\$1.8 million; and (iv) all national counterpart staff for the hydroelectric station studies (Phase II) has been charged to the project executing unit.
- 3.25 The increase in costs for subcategory 1.4, dam supervision, is explained by the fact that 276 man/months had been originally estimated for supervision during the period 1982-1986 whereas the contract with TAMS for supervision of dam construction actually called for 750 man/months over the same period, a difference of 474 man/months. In addition there is the fact that it was necessary to include an additional 18 months of supervision (all of 1987 and six months of 1988) in the updated cost. Category 1.5, Irrigation Facilities Construction and Supervision, was estimated in both the original and the present budget as a percentage of the value of the physical work. The difference is explained by a rise in the cost of the work.
- 3.26 The difference of US\$34.98 million in the costs for the dam and its auxiliary works (spillway, intakes and discharge, perimetral dike, etc.) results from larger volumes of work calculated by the consultants (TAMS-INTEGRAL) in 1980 when they developed the designs to the bidding level, compared with those estimated by the consultants (TAMS-AGRAR-INTEGRAL) and 1978 to the level of technical feasibility designs. The latter estimates were used by the Bank in reviewing the operation in 1979.
- 3.27 The difference of US\$8.50 million in the direct costs for pumping construction and equipment in the irrigation district, subcategories 2.7 to 2.10, is due to the fact that when the operation was reviewed the designs were not yet available, inasmuch as these facilities and equipment were scheduled to go on stream three years after the dam.
- 3.28 As for subcategory 3.2, maintenance machinery, the difference between the original and the updated cost is explained by the fact when the original analysis was made it had not as yet been determined that the embankments had to be constructed with selected materials, with expansive clays replaced on site, which implies a more costly and demanding type of maintenance not only for the embankments but the entire road system.

IV. EXECUTION OF THE PROJECT

A. Execution Mechanism

- 4.01 The project will be executed by CEDEGE, through an executing unit created especially for this purpose. The dam works and the reservoir, as well as the dam access road and the construction of the work camp, have been subdivided into 4 contracts. At this time, 3 of these are signed. The fourth contract, for clearing the reservoir area, would be contracted during the second half of 1985 (see Section B.4 (c) of this chapter). The works for construction of the irrigation system infrastructure, which could be awarded in either 1 or 2 contracts, would likewise be contracted to a firm or consortium specialized in this area, as would the works on parcel subdivision. The supplementary activities related to irrigation works, such as promotion, relocation and redistribution of lands, are being executed with the help of other institutions with which agreements have been signed. These are the Ecuadoran Institute of Agrarian Reform and Settlement (IERAC), the National Agricultural-Livestock Research Institute (INIAP), the Banco Nacional de Fomento (BNF), the Ministry of Agriculture and Livestock (MAG), the Ecuadoran Institute of Water Resources (INERHI), the Guayaquil Water Enterprise (EMAP-G), the National Rice Program (PNA), the National Marketing Enterprise (ENAC), and the Ecuadoran Electrification Institute (INECEL). To supervise the work on the dam and the reservoir, as well as the irrigation system, plans have been made to engage the services of specialized consulting firms (in the first of these cases, the firm has already been contracted).

B. Present Status of Execution

1. Executing unit

- 4.02 By means of a resolution of the CEDEGE Board of Directors of September, 1980, an executing unit was created for this project and put into immediate operation. This unit is responsible for programming, directing, executing and supervising project construction, execution and coordination of the institutional activities that are the responsibility of CEDEGE, as well as the works operation and maintenance programs. The unit reports to the Board of Directors of CEDEGE. It has 4 directorates: Dam, Irrigation, Hydroelectric Plant and Agricultural Development and Resettlement.
- 4.03 For the establishment and development of the executing unit's organic structure, external services were used. Basically these services consisted of: (i) design of the organic structure, location and degree of independence of the unit within the CEDEGE structure and relationships with other organizations; (ii) the systems area, with an emphasis on internal control, accounting, administrative procedures and others; (iii) personnel requirements, both numbers and qualifications; and (iv) the prospects for data processing. This technical cooperation

developed the foundation for the structure of the executing unit, with the exception of the financial area in which the manuals that were produced did not follow the accounting standards of the General Governmental Accounting Manual for the public sector.

4.04 The unit has a staff of 80 persons, distributed by functions as follows:

Executives	4
Professionals	35
Technicians	10
Administrative	15
General Services	6
Laborers	10
	<u>80</u>

4.05 It is estimated that the technical level of the executing unit is adequate and that it has sufficient personnel for the project's level of advance. When the agricultural phase of the project starts, the Directorate of Agricultural Development and Resettlement will have to be strengthened. To this time, this office has been working with just 4 agricultural engineers. Over the last three years, its work has been aimed at organizing and improving the technical strength of rural cooperatives that already exist in the project zone.

4.06 From 1985 to 1988, the directorate will have to grow in strength to a total of 21 professionals. Of these 8 would be agricultural engineers and 12, agricultural technicians. As the execution of civil works advances and more land becomes available for production, small and medium size producers ^{1/} will need technical assistance to make efficient use of available resources. To ensure timely incorporation of new staff members, it is recommended that the contract include a clause calling upon the borrower, through CEDEGE, to submit no later than 6 months after the loan contract is signed, a hiring schedule similar to the one that appears in Appendix IV-7 (see Recommendations).

2. Status of agreements

4.07 Between July, 1979 and June, 1981, ten agreements were signed. Of these, eight were aimed at advancing different functions relating to agricultural matters and two, those with EMAP-G and INECCEL, related to matters of drinking water and energy, respectively. The table that follows summarizes the status of each agreement regarding date of signature, objective, advance and other aspects included in the agreements which are still pending execution.

^{1/} Small and medium producers are those whose plots of land do not exceed 20 hectares (this category includes rural organizations for which the amount of land per producer is used).

STATUS OF ADVANCE OF AGREEMENTS BETWEEN CEDEGE AND OTHER AGENCIES

ORGANIZATION	DATE SIGNED	OBJECTIVE	ADVANCE	PENDING MATTERS & OBSERVATIONS
IERAC	7/23/80	<ol style="list-style-type: none"> 1. Program annual activities to execute agrarian restructuring project. 2. Promote and organize local rural people to execute activities in the project area. 3. Organize and supervise the operation of agrarian holdings benefited by infrastructure works carried out by the project. 4. Establish a training and instruction program in agrarian reform. 	IERAC is participating actively in the program to expropriate land in the dam area.	The actions will be expedited by an IERAC staff member, to be located in the project area, who will eliminate unnecessary paperwork.
INIAP	4/17/81	<ol style="list-style-type: none"> 1. Agricultural research in the project area 2. Technical assistance in a certified seed multiplication program. 3. Execute a training program through courses, seminars and so forth. 	Proceeding normally with close coordination between INIAP and CEDEGE to generate and transfer appropriate technology in the project area.	INIAP participation in transfer of technology to farmers in the improved area will be stepped up when the irrigation system for the first 6,000 hectares starts operation in 1987.
BNF	11/26/80	<ol style="list-style-type: none"> 1. Give necessary agricultural credit for an approximate amount of sucres \$463.7 million over the period 1980-1985 and sucres \$643.3 million over the period 1986-1993. 	The BNF has been giving credit to project farmers but it must look for ways of speeding up resource placement.	The agreement must be brought up-to-date to reflect current requirements.
MAG	4/6/81	<ol style="list-style-type: none"> 1. Prepare and execute a forest protection plan for the Upper Daule Basin. 	This plan was developed to the semi detailed level.	Taking the plan to the feasibility level will be accelerated in order to execute it immediately afterwards.
INERHI		<ol style="list-style-type: none"> 1. Give technical and institutional cooperation to complete studies, execute, supervise, operate and maintain works, especially those relating to determination of rates, collections from irrigation users, creation of user associations, water distribution, regularization of land titles and so forth. 	To date, INERHI has collaborated with CEDEGE in preparing that irrigation and drainage project.	Approve the structure of the rate schedule that CEDEGE will prepare with the help of consultants, and then apply it.
ENAP-G	4/10/81	<ol style="list-style-type: none"> 1. Offer the necessary technical cooperation to prepare the studies related to the project's influence on the Guayaquil water supply. 	Coordination work has been done in connection with water quality studies.	Work with consultants who will prepare water quality studies.
PNA	4/10/81	<ol style="list-style-type: none"> 1. Work on technical assistance programs for rice. 2. Collaborate in solving problems of programming the production and marketing of rice. 3. Work on problems of programming the production and marketing of rice. 4. Work on gathering data for the ex post evaluation of the project. 	Developing normally.	Once the land starts coming into production, PNA's most important job will be in the area of technology transfer.
EMAC	4/24/81	<ol style="list-style-type: none"> 1. Receive rice production from the project whenever necessary. 2. Sign purchase-sale contracts with area cooperatives to put price maintenance policies into practice. 	To this time, and at present production levels, there are no problems with the agreement. Most farmers sell to private companies.	Act to supplement and regulate the marketing process.
INECEL	7/2/79	<ol style="list-style-type: none"> 1. Coordinate the work on the hydroelectric plant studies. 2. Collaborate and advise on execution of the plant. 3. Designate a project director. 	Collaborate with the consultants who made the studies on the Daule-Peripa hydroelectric plant.	Work with CEDEGE on studying the dam operation model and the operating model for the national interconnected system which includes Daule-Peripa.

- 4.08 Several agreements are discussed below. Because they are important and have certain aspects pending execution, they deserve special attention.
- 4.09 IERAC agreement - land tenure. In furtherance of the obligations contracted in this agreement between the two organizations, IERAC collaborated with CEDEGE in taking a socioeconomic census of the area affected by the Daule-Peripa dam. They worked together on preparing a relocation plan for the people affected by construction of the dam. The part of this contract that still has to be executed concerns mainly the land tenure restructuring program. This includes promotion, organization and rural training, as well as awarding of lands. Bearing in mind that land expropriation in the reservoir area requires prompt action so that the reservoir can be filled on time, IERAC and CEDEGE recently adopted an agreement to place an IERAC staff member in the project area. This person will be selected by mutual agreement of both parties and act in the field to prevent any delays in processing documents that have to be sent to Quito for consideration. At the time this document was being prepared, that staff member was being selected. This person's services will speed up this process considerably.
- 4.10 INIAP agreement - applied research. The National Institute of Agriculture-Livestock Research (INIAP) has two experimental fields in the agro-ecological area of the project. These two centers are known as Pichilingue and Boliche. The two centers conduct research into different production technologies, especially on rice, oil bearing seeds, cotton, sorghum and soybeans. They give special attention to improving and adapting exotic varieties of rice, as well as developing more efficient practices to obtain better yields in consideration of the ecological characteristics of the Guayas Basin. In this connection, they conduct experiments into fertilizer levels and practices, pest and disease control, weed control, seed planting for plant population, and so forth. It is important to point out that the El Boliche station obtains registered rice seed which it sells to accredited commercial companies which in turn produce high quality certified seed for use by farmers.
- 4.11 The technologies generated by INIAP at these experimental stations are publicized to farmers through agricultural extension services, especially private and institutional technical assistance. For these purposes, CEDEGE signed an agreement with INIAP. Under this agreement, INIAP agrees to have all necessary personnel work with CEDEGE agricultural technicians in designing, executing and evaluating experiments to be carried out in the project area with the assistance of volunteer farmers.
- 4.12 BNF agreement - agricultural credit. The agricultural credit needed to finance farm activities at the producer level should come primarily from the line of credit offered by the BNF. 1/ Obviously, the agricultural

1/ The BNF has received several loans from the IDB to finance global credit programs. These are compatible with the type of investments that the farmers of this project will need. Examples are loans 717/SF-EC, 463/OC, 464/OC and 743/SF-EC.

development that this project is promoting will raise the credit requirements and make it necessary for BNF branches working in this area to become stronger and handle more credit resources. To this end, CEDEGE signed an agreement with BNF by which BNF will provide the necessary credit resources to finance the agricultural development of the area. CEDEGE will give all necessary assistance for these operations through the Directorate of the Agricultural Development and its technical assistance programs.

- 4.13 The total net repayment requirements considered necessary to develop this area for agricultural purposes come to the equivalent of US\$9.5 million during the first five years, starting in 1987 when the lands come into production. ^{1/} These requirements include the credit needs to undertake producer investments (field preparation, leveling, machinery and so forth), as well as the working capital requirements to finance farm year operations. To ensure timely availability of resources, it is recommended that an addendum to the agreement signed by BNF and CEDEGE be presented, within six months of the contract signature date, calling upon a regular updating of the amounts of credit that would be allocated to the project area. This addendum should take into account the timetable that appears in Appendix IV-1 (see Recommendations).
- 4.14 ENAC and PNA agreements - marketing. In the Daule valley, as in all the Guayas basin, rice is marketed through many small companies engaged in rice processing. With the agricultural development of the project and the important crop production gains in this area, new marketing channels will have to be developed to supplement existing ones. ^{2/} It should be noted that CEDEGE has signed an agreement with the National Storage and Marketing Enterprise (ENAC) which calls upon ENAC to facilitate the commercial transactions of rural organizations in the project area that produce grain. Similarly, another agreement has been signed with the National Rice Program (PNA), according to which PNA will, in addition to providing technical assistance to rice farmers, make estimates of crop sizes to forecast market volumes. Likewise, PNA will inspect the rice mills and hullers as part of their normal work.
- 4.15 INECEL agreement - hydroelectric plant. This agreement had an adequate advance that ended with the preparation of the final plant designs. Now, to complete this part, the task is to prepare the regulations that INECEL and CEDEGE will sign for management of the dam. These regulations are expected by April of 1986, according to the current status of clause 6.17 of loan 610/SF-EC (see Section E of this chapter). Since the plant should start operations between 1991 and 1993, and the government has taken preliminary steps to ensure adequate financing for it, it is also

^{1/} It should be noted that these requirements, which refer exclusively to the 17,000 hectares on the right bank of the Daule river, are not part of the cost of this project but were taken into account for economic analysis purposes.

^{2/} Appendix IV-2 gives details of the present rice hulling and storage capacity in the project area.

recommended that the loan contract include a clause according to which the borrower, through CEDEGE, must submit proof, no later than 6 months after the date of signature of the loan contract, that it has contracted or performed the study on the mathematical operating model of the Daule-Peripa dam and the rest of the national interconnected system, in coordination with INECCEL (see Recommendations and Appendix III-3).

3. Status of feasibility studies and designs

- 4.16 The feasibility studies for the dam and the competitive bidding design studies were prepared by the TAMS-Agrar-Integral consortium (the United States, Germany and Ecuador). The first of these (the feasibility studies) were delivered in July of 1978 and the second studies (design) in November of 1980. The construction designs, executed in 1981, along with the competitive bidding, were the responsibility of TAMS-Integral. All these studies have been approved by the IDB.
- 4.17 The competitive bid designs for construction of the civil works of the irrigation and drainage system for the 17,000 hectares were executed by CEDEGE, with the assistance of national consulting firms in specific areas. These have been approved by the IDB and by INERHI, according, in the case of the latter, to the provisions of the Waters Law. Likewise, CEDEGE conducted preliminary studies for the electromechanical designs of the irrigation and drainage pumping stations. The hiring of individual consultants for the designs and technical specifications is scheduled for the end of this year. The time needed for execution of this work has been estimated at approximately 3 months. The bid documents should be ready during the first half of the coming year.

4. Contracting of goods and services

(a) Awards made, with contracts in execution

- 4.18 Dam construction. In March of 1982, two years after the date scheduled in the approved PEP which was a condition precedent to the first disbursement, the contract with the Spanish firm, Agroman, Empresa Constructora S.A., was signed (this contract is financed in part out of IDB resources). This contract covered construction of the dam, whose execution term is estimated at 6 years. The weighted advance at this time is 28%, on schedule with the execution plan of the contract. The work was contracted late because of the delay in preparing the construction designs. These were not ready when the original financing was approved (see paragraph 4.07 of Document PR-969). Supervision of works is the responsibility of the consortium consisting of TAMS and INTEGRAL.
- 4.19 The contract includes the execution of the following works:
- (a) discharge works, consisting of the following components, whose percentages of progress on expected total excavation are noted: (i) upriver gate (97%); (ii) downriver gate (97%); and (iii) tunnels

Nos. 1 and 2 (100%) and a 49% on concrete works. The temporary diversion of the river, carried out through tunnel No.2, was finished in late July, 1984. Since that time, the work on the dam foundation has been started;

- (b) stilling pools. At this time, 20% of the total work on the stilling pools of the tunnels has been done;
- (c) intake structure. The cement work comes to 20% of the total and reinforcement works placed, 38%;
- (d) diversion dam. Excavation on this work comes to 30% of the total;
- (e) main dam and auxiliary dam. The work done to date consists of machinery mobilization, execution of leveling and excavation for buttresses, excavation of spillway, foundation concrete for the gate structure and compacted fill for abutments and foundation.

4.20 Access road to dam site. This road was awarded to an Ecuadoran company, R y H Construcciones y Equipos. In October of 1983, CEDEGE decided to rescind this contract and transfer it to Agroman because progress on the works was falling behind schedule and the R y H company was in financial straits. At this time the road is finished to the sub-base level and the base and asphalt surfacing will be completed during the next dry season. The physical advance is now estimated at 80%.

4.21 Contractor work camp. This was included in the Agroman contract. To date, work associated with camps, offices, access roads and associated construction are completed. The national company, INARQ, started construction of the Operations Village in November of 1981. This village will provide lodging for supervisory and inspection personnel. This company has shown some deficiencies in its work and these, coupled with weather problems, have resulted in a physical advance to date of 90%. The current estimate is that this work will be finished in December of 1984.

(b) Competitive biddings in process

4.22 Irrigation and drainage system for 17,000 hectares. In March of this year, bid notices went out to 14 prequalified firms and consortiums from Ecuador and 10 other member countries of the IDB. The bids were opened in June of 1984 and as of the date of this document, the Bank was analyzing the award recommendation prepared by the CEDEGE awards committee. The contract includes the construction of: (i) supply and drainage canals; (ii) roads, dikes and special road structures; and (iii) civil works for the irrigation and drainage pumping plants. According to the bid documents, the contract will have an execution period not exceeding 40 months. A list of six firms for supervision of works has been prepared. These firms will be asked to submit bids. This contract, it is believed, can be signed by the end of this year.

(c) Pending competitive bids

- 4.23 Four competitive bids are still pending. Of these, two are for acquisition of equipment and the other two for execution of works. These will be conducted in accordance with procedures acceptable to the IDB, as set out in the competitive bidding regulations agreed in principle with the borrower (see Appendix IV-3). In the case of clearing the reservoir area, plans call for hiring one or two firms for this work.

In the case of land preparation, plans call for one company for each subproject. This means a total of five contracts. The following table gives the details and timetable for these biddings.

<u>Competitive bidding</u>	<u>Amount (US\$ thousands)</u>	<u>Estimated contracting date</u>	<u>Estimated completion date</u>
Clearing of reservoir	1,700	2nd half/85	1st half/87
Pumping equipment	10,200	2nd half/85	1st half/87
Maintenance and operation equipment	2,500	1st half/87	-
Land preparation	6,800	1st half/87	2nd half/88

5. Contracting of consulting services

- 4.24 The following consulting services planned for this project, in addition to those required for supervision and completion of designs, have been contracted and executed: (i) cooperation for organization of the executing unit; (ii) Board of Consultants (in execution); (iii) development of the agricultural development plan by ECLA/ILPES (ATN/SF-1810/EC); (iv) environmental impact study; (v) advisory assistance on preparing ex post evaluation methodology, executed by IICA; and (vi) in October of this year, a company was engaged for institutional strengthening of CEDEGE (clause 6.15). In addition to the foregoing, three other studies have been added to the new financing. One is for preparation of the construction designs of the irrigation and drainage system for the 33,000 hectares which would be covered in the third stage of the program, another is to complete the environmental plan 1/, a third is to design a multivariable dam simulation model, and a fourth, that would not be financed with project resources, corresponds to the mathematical model of joint operation of the dam, referred to in paragraph 4.15, section B.2, of this chapter. In all cases, the contracts would be let in accordance with procedures acceptable to the IDB (see Appendix IV-3).

1/ Details of these studies appear in Section D of this document.

- 4.25 The studies for preparing the designs for the 33,000 hectares will take 20 months. It is recommended that these studies be contracted no later than 6 months after the date of signature of the loan contract and that CEDEGE and its consultants show, in a way satisfactory to the IDB, no later than 5 months after the consulting services contract is signed, that the design criteria proposed represent the lowest possible cost solution consistent with the agricultural development objectives proposed and use of execution and operation technologies appropriate to Ecuador. The start of the final design stage would be subject to the approval of this report (see Recommendations). In view of the fact that CEDEGE is in an advanced stage of conversations with the Center for Hydrogeophysical Studies of Spain to conduct these studies under very favorable conditions, with an agency of renowned capacity and that would be able to initiate the studies within a short period of time, it is deemed adequate that, if a favorable agreement is reached for CEDEGE, the studies can be executed by that institution. The studies on the multivariable simulation model should also be conducted within the six months period after the date of signature of the contract (see Recommendations).

6. Lands, resettlement and land distribution

(a) Land flooded by the reservoir

- 4.26 The reservoir will cover an area of approximately 30,000 hectares. All of this loan has to be expropriated before the filling of the reservoir can start. The number of people who will be displaced is calculated at approximately 15,000. These persons will have to be compensated for their property and improvements. The number of productive units has been calculated at 1,400. These properties are engaged primarily in raising permanent crops such as coffee, cacao and other tree crops (6,000 hectares), cultivated grasses (11,000 hectares), short-cycle crops (1,600 hectares) and the rest in natural grass and secondary forests (11,000 hectares) (see details in Appendix IV-4).
- 4.27 One of the conditions precedent to the first disbursement of loan 610/SF-EC was that CEDEGE, in collaboration with IERAC, had to submit to the Bank for approval a resettlement plan for people displaced by the reservoir. The plan included: (a) a socioeconomic diagnosis of the population; (b) agricultural plots, housing and services proposed as solutions for the socioeconomic group; (c) communications and information programs about resettlement activities; and (d) execution timetables, including implementation of the plan between 1984 and 1986.
- 4.28 To start the expropriation, a ministerial decision, issued in February of 1982 to regulate Decree 70 of 1971, declared that the reservoir area was to be taken over and expropriated. 1/ To date, approximately 2,600

1/ Ministerial Decision 022, February 9, 1982.

hectares of land have been expropriated. This work is proceeding slowly and thus it has been considered necessary to strengthen this activity. In this connection, as mentioned in Section B.2 of this chapter, the Ministry of Agriculture decided to appoint a field official from IERAC to act as high level coordinator between IERAC and CEDEGE to speed up the legal paperwork necessary to meet the expected timetable (see Appendix IV-5, timetable for expropriations and clearing of reservoir area). This official was being selected by the two organizations at the time this document was being prepared.

- 4.29 Persons displaced by expropriation have the alternatives of receiving monetary compensation or an agricultural unit similar to the one expropriated from them. Either one will enable them to continue their economic activities. However, even though the farmers can be resettled on state lands in the Daule valley, most have preferred to relocate in areas around the dam. As called for in clause 6.18 of the loan contract 610/SF and 32/VF-EC, the borrower, through CEDEGE, will have to show by April of 1986 that it is in possession of all the land in the reservoir area and that it has completed relocating all displaced inhabitants (see Section E of the chapter). It is expected that when this new financing is approved, the period will be extended until mid-1987.

(b) Daule irrigation zone

- 4.30 The land tenure situation in the irrigation zone on the right bank of the Daule river is as shown below, according to 1983 data: 1/

<u>Strata of tenure</u>	<u>No. of holders</u>	<u>%</u>	<u>Area (ha)</u>	<u>%</u>
0 - 6 ha	1,889	(69.5)	5,942	(29.6)
6 - 10 ha	405	(14.9)	3,195	(15.9)
10 - 20 ha	312	(11.5)	3,869	(19.3)
20 - 50 ha	70	(2.6)	2,320	(11.6)
50 - 100 ha	30	(1.1)	2,100	(10.5)
100 to 200 ha	7	(0.2)	1,026	(5.1)
More than 200 ha	6	(0.2)	1,598	(8.0)
Totals:	<u>2,719</u>	<u>(100.0)</u>	<u>20,050 ^{2/}</u>	<u>(100.0)</u>
	=====	=====	=====	=====

- 4.31 As the foregoing table shows, the number of properties with more than 50 hectares is only 43. These occupy an area of 4,724 hectares (an average of 109.9), while holdings of fewer than 6 hectares total 1,889 and occupy an area of 5,942 hectares (an average of 3.1 hectares). This land tenure situation has been changing significantly over the years as

1/ Appendix II-4 shows in detail the structure of land tenure, including tenure forms, different groupings the irrigation subprojects.

2/ Represents 17,000 ha of irrigated land.

current laws in Ecuador concerning land distribution and awards have been applied, and large properties which could not be operated adequately have been subdivided.

- 4.32 To comply with contractual clause 6.16 (a) of loan 610/SF-EC and 32/VE-EC, CEDEGE submitted to the IDB for approval, in November of 1981, an agricultural settlement plan for the irrigation zone. According to this plan, farms that were not operated adequately would be affected, according to law. These farms would be subdivided among farmers who had less than 6 hectares. This plan would develop economic units that would allow full development of these rural families. 1/
- 4.33 Bearing in mind the advisability of preventing any activities that adversely affect present land tenure in the project area, stemming from construction of these works, it is recommended that the contract for the new financing include a clause calling upon the borrower to agree to take all necessary steps before the first loan disbursement is made to issue legal instruments which will prevent land transfers and establishment of encumbrances in the project area and enable IERAC to occupy in good time lands which will be distributed eventually (see proposed resolution). To supplement the foregoing, no later than 12 months after the date of signature of the eventual loan contract, the borrower would agree to submit through CEDEGE a final land distribution and settlement program for the project irrigation area. This program should include a detailed timetable of expropriations and awards of land in accordance with the plan submitted by CEDEGE in furtherance of clause 6.16 of loan contract 610/SF and 32/VF-EC (see Recommendations). In addition, the borrower would present every year, starting in the second year after signature of the loan contract, progress reports on execution of the land distribution plan, until completion of the fourth year after the contract is signed. At that time, the report would be a final report, recounting all activities carried out to implement completely the detailed plan of the aforementioned clause (see Recommendations). According to the present situation of clause 6.19 of loan contract 610/SF and 32/VF/EC, the borrower, through CEDEGE, should submit proof by April of 1985 that it has completed the land distribution plan for the irrigation area and carried out the provisional settlement plan for the cooperatives and beneficiaries (see Section E of this chapter). However, given the current schedule, it is expected that when the new financing has been approved this clause will be extended through 1988.

1/ Appendix IV-6 gives a financial analysis of farm income for a 6 hectare unit. This analysis shows that this size is the smallest economic unit capable of sustaining a rural family.

C. Agricultural Development ^{1/}

- 4.34 Efficient use of water and soil resources in the project area entails the planning and execution of an agricultural development program to supplement investments made in irrigation and drainage infrastructure and the actions in the area of land redistribution. The program includes a group of activities aimed at ensuring that farmers will receive benefits. It should be noted that this agricultural development component, which has been included in the agreements to which section B.2 of this chapter refers, is not part of the cost of the project, with the exception of technical assistance to farmers. In this case, the part for CEDEGE personnel who would participate in this activity is being included as a cost (see section B.1 of this chapter).
- 4.35 Specifically, the principal activities that the agricultural development component includes are the following: (a) technical assistance to farmers (to be executed by CEDEGE); (b) applied agricultural research (INIAP agreement); (c) agricultural credit (BNF agreement); and (d) marketing (ENAC and PNA agreements). More details on these can be found in section B.2 of this chapter, with the exception of the technical assistance, which is explained below.
- 4.36 The methodological approach to the technical assistance that is being granted to the project area is based on individual contacts between technicians and local community leaders. These leaders will also help to spread information about the most appropriate production technologies to help boost crop yields. Local farmers will be encouraged to participate in the learning-teaching process in an effort to stimulate a search for solutions to problems by the farmers themselves. The action of the technical assistance would be limited, then, to orienting and directing this process. This work will use audio visual techniques, pamphlets, radio messages and others to achieve best public information about these technologies. Special emphasis will be on the training of these rural people through cooperatives which will have to move toward self-management.
- 4.37 The aforementioned technical assistance scheme provided by CEDEGE would benefit small and medium producers and rural organizations exclusively. Large producers will have to secure their own technical assistance from private and professional organizations engaged in providing such services.

D. Environmental Impact

- 4.38 The impact this project will have on the local ecology has received special attention from CEDEGE and the government. As the loan contract

^{1/} Appendix IV-8 contains a description of crop patterns and agricultural production, including a timetable for incorporation of lands into production in the project zone.

clause on this matter calls for, a contract to study this question was signed. The recommendations of this contract submitted to CEDEGE in December of 1983 have been supplemented by an analysis and short and long-term plans prepared by CEDEGE in cooperation with TAMS-AHT-INTEGRAL.

- 4.39 As a result of the foregoing, and as pointed out in the preceding chapter, additional and more specific studies have been identified. These studies require the engagement of consulting services and the establishment of the group of national experts who together will carry out the studies. In this connection, it is recommended that the eventual loan contract include a clause to ensure timely availability of this national personnel. According to this clause, the borrower, through CEDEGE, would agree to take, no later than 6 months after the date of signature of the loan contract, the steps necessary to show that it has established a technical team to prepare the environmental studies for the project (see Recommendations).
- 4.40 The consultants required to conduct these studies will be selected in accordance with procedures acceptable to the IDB (see Appendix IV-2). The total time required for this purpose will be 30 months, although each individual study has a specific period: (i) water quality, 18 months; (ii) hydrobiological resources, 12 months; (iii) occupation plan for hydrographic system space, 15 months. Consequently, the timetable would be as follows:

	0	6	12	15	18	21	30
Water Quality	-----						
Study of farm chemical management in hydrobiological resources						-----	
Study of renewable natural resource management and spatial occupation plan	-----						

- 4.41 To help carry out this timetable, it is recommended that the eventual loan contract include a clause calling upon the borrower to agree to hire, through CEDEGE, the following: (i) within 6 months of the date of signature of the loan contract, the consultants to conduct the study of the project's impact and effects on water quality in the hydrographic system, and the consultants to conduct the studies on management and conservation of natural resources in the Daule-Peripa-Guayas hydrographic system; and (ii) within 18 months of the date of signature of the contract, the studies on the impact that farm chemicals will have on development of hydrobiological resources of this hydrographic system. These studies could be executed by the Fishery Institute given its extensive experience in the field (see Recommendations). It has been considered advisable to look into the possibility of hiring the Fishery Institute directly, owing to the experience and considerable knowledge that this organization has in this subject area. This could result in a saving of time and money and, at the same time, a higher quality study.

- 4.42 To ensure implementation of these recommendations, the borrower shall present, through CEDEGE, and no later than 6 months after the date of approval of the final report of each environmental plan study, a plan and timetable for this purpose, which shall be implemented once it has been approved by the Bank, and information shall be provided annually on the state of advance (see Recommendations).

E. Compliance with Contract Clauses

- 4.43 With the exception of the contract clause relating to presentation of audited financial statements (see Section B.5 of chapter V), the contract clauses established in these loans are current although, in some cases, they have required extensions of time for compliance.
- 4.44 The following current clauses of loans 610/SF and 32/VF-EC, corresponding to execution of the project and important for that purpose, must be complied with in the future:

<u>No.</u>	<u>Clause</u>	<u>Date</u>	
		<u>Original</u>	<u>Extended</u>
6.15	Hiring consultants for CEDEGE institutional strengthening.	4/82	10/84
6.17	Regulations, dam operations.	4/84	4/86 <u>1/</u>
6.18	Proof of possession, reservoir area and completed relocation of displaced inhabitants.	4/84	4/86
6.19	Proof of completion, irrigated lands plan and implementation of temporary settlement plan.	4/85 <u>1/</u>	

F. Period of Execution and Disbursement Timetable

- 4.45 The disbursement period is estimated at 4 years as from the date of signature of the contract. This time is based on the fact that the contract signed for construction of the dam, which to this time is proceeding normally and on schedule, has an execution period of 6 years as from the date of signature of the contract (March, 1982). Also, the contract for execution of the irrigation infrastructure, which will be awarded this year, has an execution term of 40 months. As a result, this part of the work should be finished by mid-1988.
- 4.46 The following is the timetable for projects disbursement, broken down by year and source of financing:

1/ Will be extended once the new financing has been approved.

	To <u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>Total</u>
Loan 58/IC	50.0	-	-	-	-	50.0
Loan 610/SF	22.0	28.2	19.8	-	-	70.0
Loan 32/VF	0.4	24.6	-	-	-	25.0
New IC Loan	-	19.2	54.7	74.8	26.3	175.0
Local contribution	<u>30.0</u>	<u>15.1</u>	<u>14.2</u>	<u>14.3</u>	<u>9.4</u>	<u>83.0</u>
Total	102.4	87.1	88.7	89.1	35.7	403.0
	=====	=====	=====	=====	=====	=====

G. Ex Post Evaluation

- 4.47 The borrower has been complying with the clauses set for this matter in the contracts of loans 610/SF and 32/VF, including the presentation of basic data. For this reason, the current clauses on this subject will be kept in effect: (i) during the loan contract, and every year thereafter for 3 years following the date of final disbursement of the financing, the borrower, through CEDEGE, shall submit to the IDB the annual comparative data to evaluate the results of project execution (see Recommendations); (ii) the borrower, through the CEDEGE, shall submit to the Bank, at the end of the third and sixth years after the final disbursement date, project evaluation reports based on the methodology and guidelines agreed with the IDB (see Recommendations).

H. External Audit

- 4.48 The financial statements of CEDEGE, for a period of 10 years, and those of the project, during its execution, shall be submitted to the IDB after being audited by the Office of the State Controller General. In the event this office cannot perform this work in accordance with requirements satisfactory to the IDB and within the stipulated terms, the executing agency or the borrower shall engage the services of certified public accountants who shall follow IDB rules and procedures for this area (see Recommendations).

I. IDB Supervision

- 4.49 The supervision of this project by the IDB shall be the responsibility of the Field Office in Ecuador.

V. THE BORROWER AND EXECUTING AGENCY

A. The Borrower

- 5.01 The borrower would be the Republic of Ecuador, which would provide, through its general budget or by internal financing, the local counterpart funds needed to complete the financing of the project, and would service the prospective loan in addition to the loans previously granted. ^{1/}

B. Executing Agency

- 5.02 The Executing Agency would be the Comisión de Estudios para el Desarrollo de la Cuenca del Rio Guayas (Commission on Studies for Development of the Guayas River Basin, or CEDEGE), which has been coordinating and supervising the execution of the projects, and is specifically responsible for: (i) the preparation of studies and designs, (ii) contracts and bids, (iii) the obtaining of financing, (iv) coordination with the public and private entities participating in the project, (v) the administration of resources, and (vi) relations with the agencies financing the project. For the performance of these functions in execution of the project, in September 1980 the CEDEGE added an executing unit to be directly responsible for these activities (this unit is described in Section B.1 of Chapter IV).

1. Background

- 5.03 The CEDEGE is a public agency with its own legal personality, net worth, and headquarters in the city of Guayaquil. Established by Supreme Decree No. 2672 of 2 December 1965, up to 1972 its institutional policy was to study the national resources of the Guayas river basin for the purpose of inventorying them and assessing their development potential, and to identify investment projects and evaluate their technical and financial feasibility. The studies for these purposes were made by foreign consulting firms in association with local consulting firms, and the agency's function consisting in overseeing, taking receipt of and accepting the studies contracted for.
- 5.04 In 1972 the Comisión decided to take over the preparation of the basic studies itself and to redirect them toward the identification of projects that would develop the existing resources for the benefit of broad population sectors. Under this strategy the institution launched the execution of the Babahoyo irrigation and drainage project, made excursions into experimental projects carried out immediately, and continued its pursuit of studies for "slow-ripening" works, without abstaining from action in emergency operations, particularly in response to floods.

^{1/} Pursuant to Decree No. 173 of 11 April 1980, the service on the debt (principal and interest) would be provided out of the public debt sector of the national general budget.

- 5.05 At present, under Decree No. 3797 of 12 August 1979, it is engaged in the construction of the Daule-Peripa multipurpose project and in the studies for construction of the Peninsula project.
- 5.06 Pursuant to Supreme Decree No. 2672 and its amendments, the functions and powers of the CEDEGE are:
- (a) To establish special committees as necessary to make the studies and preparations for the program for development of the Guayas river basin;
 - (b) To study and approve programs for studies in that basin;
 - (c) To coordinate, through special committees, the work of the different entities that must participate in the studies and in preparation of the Guayas basin development project;
 - (d) To prepare, in conjunction with the National Development Council, the program for development of the Guayas basin on the basis of the results of the studies performed by itself;
 - (e) To supervise the conduct of the research and studies performed in the basin;
 - (f) To study and approve revisions of the annual budget for studies on the basin;
 - (g) To contract for performance of the scheduled studies;
 - (h) To negotiate and enter into contracts for domestic and foreign loans to finance the studies and carry out the works it has scheduled;
 - (i) To encourage the interest and participation of public and private entities functioning in the area and of the citizenry at large in the integral development of the Guayas river basin;
 - (j) To present an annual report on its operations to the executive branch for consideration;
 - (k) To issue its own internal regulations, and
 - (l) To enter into all acts and contracts that may be needed for the execution and development of the scheduled works, including those for purchases and sales, leases, and participation by enterprises and cooperatives.
- 5.07 In keeping with the policies of the national development plan put into effect in 1980, and in consideration of the progress made up to 1983 in performance of the studies and execution of the different programs and projects entrusted to the Comision, the institutional operations scheduled for 1984 and thereafter are as follows, in order of priority:

- (a) Continued execution of stage I of the Daule-Peripa multipurpose project and preparation of the designs for purposes of the bidding procedures in connection with the hydroelectric power station.
- (b) Completion of the execution of the Babahoyo irrigation project, particularly in regard to the preparation and bringing into production of the land served by the principal irrigation and drainage system, including the entry into operation of the rice processing mill and other works carried out under the project;
- (c) Continued preparation of the Guayas regional development plan, with articulation of the specific projects and programs in execution in the regional context and with the country's development policies;
- (d) Continuation of the studies for the diversion of water from the Daule river to Santa Elena peninsula for the irrigation and agricultural development of 50,000 hectares.

2. Organizational structure of the CEDEGE

- 5.08 The present organization is illustrated in the functional organizational chart of Appendix V-1, which reflects the actual operation of the present administration and includes the changes that have been in progress in its organic structure since the preparation of loan document PR-969.
- 5.09 At the apex of the organization is a board of directors, which functions as the governing body of the CEDEGE. It has the following members: (a) a representative of the President of the Republic, who is the chairman; (b) a representative of the National Development Council (CONADE); (c) one representative each for the Ministries of Public Works, Agriculture, National and Energy Resources, and Finance and Public Credit; (d) one representative each for the Guayas and Los Rios Provincial Councils; (e) one for the Sociedad de Ingenieros y Arquitectos del Litoral (Society of Seaboard Engineers and Architects, or SIAL), and (f) one from the INERHI. The main function of the board of directors is to establish the institution's policies and approve or amend the general plans and programs of action presented for its consideration by the administration of the CEDEGE through the executive director. The board of directors has set up committees to analyze the different aspects of the organization and of the projects in execution; these committees are (i) budget and finance, (ii) technical advisory services, (iii) development, and (iv) Bidding Procedures. The members of these committees are members of the board of directors.
- 5.10 The administration of the CEDEGE consists of the senior direction and its advisory bodies, consisting of a Director and an assistant director, with different advisory units to provide technical and administrative support. The Unit on Organization and Systems was established in 1984 to develop and oversee institutional procedures.

- 5.11 At the support level are the administrative and financial departments, the first being responsible for personnel and general services, and the second for the preparation of budgets, budget utilization, accounting and disbursements.
- 5.12 The operational level consist of the following executing units: (i) the Daule-Peripa Project, (ii) the Project for Diversion of Water to Santa Elena Peninsula, and (iii) formulation of the regional development plan.
- 5.13 In addition to these three executing units, the CEDEGE has a Technical Direction in charge with completing the construction of the Babahoyo Irrigation Drainage and Flood Control Project, and also with preparing the studies for the lower basin. The Babahoyo Irrigation and Drainage Commission was created in January 1982 to operate and administer Babahoyo areas A and B.
- 5.14 This structure was set up in 1981 subsequent to the approval of loans 610/SF-EC, 32/VF-EC, and 58/IC-EC. The purpose of the restructuring was to correct the overconcentration of responsibilities in the technical direction, which then included, in addition to the technical part, research (designs, feasibility studies, etc.), and the execution and operation of projects. The new orientation is for the technical direction to focus on research, and project execution has been therefore taken out. The executing units, to which these responsibilities have been transferred, are now attached directly to the Executive Direction, which makes for greater administrative and technical autonomy in the execution of projects.
- 5.15 The present manual of organization was drawn up in 1983 by the consulting firm of PEAT-MARWICK - Mitchell & Co., and is the basis for much of the present organization. However, the CEDEGE has not yet formalized the present organization for there are not yet any functional organic regulations, which in the Ecuadorian public sector govern the internal structure of organizations.

3. Present and future reorganization studies

- 5.16 Clause 6.15 of loan contract 610/SF-EC required the CEDEGE to present to the Bank within two years from the signing of the loan contract, evidence of having hired consulting services to advise in the reorganization of its technical, administrative and financial departments. This term expired on 15 April 1982 and was extended to the present year because of a two-year delay in contracting for the dam works. The contract was signed in October this year with the firm Consorcio Marshall y Asoc./OSG - CONSUPLAN.
- 5.17 This technical assistance covers the phases of diagnosis, design, implementation, and verification of results in the areas of (i) general organization, (ii) system of rates and for the operation and maintenance

of districts, and (iii) a computerized information system. This technical cooperation will reinforce those central aspects of the operation of both the Daule-Peripa and the Babahoyo project.

4. Financial and accounting administration

- 5.18 The financial administration of the CEDEGE is exercised by the financial department. Subject to the current provisions of the manual of government accounting and the organic law on financial administration and Control, the CEDEGE has designed and implemented a new plan of accounts for the net worth and budgetary accounting, which has been approved by the Dirección de Normas y Consolidación Financiera in the Office of the Comptroller General of the Republic.
- 5.19 The financial services of each executing unit produce financial statements on the projects in execution; these services are administratively subordinate to the management of each executing unit and functionally subordinate to the financial direction. They control the financial activity in each loan and, in particular, prepare justifications for advances of funds received, the certification of local contributions, and the service on the domestic and foreign debt, and perform related tasks.
- 5.20 The financial department is headed by a financial director, who is answerable to the executive director and charge with supervising the chiefs of the sections of accounting, programming and budget, treasury, computer services, and the financial sections of the executing units. Its basic functions are (i) to organize, direct, coordinate and monitor all the entity's financial operations, (ii) to oversee the implementation of specific internal control procedures, and insure that the budgeting, financial resource determination and collection, treasury, accounting and data processing systems function properly and on schedule, and (iii) to oversee the functioning of the internal financial controls and take corrective measures for improving the systems of financial administration.
- 5.21 The financial department compiles, consolidates and issues managerial information on the entity's financial administration for use at the directorial level, for the monitoring agencies, and for the government agencies charged with the consolidation of accounting, financial and budgetary operations, the physical advance of works, and the attainment of goals.
- 5.22 The accounting-financial administration area in the CEDEGE revealed very important shortcomings in the period 1980-1982, which contributed to an excessive delay in the presentation of the financial statements of the institution and the projects for which it is responsible; the Office of the Comptroller General certified those statements, with reservations. Starting in 1983, the accounting has been improved by partial mechanization with a mini-computer that speeds up the recording of

accounting transactions and, moreover, in June 1984 contracts were signed for the acquisition of larger-capacity computer equipment that will be able to handle the whole system.

- 5.23 The CEDEGE has an internal auditing office whose operations are governed by the law on financial administration and Control. The internal auditor and his assistants are designated by the Office of the Comptroller General of the Republic, to which they are functionally subordinate although they are employed in and their salaries are paid by the public agency in which they work.
- 5.24 The internal auditing unit formulates its plan of work every year and submits it to the Office of the comptroller general in the last quarter of the year prior to the year covered by the plan; however, the document mentioned requires additional information not provided in the plan of work in which, on occasion, some points are insufficiently analyzed or reviewed for lack of personnel.

5. External auditing

- 5.25 Loan contracts 610/SF, 32/VF and 58/IC-EC have required the presentation of financial statements both for the CEDEGE and for the project, certified by a firm of independent auditors. However, because of provisions in the organic law on financial administration and control assigning to the Comptroller General the decision on whether the work is to be done by auditors of the Office of the Comptroller General or by independent professionals, this clause has been very difficult to comply with because it has to be dealt with anew every year. This is why the last financial statements audited by an independent firm are those of fiscal 1979. The reason for this has been that the hiring of external auditing services by independent public accountants was repeatedly objected to by the Office of the Comptroller General of the Republic. Because of this situation, the Bank exempted the CEDEGE from the obligation that the financial statements for 1980 and 1981 be certified by the Office of the Comptroller General. In regard to the statements for fiscal 1982, which have already been presented audited by this agency, it has been decided and approved that they be reviewed and certified by independent public accountants and that those of 1983 be certified by independent firms. The firm that will do this work was hired in October of this year.

6. Human resources

- 5.26 The following table summarizes the numbers of staff in the personnel categories of the agency in 1983 and 1984:

Summary of the agency's personnel

<u>Category</u>	<u>1983</u>	<u>No. of Civil Servants</u>		<u>%</u>
		<u>%</u>	<u>1984</u>	
1. Directorial	18	4	13	3
2. Professional	140	30	153	29
3. Technical	50	10	52	10
4. Administrative	90	18	101	19
5. Services	55	11	69	13
Total employees	353	73	388	74
Workers	135	27	135	26
Total employees and workers	488	100	523	100

5.27 The year 1984 saw an 8.6% increase in the personnel of the institution, particularly in the administrative and general services areas. However, expenditures for wages and benefits declined in constant US dollars because the wage increases did not keep pace with the devaluation of the sucre relative to the US dollar. Of the total professional staff, 132 persons (86%) are classed in the administrative career category regulated by the Dirección Nacional de Personal, which evaluates them constantly as to their competence and professional ethics, and safeguards the permanence of their employment status.

5.28 The professional staff are mostly civil engineers, agronomist and administrators, who have built up a most extensive experience in project execution. The financial direction has a staff of 36, or 9.16% of the total personnel strength, and of which 52% are hold professional degrees or are university students. The internal auditing office now has 6 posts (1 chief auditor, 5 auditors, and 1 administrative assistant), of which one auditor 2 post is vacant since January 1984 and is expected to be filled shortly. This situation is an improvement over the one depicted in the report of Project PR-969, which noted the absence of any internal auditing function at that time, when an internal auditor had only just been appointed.

7. Financial analysis of the CEDEGE

5.29 Following is a financial analysis of the executing agency, the CEDEGE, presenting the historical background of the financial situation and the results of the institutional's operations. The general balance sheets and the statements of income and expenditure to 31 December in each of the years considered were certified by the Office of the Comptroller

General up to 1982. 1/ The financial statements considered in this report have been prepared in keeping with generally accepted auditing practices, and the policies and technical standards established by the Office of the Comptroller General of the Republic. Although the certifications of the Office of the Comptroller General express minor reservations, the financial statements reasonably represent the financial situation of the agency and of the projects under its responsibility.

(a) Statements of financial condition

5.30 A table depicting the financial situation of the CEDEGE is given in Appendix V-2. The CEDEGE's net worth consists of (i) appropriations on the government budget, (ii) allocations of regional institutions, (iii) domestic and foreign loans, and (iv) income from the operation of works, rates and other services rendered. In pursuit of its institutional purposes, the CEDEGE has been developing major infrastructural works, chief among them the partially completed Babahoyo project and the first stage of the Daule-Peripa project, under construction. The two projects have substantially increased the institution's net worth and assets.

5.31 The following table summarizes the CEDEGE's financial situation in the years 1982 and 1983:

(In US\$ thousands)					
	<u>1983</u>	<u>%</u>	<u>1982</u>	<u>%</u>	<u>Change (%)</u>
<u>Assets</u>					
Current	23,706	20	29,493	29	(20)
Net Fixed	80,476	71	70,877	70	14
Others	<u>9,946</u>	<u>9</u>	<u>381</u>	<u>1</u>	<u>2,500</u>
Total	114,128	100	100,751	100	13
	=====	===	=====	===	=====
<u>Liabilities and Net Worth</u>					
Short-term liabilities	3,213	3	5,862	6	(45)
Long-term liabilities	21,260	18	31,256	31	(32)
Net Worth	<u>89,655</u>	<u>79</u>	<u>63,633</u>	<u>63</u>	<u>41</u>
Total	114,128	100	100,751	100	13
	=====	===	=====	===	=====

1/ The financial statements for fiscal 1983 have not been audited.

- 5.32 The institution's most important asset is its fixed assets, which account for 71% of the total and consist of the movable goods, vehicles, machinery and equipment, buildings, and structures in construction. These structures represent 97% of the total fixed assets and include the construction of canals, irrigation systems, roads, pumping stations, installations for the Babahoyo rice processing mill and, chiefly, construction of the Daule-Peripa project. Depreciation accounts for barely 3% of the original investment because a large proportion of the fixed investments has not yet gone into operation.
- 5.33 The current assets are chiefly the cash, banks and revolving fund accounts (23%); accounts receivable from the private and public sector (4%), inventory in transit (14%), and short-term contractual advances (56%). The latter consist chiefly of advances to the firm constructing the dam of the Daule-Peripa project. With short-term liabilities of US\$3,213,000, the CEDEGE has a current ratio of 7.38, which enables it to meet short-term obligations comfortably.
- 5.34 Other assets are the debts owed by the cooperatives established in the area of the Babahoyo irrigation and drainage project representing the cost of the infrastructure and on-farm irrigation installations, for which the different contractors were paid by the institution. An acceleration of this activity in 1983 caused the amount of this item to increase about 25 times above the figure for 1982. These investments will begin to be recovered when the grace period (4 years) has elapsed, and the CEDEGE must enter into agreements with the BNF so that the beneficiaries may obtain foreign loans to amortize these debts.
- 5.35 The long-term liabilities come to the equivalent of US\$21.3 million, or 19% of the agency's capital; it consists of the loans acquired to finance the different studies and infrastructure projects that have occupied the CEDEGE in recent years. It must be noted that, in keeping with the accounting policy of the Ecuadorian public sector, although these obligations are shown on the balance sheet as CEDEGE liabilities, the service of this debt devolves in practice on the government, which carries it in the form of budgetary contributions.
- 5.36 These liabilities - which, it bears repeating, are not obligations for the CEDEGE - are represented by obligations in foreign exchange and local currency; the foreign exchange liabilities have not been readjusted to the exchange rate in effect on the dates of the balance sheets, but are rather enter on the accounts at the times they are incurred so that, on the whole, the amounts of the balance sheets do not convey real values, which are represented by the loans presented in Appendix V-3. Loans 610/SF, 58/IC and 32/VF for the Daule-Peripa project are not entered on the accounts under these liabilities.
- 5.37 The agency's net worth consists of the carry-forwards from preceding business years and the annual surpluses of the contributions on the national budget and in acquired loans; in 1983 it increased 41% to a

total of US\$89.7 million, or 81% of the capitalization, which attests to the financial solidity of the CEDEGE.

(b) Statements of income and expenditures

- 5.38 The following table presents a comparative statement of income and expenditure of the CEDEGE for the period from 1980 to 1983.

CEDEGE - COMPARATIVE STATEMENTS OF INCOME AND EXPENDITURE
(In US\$ thousands)

<u>Income</u>	<u>1983</u>	<u>%</u>	<u>1982</u>	<u>%</u>	<u>1981</u>	<u>%</u>	<u>1980</u>
Approved national government contributions	15,890	36.9	14,441	32.4	11,512	59.6	3,608
External Financing	24,853	57.7	25,021	56.1	6,426	33.3	4,455
Others	<u>2,326</u>	<u>5.4</u>	<u>5,174</u>	<u>11.5</u>	<u>1,378</u>	<u>7.1</u>	<u>7,582</u>
TOTAL INCOME	43,069	100.0	44,636	100.0	19,316	100.0	15,645
EXPENDITURES							
1) <u>COMMON OPERATIONS</u> (Senior Direction and Advisory Bodies, Technical Direction Financial ADM)	907	3.0	1,035	2.5	1,238	7.7	1,405
2) <u>PROJECT STUDIES</u>	1,261	4.1	2,143	5.1	1,944	12.0	3,163
3) <u>PROJECT EXECUTION</u>	<u>28,766</u>	<u>92.9</u>	<u>38,450</u>	<u>92.4</u>	<u>12,948</u>	<u>80.3</u>	<u>10,403</u>
-Bab. Irr. Proj Administration (Commission on Irrigation, Mechanization)	1,059	3.4	1,036	2.9	1,329	8.2	1,388
-B.I.P. Construction (Rice processing mill)	1,492	4.8	2,475	6.0	2,756	17.1	8,422
-Jaime Roldos Aguilera Project	23,552	76.1	32,764	78.5	6,547	40.6	592
-Peninsula Project	2,663	8.6	2,074	5.0	2,316	14.4	-
4) <u>TOTAL EXPENDITURES</u> <u>(4)=(1)+(2)+(3)</u>	<u>30,934</u>	<u>100.0</u>	<u>41,628</u>	<u>100.0</u>	<u>16,130</u>	<u>100.0</u>	<u>14,970</u>
<u>NET INCOME</u>	<u>12,135</u> =====		<u>3,008</u> =====		<u>3,186</u> =====		<u>675</u> =====

- 5.39 The institution's income rose rapidly over the period considered from the equivalent of US\$15.6 million in 1980 to that of US\$43.1 million in 1983 for an increase of 175%, generated mostly by the progress of the works for the Daule-Peripa project. The composition of the income has also changed in respect of the proportions of the different sources of financing. Thus, in 1980 national government contributions provided 23% of the income, external financing 28.5%, and other income 48.4%, the latter item consisting of services rendered, grants, and contributions from other regional agencies. In 1983, the national government contributions stood at 32.4%, external financing at 56.1%, and other income at a mere 11.5%.
- 5.40 Expenditures also have increased substantially mainly because of the progress of project works. However, administrative expenditures held relatively steady at above US\$1.4 million in 1980, from which they dropped in 1983 to US\$0.9 million owing more than anything else to exchange-rate differences.
- 5.41 Project studies and execution are the activities that have claimed the largest proportion of the institution's expenditures:
- (a) Project studies. Activities for project studies have been diminishing as a proportion of expenditures, declining from 21.1% of them, with the equivalent of US\$3.2 million, in 1980 to 5.1% with the equivalent of US\$1.3 million in 1983, owing to completion of the studies for the Daule-Peripa project and the predesign of the Peninsula project.
 - (b) Project execution.
 - (i) Administration of the Babahoyo irrigation project. Expenditures for the administration of this project remained constant throughout the years considered (at US\$1.0 million), and covered the costs of operating and maintaining that project and the provision of mechanization services and on-farm land preparation. These expenditures were financed through by appropriations on the budget of the central government, for rate collections and payments for services rendered, including amortization of the debt, barely covered 18% of them. Under agreements with the IERAC and the National Development Bank, the CEDEGE is trying to recover the investments in permanent improvements by adding them to the price charged by the IERAC for land, and the rates for operation and maintenance through working-capital loans, granted by the BNF.
 - (ii) Construction of the Babahoyo irrigation project. The expenditures incurred for construction of this project during 1980 came to US\$8.4 million, which fell to US\$1.5 million in 1983 as construction of the rice processing mill was completed. The CEDEGE will have to continue investing funds of its own to bring the rest of the hectares into production and for on-farm works in the project area.

- (c) Daule-Peripa project. This is the CEDEGE's most ambitious project, and in 1983 and 1982 absorbed 76.1% and 78.5%, respectively, of the total budget. Expenditures have risen 38 times from the level of 1980, when physical execution of the project had not yet begun.
- (d) Peninsula project. In 1981 the CEDEGE began making investments in the project for the deviation of water from the Daule river to the Santa Elena peninsula. These investments come to US\$7.1 million, financed with funds from the Banco Exterior de España and local resources; the investment has absorbed between 14.4% and 5% of the institution's total expenditures.

In all the years considered the statement of income and expenditure shows a surplus on capital and current expenditure account, which ranged between US\$675,000 in 1980 and US\$12,135,000 in 1983, chiefly because of the lag between expenditures incurred and disbursements under projects in execution. These surpluses are used in the following year to finance operations and to augment the institution's limited net worth.

8. Budget utilization and the 1984 budget 1/

- 5.42 The CEDEGE's share in the National General Budget has ranged between a high of 1.82% in 1980 and a low of 1.74% in 1982. Its share of the budget for the agricultural sector ranged between 6.71% and 20.84% in 1980 and 1982, respectively.
- 5.43 Budget utilization has been slow, ranging between 22.7% in 1980 and 59.8% in 1983. This low budget utilization was due mainly to delays in starting the execution of the project, which has kept expenditures low relative to those budgeted at the beginning of each year.
- 5.44 The budget approved for 1984 comes to the equivalent of US\$58.8 million, for an increase of US\$14.1 million, or 32%, above the 1983 budget. The budget for current expenditures is US\$3.8 million and the one for capital expenditures US\$55.0 million.
- 5.45 The current expenditure budget is divided into expenditures for central administration (28%), project studies (15%), and project execution (56%). The latter item corresponds to the current expenditures of the executing units of the different projects in progress.
- 5.46 Project studies account for 2% of the CEDEGE's total budget, and are represented by basic studies, a study of hydrology and water resources for the lower-basin project, and the regional project for the Guayas river basin and the Santa Elena peninsula.

1/ See Appendix V-4.

- 5.47 Project execution is the most important item in the CEDEGE's budget, totalling US\$56.5 million, or 96% of the total budget, in 1984. According to the capital budget for this year, the distribution of the budgetary funds for project execution is as follows:

Budgetary Allocations for Project Execution in 1984

<u>Project</u>	<u>(In US\$ thousands)</u>	<u>%</u>
ADM: Babahoyo Proj.	925	1,6
Constr. Babahoyo Proj	4.166	7,4
Daule Peripa	49.372	87,4
Santa Elena Peninsula	<u>2.037</u>	<u>3,6</u>
	56.500	100.0
	=====	=====

- 5.48 This table brings out the importance of the Daule-Peripa project, which accounts for 87.4% of the total CEDEGE budget for 1984. The Babahoyo irrigation project is continued with an allocation of US\$4.2 million for the activities of land preparation and bringing into production of the remaining 2,000 hectares, and the Santa Elena peninsula project with 3.6% of the budget.

- 5.49 The budgetary income for the financing of current and capital expenditures in 1984 are as follows:

CEDEGE Income - 1984

<u>Current</u>	<u>(US\$ thousands)</u>	<u>%</u>
Transfer from National General Budget	2,160	91.9
Income from Services and Rates	190	8.1
	<u>2,350</u>	<u>100.0</u>
	=====	=====

Capital

Transfers from National General Budget	4,313	7.6
Foreign Public Credit	40,009	70.9
Domestic Public Credit	<u>12,171</u>	<u>21.5</u>
	<u>56,493</u>	<u>100.0</u>
	=====	=====

<u>Total Income</u>	<u>58,843</u>	<u>=====</u>
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- 5.50 Transfers from the national general budget finance 91.9% of the institution's current expenditures, against only 8.1% from the institution's own income. External financing covers 70.9% of the agency's capital budget, chiefly in loans for execution of the Daule-Peripa project and the financing from the Banco Exterior de España for the Santa Elena Peninsula project; domestic public credit covers 21.5% of the budgetary income for this purpose, and is supplied chiefly by FONAPRE and the BEDE for the financing of studies in the former case and, in the latter case, for the local counterpart to the loan for Daule-Peripa. It may be noted that in June of this year the BEDE approved a loan of S/1,500 million to finance the local counterpart contribution to the Daule-Peripa project in 1984 and 1985. Direct transfers under the National General Budget for capital expenditures provide only 7.6%, the equivalent of US\$4.3 million.

VI. JUSTIFICATION OF THE PROJECT

A. Technical Feasibility

- 6.01 The revision of the analysis of this project included a review of the availability of water in the Daule-Peripa reservoir to meet the needs that would be generated by the different stages of the overall development program as follows: irrigation of 50,000 ha in the Daule valley, irrigation of 50,000 ha on Santa Elena peninsula, generation of 400 to 500 Gwh, deviation of water to Manabi province and the Vinces river basin, the supply of drinking water to Guayaquil, control of tidal seawater intrusion at the offtake site, and dilution of discharges to lower the concentration of agrochemicals in used irrigation water.
- 6.02 The results of simulations based on a revised model corroborates the availability of water for the first three stages (irrigation of 17,000 ha, the hydroelectric power station, supply to Guayaquil and seawater control, and irrigation of 33,000 ha).
- 6.03 On the score of water quality, the flows generated at the reservoir would assure favorable effects through regulation of the river for the control of salinity and the dilution of waste water discharged into the river in Guayaquil and other towns.
- 6.04 Thus, in relation to agrochemical pollution, the regulation of river flow that would be provided by the project could have the following effects: (i) a reduction of present pollution and of that to be brought about by the project through irrigation, which would result in improvement of the quality of the water; (ii) keeping pollution at its present level for, although the absolute quantity of pesticides is rising, dilution volumes would also be generated which would offset their effects; (iii) in extreme cases, if the resulting pollution exceeded permissible limits, the project would be able to provide the additional diluting volumes needed to keep the water of a quality from which it could be made drinkable by conventional methods.
- 6.05 In addition, since the project favors organized agricultural operations, it would facilitate the introduction of measures for the control and management of agrochemicals through the enactment of legal technical provisions limiting their use.
- 6.06 To determine the corrective and preventive measures needed for the optimal management of financial resources in the project area and to guarantee the quality of the water for multiple uses, and particularly for drinking purposes, financing is included for the performance of feasibility studies for the environmental plan, including research and specific studies of water quality and renewable natural resources.

- 6.07 Since the entire simulation model is bivariate, it has been considered advisable to work out a multivariate model also to generate stochastic series on rainfall and demand correlated with discharge volumes. This new model can be used to optimize management of the reservoir.
- 6.08 The contractor entrusted with execution of the dam works has given proof of high capacity in the conduct of his operations. While the contract was begun two years behind schedule owing to difficulties stemming from delays in the bidding process and in adjudication of the works, execution has drawn abreast of the established timetable, the diversion of the river - one of the principal works - having already been completed. The present stage of advance warrants the anticipation that the the time provided for execution under this contract will prove adequate.
- 6.09 The firm charge with supervising these works is functioning properly; given effective support to the executing unit, with which it maintains smooth relations.
- 6.10 The contract for construction of the irrigation and drainage works is nearing adjudication. The firms selected for invitation to present proposals met with no objections on the Bank's part, and are experienced firms and consortia. It is important that appropriate steps be taken to ensure that the timetable is adhered to, for the term of 40 months established in the bidding documents for execution of the works could prove tight, depending on weather conditions during that period.
- 6.11 Contractors to supervise these irrigation and drainage works are in process of selection for hiring. The Bank did not object to the list of firms invited to present proposals, and the term for those presentations expires at the end of November of this year.
- 6.12 The terms of reference for the additional studies incorporated into this new financing were thoroughly studied, and are regarded as consistent with the purposes for which those studies would be done in regard both to designs for the 33,000 ha and to the environmental plan and the study for design of the multivariate model of the reservoir.
- 6.13 The cost estimates were reviewed in detail in the light both of the statements of expenditures already presented by the contractors for determination of the portion already executed, and of the estimates for the portion still to be executed.
- 6.14 In keeping with what has been said above the state of advancement of the contract for the dam and about the contract for construction of the irrigation and drainage system, it is considered that the time allowed for completion of the project - four years from the date of signature of the contract for this new financing - is sufficient for the purpose. Moreover the measures taken in regard to aspects of the management and operation of the hydroelectric power station and the state of

advancement of the designs for it justify the expectation that construction of this power station (Stage II of the Program) can be begun early enough to enable it to go on-stream at the time when it will be required. Similar measures are being taken in connection with the studies for construction of the system for the irrigation and drainage of the 33,000 ha on the right bank, which constitutes Stage III of the program.

B. Institutional and Financial Feasibility

1. Institutional feasibility

- 6.15 Since its establishment, the CEDEGE has been carrying out infrastructure projects in its area of influence, particularly the Babahoyo project, partly financed by the IDB through loan 377/SF-EC, and has been supervising the studies for and execution of the Daule-Peripa project. During this time the institution has built up a significant fund of technical and administrative experience that has enabled it to carry out large-scale projects relatively successfully.
- 6.16 In addition to physical execution of the works, complementary measures are required to support production in the project area so that economic benefits will be maximized. To this end, the CEDEGE has signed agreements with public institutions that are helping to strengthen the technical assistance, campesino organization, research, marketing, and other services. Work under these agreements has been progressing normally in keeping with the advancement and requirements of the project.
- 6.17 The CEDEGE shows certain administrative deficiencies, particularly in the accounting and finance area and in operation of the Babahoyo project, particularly in regard to the setting and collection of rates. A consulting firm was recently hired to strengthen the Comision in this area.

2. Financial feasibility

(a) Local contribution

- 6.18 It is estimated that the local counterpart funds that will have been disbursed by the end of 1984 will come to US\$30 million, which, added to the S/1,500 million (equivalent to US\$24 million) of the internal loan granted in 1984 by BEDE, of which US\$5 million has been disbursed and included in the \$30 million mentioned previously, brings the additional local counterpart requirements to US\$34 million.
- 6.19 Without a new financing, the local counterpart resources for this project amount into 51%, 40% and 54% of the local-contribution commitments for 1984, 1985 and 1986, respectively.

- 6.20 Approval of the present financing will considerably reduce the requirement for local counterpart funds, which will have the following effect on the investment budgets of central government and the agricultural sector.

Capital Budget	Investment Budget 1983 ^{1/}	(in US\$ millions) Local contribution to the project			
		1985	1986	1987	1988
Government Total	355.17	16.5	14.2	14.3	9.4
Agricultural Sector Total	46.17	4%	4%	3%	0.4%
		33%	31%	31%	2%

- 6.21 As can be seen in the above table, the most significant budgetary impact is felt in 1985 and 1986, the years in which the largest investments are concentrated. Also, the funding requirements for the project are significant under the budget of the agricultural sector and, to a smaller extent, in the government's investment budget.
- 6.22 In the years 1980-1984 the government has contributed the equivalent of US\$41,94 million to the project. In addition, the BEDE financing assures the resources for the rest of 1984 and for 1985. For subsequent years the government will provide the needed funds through its budget or through internal financing. Since the government has clearly stated the priority it attaches to this project because of its importance for the development of the area in particular and of the country's agricultural sector in general, no problem is expected to be encountered in receiving these funds on schedule.

(b) Financial projections of the CEDEGE

- 6.23 In order to determine the financial impact of the investment and the expenditures for operation and maintenance of the project both in the first stage and in subsequent stages, and the income from irrigation rates and sales of the electric energy to be generated, the financial projections shown in Appendix VI-1 were calculated on the following basic parameters.
- (1) The investments of the first phase total US\$403.0 millions, of which external financing should account for US\$320 million, including the two preceding loans plus the prospective new loan. The conditions of the external financing for the project, weighting those of all four loans, are interest at 8.38% and a term of 25.5 years.

^{1/} Latest figure available on budgetary utilization in 1983, used for comparison with the local contributions to the project.

- (2) The investments envisaged for stages II and III are those estimated in the economic analysis. The financing scheme assumes that 75% of the financing will be external and 25% local. According to the investment timetable, stage III, for construction of the irrigation system for 33,000 ha, would be carried out between 1987 and 1991 at a total of US\$159.5 million, including contingencies, escalation and finance charges. The investments in the hydroelectric power station, corresponding to stage II, would begin in 1986 and be completed in 1992 at a total investment of US\$160.4 million, also including contingencies, escalation and finance charges. These calculations assume interest at 13% and a 25-year amortization period.
- (3) The operating and maintenance costs for each component have been estimated for the period considered, including future investments for replacement of equipment and machinery (see Appendix VI-12).
- (4) Because of the financial structure of the CEDEGE, annual operating deficits, including the service on the debt of the loans, would be absorbed by means of appropriations on the budget of the central government.
- (5) The rates for the irrigation systems have been calculated on two basic alternatives: (a) that they cover operating and maintenance costs in keeping with the provisions of loan contracts 610/SF and 32/VF, and (b) that they cover the operation and maintenance costs plus amortization of the investment. The latter alternative was calculated assuming amortization in 40 years as the average service life of the investments, and in 75 years, which is the period used by the INERHI in other irrigation districts in the country in compliance with the provisions of the water law.
- (6) The income generated by the hydroelectric power station was calculated using a constant figure of US\$24.54 million a year starting in 1993 as the highest amount that INECCEL could be prepared to pay for the energy produced by the power station estimated as the alternative cost of meeting demand with an expansion plan excluding Daule-Peripa.

(c) Results of projections

(i) Rates covering operating and maintenance costs

- 6.24 On a basic assumption of rates that generate the recovery only of operating and maintenance costs for the areas under irrigation, the following rates per ha/year have been calculated for the years in which the 50,000 hectares brought under irrigation are in full production.

<u>Project</u>	<u>Rate US\$ ha/year 1/</u>	<u>Total Income (in US\$ thousands)</u>
17,000 ha	111.76	1,900
33,000 ha	98.76	3,260
Average irrigation rate	105.28	
	=====	
Weighted	103.20	

- 6.25 These rates were calculated on the base of projections of costs for the operation, maintenance and administration of each irrigation project, and were found to offer a relatively significant economy of scale per ha given the distribution of the associated fixed costs. These rates per ha/year are relatively high compared to those of a gravity irrigation system, because of the high energy consumption required for the operation of pumps. At present, an expense of US\$100 ha/year is being incurred for inefficient irrigation, and the project would contribute to raise agricultural productivity 44% by providing water for two crops, which leads to the conclusion that the beneficiaries of the project could afford the rate for operation and maintenance.
- 6.26 Under this rate scheme, the project, on reaching full development, will earn an average income of US\$5.3 million a year, which, added to the income from sales of electric energy (US\$24.5 million), would provide a total income of US\$29.8 million a year.
- 6.27 The expenditures for the project average US\$54.0 million a year, consisting of interest on loans obtained (US\$31.9 million), operating and maintenance costs (US\$6.9 million), and average investment depreciation (US\$17.9 million). The result is the generation of operating losses of equivalent to US\$24.2 million a year.
- 6.28 Annual cash deficits have been calculated at above US\$31.5 million resulting from operating losses less depreciation plus amortization of loans estimated at US\$28.3 million a year, which would decrease at the far end of the projections as the different loans were paid off. The cash deficit accumulated over 20 years would total US\$631.6 million.

(ii) Rates covering operating and maintenance expenses plus amortization of the investments.

- 6.29 In a first approximation, a rate including amortization of the investment was calculated to include only the investment for the irrigation works. Two situations were considered: one assuming

1/ The rate for the 17,000 hectares is higher than that for the 33,000 ha because the fixed cost is distributed among different numbers of hectares.

amortization over the 40 years of the service life of these works, and another based on a service life of 75 year in accordance with the rate scheme of INERHI based on the provisions of the water law. The rates so calculated would be as follows:

<u>Project</u>	<u>Annual Rate</u>	<u>(\$/ha/year)</u>
	<u>40 years</u>	<u>75 years</u>
17,000 ha	245	185
33,000 ha	<u>225</u>	<u>174</u>
Average irrigation rates	235	179.5
	===	====
Weighted	231.8	177.74

- 6.30 However, this rate should also include a component for amortization of the investment in the dam. For this estimate account was also taken of the allowance for each of the multiple uses of the water stored in the dam. Based on the consumption volume/year, 40% of the cost of the dam was attributed to irrigation. For purposes of arriving at an annual quota for amortization, it is assumed that the total area that could eventually be irrigated would be 145,000 ha, consisting of the 50,000 in the Daule valley and an additional 95,000 ha of the Manabi diversion and the Santa Elena peninsula. In this case, the total rates would be as follows:

<u>Project</u>	<u>Annual Rate</u>	<u>(\$/ha/year)</u>
	<u>With dam</u> <u>40 years</u>	<u>With dam</u> <u>75 years</u>
17,000 ha	276	202
33,000 ha	<u>256</u>	<u>191</u>
Irrigation average	266	197
	===	===
Annual income (US\$ millions)	13.3	9.85

- 6.31 According to the estimates in the Appendix VI-2, the net income per hectare, not counting irrigation rates, would be above US\$750-850 per ha/year when the project were finished and in full production.
- 6.32 In this situation, the project beneficiaries could amortize the investment for the irrigation system, including the investment for the dam, over a period of 75 years. This would reduce annual operating losses to US\$22.0 million, and the annual cash deficit to US\$26.8 million, which would result in a cumulative deficit of US\$561.1 million in 20 years.

(iii) Conclusion

- 6.33 The projections cover the first 20 years of service life of the project, in which the government must make a major financial effort to finance the investments and service the external loans. The government contribution for the two purposes has been estimated at the equivalent of US\$650.8 million over the 20 years.

- 6.34 In view of the rate structure for amortization of the investments in 75 years, it is clear that the rate would not generate enough funds to service the debt, although financial surpluses would be generated once the loans had been amortized.
- 6.35 It may be noted that the estimated potential financial impact makes no allowance for possible future income that would mitigate it. Firstly, since the size of the dam permits expansion of the area under irrigation beyond the 50,000 ha here considered in the Daule valley, the incorporation of additional areas would increase the CEDEGE's income, for those areas would have pay their share toward amortization of the dam, which would reduce the government contributions required for the purpose. Moreover, in considering the government contributions to the project, it must not be overlooked that the project would in turn help raise fiscal revenue through the mere application of the country's tax laws; this aspect has not been quantified.
- 6.36 Because of the foregoing considerations, a proper rate structure needs to be designed that would take account of the payment possibilities of different sizes of plots and thereby maximize the income to the project from this source (see Recommendations).
- 6.37 The technical cooperation included in loan 610/SF-EC should address both the setting of rates and the design of an efficient administrative system that would maximize collections. It is hence recommended that, within 24 months from the date of signature of the contract, the CEDEGE be required to present to the Bank for approval the rate structure to be applied in the irrigation area of the project, designed in light of the recommendations resulting from that technical cooperation (see Recommendations).

C. Economic Feasibility

(1) Introduction

- 6.38 Although the project that is the object of this financing is only for completion of the Daule-Peripa dam and the preparation of 17,000 ha on the right bank of that river, the economic analysis of the proposed investments can only be made on the assumption of a minimum configuration of all the works envisaged in the Program (paragraph 2.43 et. seq.). This is so because it is reasonable to consider that the project would never have been undertaken otherwise. Therefore, for purposes of the present analysis, "the project" is regarded as comprising the investments for the dam, all the extended irrigation area in the Daule river valley (both the 17,000 ha on the right bank and the 33,000 ha on the left bank), and the hydroelectric power station.
- 6.39 The analysis consists in a comparison of the direct economic benefits generated by the multiple uses to which the dam water would be put with the economic costs of execution of the first three stages of the program

referred to in the preceding paragraph. The multiple uses in question have been boiled down to essentially three as the only ones with any immediate possibility of development, as follows: (i) irrigation and flood control in the Daule river valley, partly financed in the present instance; (ii) electric power generation by the hydroelectric power station envisaged for a forthcoming step, and (iii) a household water supply for the greater Guayaquil area.

6.40 Because of the complexity of the project, the results of the analysis are presented for each component separately and combined with the dam. Hence, there are the following analytical variants. 1/

- (1) The Daule-Peripa project: first three stages as follows: (a) dam, (b) irrigation area (50,000 ha in the Daule valley), (c) hydroelectric power station, and (d) drinking water supply.
- (2) The project now being financed by Bank, both the original part and the complement proposed for financing herein: (a) the dam, and (b) the irrigation area: 17,000 ha on the right bank of the Daule river.
- (3) Separate components: (a) the right-bank irrigation area (17,000 ha), (b) the left-bank irrigation area (33,000 ha), and (c) the hydroelectric power station.

6.41 It may be noted that the analytical scheme outlined in the foregoing paragraph leaves out all investments in the program outside the Daule-Peripa basin (the Santa Elena peninsula and Manabi diversion). For purposes of the analysis, however, it was decided to include components additional to the project now being financed by the Bank, which together amount to what may be called a minimum configuration of the total program. It would be difficult to suppose that investments could have been envisaged that were confined to the dam and only part of the irrigation area, and without the hydroelectric power station. Although this minimum configuration makes possible the future implementing of related investments outside the Daule-Peripa basin, the financial constraints on the country and the lack of reasonably accurate estimates of their costs and benefits make it advisable to exclude those other investments from an analysis of relevance to decisions to be taken in the present period.

6.42 Nevertheless, during the analysis a review was made of complementary projects that might contribute to the full utilization of the water stored by the dam (6,000 million m³). According to the operating model for the dam and irrigation area, the capacity of the reservoir would be more than enough for agricultural development of the Daule-river valley. The most important of the future projects is the one for Santa

1/ The term "analytical variant" refers to a given set of investments whose costs and benefits are analyzed in each case.

Elena peninsula, involving a diversion of water from the Daule river to that peninsula through a pumping station downstream from the Daule irrigation area, a secondary storage system, and a network for distribution to several parts of the peninsula for the prospective irrigation of about 50,000 ha.

- 6.43 The Santa Elena study yields an IRR of 11.5% on an investment estimated at more than S/30,000 million (more than US\$300.0 million at the current exchange rate) for infrastructure alone, not counting investments in the land improvements needed for its operation. In view of these high investment levels - averaging more than US\$7,000/ha - the CEDEGE is reviewing lower-cost technical alternatives for the diversion of water to Santa Elena. It is also studying the possibility of developing the project in stages. In any case, completion of the Daule-Peripa dam and its regularization of the Daule river make possible the implementation of the Santa Elena project at a lower cost than if the dam did not exist.
- 6.44 A review was also made of the proposal for another diversion of water from the dam, in this case directly from the reservoir to Manabi province, on the Pacific coast, to complement the Posa Honda and La Esperanza dams for the benefit of 45,000 ha. The analysis also considers the proposal of carrying water from the Daule river to the Daule-Macul area. The conclusion of the analysis is that, while these investments would indeed contribute to full utilization of the dam, their economic contribution would be minimal because each proposal entails investments equal to or greater than the benefits generated. ^{1/} This conclusion is based on the feasibility study for the Santa Elena project, recently completed by the CEDEGE, and other much more tentative studies of the other proposed projects.
- 6.45 The overall analysis made of the minimum configuration of the program provides the economic indicators for it and also for the first stage, for which this additional financing is proposed. Since construction of the dam is already in full swing, the investments made to date (end of 1984) are regarded as "sunk costs," or irreversible investments, both for the Daule-Peripa project as a whole and for the aforementioned variants. This analysis reflects the impact of the future investment alone, that is, it analyzes only the incremental benefits and costs, and hence must be the basis for the decision on whether to finance all the pending works, while the analysis of the project with the historical cost is considered as useful for information purposes only when considering the additional financing.

^{1/} The effect on the indicators from an additional subproject with an IRR below the opportunity cost, such as the Santa Elena project, is to make the NPV even more negative, although the overall IRR could be made higher if the IRR of the new subproject were higher than the original IRR.

- 6.46 Following is a description of the methodology and assumptions used in the analysis of each component and the results in terms of benefits and costs, with the key indicators of internal rate of economic return (IRER) and net present value (NPV) for each of the aforementioned variants.
- 6.47 In keeping with the practice of the Bank's economic analyses, only direct benefits were identified - for agriculture these were the net value of the incremental production generated by the project, and for electricity the energy generated, valued at an economic price. While the intensive agricultural development envisaged would indeed have an important impact for employment generation in the agricultural sector, in addition to the benefits its multiplier effect would propagate in other sectors (mainly agroindustry and trade), it would induce other costs as well, not all of them known in the same detail as the benefits and costs here analyzed. The present analysis has therefore followed the pattern in the original project of not endeavoring to quantify effects of the project that have not been explicitly identified and studied.

2. Agricultural component

- 6.48 Agricultural development is the reason for being of the Daule-Peripa project, and would generate the great majority of the benefits, mainly through rice production. The Daule-Peripa dam would regulate the waters of the Daule river and thereby avert the frequent winter flooding that today confines cultivation to less than 10,000 ha (20%) of a potential 50,000 ha, while overcoming another major limitation: lack of water during the complementary summer season. 1/
- 6.49 Construction and operation of the irrigation system on the right bank of the Daule river would expand the area under cultivation from about 6,000 ha (11,000 ha of harvest) today to 17,000 ha. The timetable for bringing this new area under cultivation is presented in Appendix IV-8 together with the associated crop plan. The predominant crop on that plan is rice, which would be planted in more than 75% of the area under cultivation (24,449 ha harvested annually). The timetable was prepared in response to the need to optimize the economic benefits by introducing irrigation as quickly as possible and with a minimal interruption of the field work. The most important goal is completion of construction of the irrigation area in time for the start-up of the dam in 1987.
- 6.50 It is also considered necessary to seek greatest possible utilization of the land through double cropping wherever possible in the area.

1/ Regulation would also have minor beneficial effects for the control of overflow along the banks of the river between the dam and the area of expanded irrigation, which have been computed into the final results.

Therefore, the analysis employed a land-use coefficient of 1.85, 0.95 in the summer - that is, under irrigation - and 0.90 in winter when more erratic weather could enforce less than full utilization. This figure, although high relative to indexes in other areas of Ecuador and to irrigation projects in other countries, is regarded as feasible for several reasons, one of them being that since rice will be practically the only crop grown, the cultural practices will be always the same, and the farmers will not have to acquire the wider range of knowledge required for a more varied crop plan. Also, agrological conditions sometimes permit yet a third crop of some fast-growing plant, which would raise the land-use indexes even higher.

- 6.51 For analysis of the project as a whole, agricultural development of the 33,000 ha on the left bank, dominated in the same proportion by rice-growing, was also considered. The timetable for bringing this land under cultivation, beginning in 1990, is presented in Appendix VI-3. As will be shown further on, including this major complementary area is regarded as essential to the project, and its exclusion would be a source of major disequilibrium, because this is precisely the area of greatest potential in the valley.

(a) Basic assumptions

- 6.52 The analysis of the benefits and costs of the agricultural component is based on the following assumptions 1/ as to yields, prices and costs of the agricultural production, the costs of the investment and for operation and maintenance, and the distribution of benefits.

(i) Yields

- 6.53 The agricultural yields used in the analysis of benefits are substantially higher than the averages for the country and the region. In the immediate area, however, similar averages are obtained in cases where the farmers have enough water and technical assistance to make proper use of it. In these cases, the production techniques are similar to those that would be introduced in the project area, for which purpose provision has been made for the needed technical assistance and appropriate credit facilities. The yields employed in the analysis with and without the project are given in Appendix IV-8, showing the initial levels and the levels of consolidated production, normally six years after the areas in question have been placed under irrigation.

1/ The basic assumptions and general analytical approach are largely the same as for the evaluation of the initial project done in 1979. This agreement affords comparability between the economic indicators of the two projects.

(ii) Prices

- 6.54 Economic prices were applied based on prices CIF Guayaquil projected to the years 1990 and 1995 1/ adjusted to the farm level for import-replacing commodities such as corn, sorghum and soy beans. For the special case of rice, the project would have an impact on the balance between the country's imports and exports of this commodity, and according to the projections for the analysis, would make Ecuador a rice-exporting country around the year 1990. Therefore, it was perceived that a special analysis is needed of rice prices based on the projection of the demand for domestic consumption 2/ compared to the expected production. For this latter analysis, specific assumptions were used for production in other important projects such as Babahoyo and Milagros, and general assumptions for the rest of the country. This afforded an estimate of the proportion of the production that would be an exportable surplus, to which the economic price FOB Guayaquil for the respective year was applied, also adjusted to the farm level after conversion of the hulled rice to the equivalent in paddy. 3/ To the remainder, which continues replacing imports, the CIF economic price adjusted to the farm level was applied. The economic prices of the agricultural products and the details of the rice price calculation are given in Appendix VI-4.

(iii) Production costs

- 6.55 The detailed costs worked out by the CEDEGE based on experience in the area have been adjusted to economic prices, chiefly farm labor, which has been adjusted by a factor of 0.8 on a day wage of S/300, the equivalent of US\$4.75, which is considered high relative to the opportunity cost, estimated at S/240 for the area.

(iv) Investment costs

- 6.56 The investment costs used are regarded as more accurate than in most projects of this nature. First, because of the existence of the contract for the dam and knowledge of the bids for the irrigation area,

1/ Source of the projections: Primary Product Price Forecasts, IBRD, July 1984.

2/ The projection of the demand for rice was based on CELADE's population projections, which place the population at 14,595,900 by the year 2000. Starting with the current per capita consumption of about 30 Kg per person, a projection was made of the increase of per-capita consumption relative to income, which was done using a semilog function for demand: $Y = a + b \log X$. The assumed parameters were an income elasticity (b/Y) of 0.28 and an increase of per capita real income (X) of 2% a year.

3/ The conversion coefficient was 0.65, slightly higher than the present level of 0.60 to 0.62 but regarded as realistic owing to the existence of a new plant at Babahoyo, which should operate more efficiently than existing plants.

and secondly because of the investments already made since 1980. For purposes of the economic analysis, the latter investments have been adjusted to US dollars of 1984. Moreover, adjustments have been made for distortions in labor and fuel prices and for taxes. For labor, an adjustment of 0.6 was applied to reflect the difference between the day wage (S/400) paid to unskilled labor and the opportunity cost, estimated at S/240. Fuel was adjusted by a coefficient ranging between 1.7 (1984) and 2.2 (1981) owing to the different levels of subsidy prevailing for oil products in Ecuador.

(v) Operating and maintenance costs

- 6.57 Operating and maintenance costs have been calculated separately for the dam and irrigation area, they include labor, equipment, and energy to operate the irrigation and drainage pumps, and allow for the replacement cost of pumps and maintenance equipment during the service life of the infrastructure. These costs were adjusted at economic prices with the same coefficients used to adjust the investment in works. ^{1/}

(vi) Service life of the infrastructure

- 6.58 The benefit-cost analysis was based on a period of 50 years commencing to run at the time of start-up of the dam in 1987, that is down to the year 2036. Although the dam could have a longer service life if it encountered no silting problem, the impact of calculating benefits and costs for a period beyond 50 years is minimal, owing to the discount factor for that period (.00346 at 12% by the year 50).

(vii) Situation without the project

- 6.59 The benefits of the project were adjusted comparing the situation with to the situation without the project, for which a modest increase over present production was projected in part for expansion of the present area and in part for slight increases in yields. For the right bank, 12,000 ha of rice crops are projected compared with 11,000 ha at present; productivity is expected to increase from 4.5 metric tons per hectare to 5.0 mt/ha between 1987 and 1995. This represents net benefits of US\$6.0 million. Other crops - corn, soy beans and some fruits - contribute another US\$1.0 million in benefits without the project. For the left bank, the 3,000 ha of rice now cultivated would increase to 4,000 ha, with yield increases similar to those of the right bank. The net benefits from rice and other crops on the left bank total US\$3.0 million a year from 1995 on.
- 6.60 To avoid double counting, the value of production in the reservoir was taken as the cost of indemnification, these values having been estimated by the CEDEGE in light of the production prospects of each permanent crop (coffee, fruits, etc.) in addition to the value of the land itself with its permanent improvements. The total resulting from these estimates was US\$20.0 million.

^{1/} See Appendix VI-11.

(b) Agricultural benefits

- 6.61 When production had become consolidated, in the year 2000 the total project would produce 330,000 tons of hulled rice a year. It is estimated that about 100,000 mt would be exportable surplus. The years for which the greatest exportable surpluses are projected are of those from 1992 to 1996 owing to lower consumption levels; the surplus ranges between 158,000 and 169,000 mt. The balance between production and consumption and the exportable surpluses for the different years are given in Appendix VI-5.
- 6.62 The production attributable only to the irrigation project now being financed on the 17,000 ha of the right bank would come to 100,000 tons of hulled rice from the year 1995 on.
- 6.63 In regard to the other crops, consolidated production for the project as a whole would amount to 21,350 tons of corn, 3,800 mt of soy beans, 20,000 mt of tomatoes, 8,500 mt of castor beans, 12,000 mt of cotton, 10,000 mt of beans, and 1,500 mt of sorghum. These crops are expected to be grown in similar proportions on both banks of the river.
- 6.64 In terms of economic benefits to the farmers, this production increase implies an average income increase of about US\$4,115 for the 2,719 farmers on the right bank, although the range varies between less than US\$1,000 and more than US\$30,000 for owners of more than 50 ha. The great majority of the beneficiaries are the cooperative members and smallholders working less than 20 ha, whose individual income would rise by about US\$2,820. This distribution of benefits is regarded as reflecting the distribution of the lands, for there are no major economies of scale in the range considered. This distribution is represented by a Lorenz curve for the area of 17,000 ha, for which the Gini coefficient is found to be 0.68.

(c) Market for agricultural products 1/

- 6.65 According to the analysis and in keeping with the crop plan worked up by the CEDEGE, rice accounts for more than 90% of the expected agricultural output of the project, both in volume and in value. Hence, there must be an emphasis on marketing, as an integral component of the analysis of the project, but even more importantly as a key on-going activity for the CEDEGE and its coparticipants in the project, chiefly the Ministry of Agriculture.
- 6.66 It is particularly necessary that the CEDEGE make a study of the rice situation in Ecuador, the trends of domestic consumption and the prospects for exportation of the expected surplus. So far, the tendency has been to view rice essentially as an import-substituting commodity,

1/ The details of this analysis are given in Appendix VI-II.

partly because of overestimation of future domestic consumption. In view of the great potential of the Daule-Peripa project for the production of substantial surpluses, it is considered necessary to provide for the steps that must be taken to arrange for its marketing.

- 6.67 The foregoing conclusion is reinforced by the projection of rice consumption presented in Appendix VI-6 and the balance between consumption and production expected during each year of life of the project. According to that exercise, Ecuador could produce significant surpluses from around 1990 to the year 2005, after which domestic demand would exceed production on the lands covered by the projection. The period of greatest exports runs from 1992 to 1996, when the surplus ranges between 158,000 and 169,000 mt a year.
- 6.68 The market analysis took these volumes as its starting point, and, since the production costs are similar to those in other countries of the region, viewed as Ecuador's principal comparative advantage its geographical location on the Pacific coast and the proximity of the country's rice-growing region, including the project area, to the port of Guayaquil.
- 6.69 The situation of each country on the Pacific coast of Central and South America was examined, and the future possibilities for their importing rice from Ecuador or, in the case of Colombia, of competing with Ecuador as an exporter, were evaluated. The results of this exercise indicated that Central America could be regarded as a self-supplying region with an export potential.
- 6.70 Peru is seeing as the principal and perhaps only future buyer in the region, with a substantial and on-going demand. The demand in the other countries is limited by their consumer habits, or else they are essentially self-sufficient, with an only sporadic need to import to meet occasional deficits. Peru, on the other, has lately made imports of more than 100,000 mt (in 1981 and 1983, mostly from the USA) despite its own relatively high productivity, greater than 4.1 mt/ha of paddy.
- 6.71 A projection based on the present consumption level of 31.4 Kg per person, with a slight increase in production to 500,000 mt of hulled rice suggests a deficit of 157,000 mt in 1991, which would rise to 300,000 mt in the year 2000, during which period Ecuador would have between 100,000 and 169,000 mt to market per year. In these conditions, it is inferred that Peru could absorb all the Ecuadorian rice surpluses projected for that period.
- 6.72 It is concluded from the foregoing that the country has no guarantee of being able to market its exportable surpluses, although there are good prospects for maintenance of the present consumer trends and assuming normal trade relations with neighboring countries in the region. To assure that these possibilities are fully realized, emphasis is placed on the establishment within the CEDEGE of a unit to study and establish the requisite marketing channels.

- 6.73 The other commodities pose no marketing problems, for their production would not increase so greatly. In the case of corn, the leading crop after rice, the 21,400 mt a year expected to be harvested following the consolidation of production amounts to less than 10% of the present production level of more than 220,000 mt. The increases in the other crops are much smaller. Moreover, there are adequate marketing channels for all of these commodities.

(d) Crop-processing capacity

- 6.74 Following is an analysis of the rice-hulling facilities in the region. According to the national rice program, there are 631 rice hulling mills Guayas province alone, with an installed capacity of 403 mt/ha. Operating one daily shift for about 120 days a year, these mills could hull 387,000 mt of paddy, which is considerably above the present production ^{1/} in the province, and very close to production levels in the country as a whole. In Los Ríos province there are another 450 hulling mills with a capacity to process more than 200,000 mt of paddy. Moreover, the largest hulling mill in Latin America is about to go into operation at Babahoyo, with a capacity of 100 mt/hour and a storage capacity of 30,000 mt, equivalent to more than 100,000 mt a year in one single shift. Thus, this mill should increase the capacity of the region by more than 25%. It is considered that much of the Daule rice, especially if it is to be exported, should be taken to Babahoyo for processing because of the better quality of the product that this mill would provide.
- 6.75 Moreover, the phenomenon of the establishment of new hulling mills in response to the demand, that is, to rice production, is well known in the area, being one of the few agroindustrial investments that is feasible on a large scale.
- 6.76 Therefore, in view of the current installed capacity, the forthcoming opening of the Babahoyo mill and the response capacity of the entrepreneurs in the region, it is considered that agroindustrial rice processing would not become a bottleneck.
- 6.77 In regard to soy beans, the production of the project, estimated at 3,800 mt a year, could be processed in about one week by the currently available oil extraction facilities.

3. Energy component

- 6.78 The analysis of the benefits deriving from the electric energy generating station was made on the basis of the part that station would play in the electric power expansion Plan considered by INEC. As a

^{1/} According to USDA estimates, the rice-hulling mills in Ecuador are operating at only 55% of their installed capacity.

first step, the possible date of start-up of the station under a minimum-cost expansion plan was determined, followed by an estimation of the benefits attributable to the power station based on a valuation of the energy supplied by Daule-Peripa.

- 6.79 As a first approach, and in the context of a multiple-use project, it must be established whether the energy component is economically feasible in the sense of justifying the separable costs, here the power station. For this reason, both in the analysis of the probable start-up date and in that of the benefits from the energy, it has been assumed that construction of the dam itself is an independent decision, and only the costs of the power station have been considered.

(a) Demand projection of demand

- 6.80 The demand projection used in the analysis was worked out by INECEL on the basis of a model relating the total cost of the energy demanded in each year to the current GDP and lagged for one and two periods, and to lagged consumption. The annual growth rate of consumption expected by INECEL is 6.3% between 1984 and 1985, and 8.5% between 1996 and 2010; these rates are significantly below those seen between 1970 and 1980, but this difference is accounted for on the basis of future prospects for growth of the industrial sector (and of the economy in general) substantially lower than those of that decade, in which the determining factor was oil exports, and that at the beginning of the 1970s the coverage of the electric power system was relatively limited, while the sectors and areas of greatest consumption are today covered about 90%.

- 6.81 An analysis has been made on the basis of two alternative demand hypotheses which differ mainly as to change in the short run: a so-called middle hypothesis with rates recommended by INECEL, and another, called a high hypothesis, suggested by the Bank, with an annual growth rate of 7.5% between 1984 and 1990 and of 7.8% between 1991 and 2010. The expected demand for power and energy under these two hypotheses is summarized in the following table.

Projection of Demand for Electricity

<u>Year</u>	<u>Middle Demand</u>		<u>High Demand</u>	
	<u>Energy (GWh/year)</u>	<u>Power (MW)</u>	<u>Energy (GWh/year)</u>	<u>Power MW)</u>
1985	4,473	860	4,577	880
1990	5,931	1,181	6,538	1,303
1995	8,113	1,605	9,280	1,836
2000	12,206	2,382	13,660	2,666
2005	18,690	3,604	19,656	3,790
2010	28,491	5,421	28,890	5,497

(b) The Daule-Peripa power station in the context of the expansion plan

- 6.82 INECEL has studied the alternatives of plant construction for the electric power system in the short, medium and long term using its DSIG

program, ^{1/} which evaluates the cost of investments, operation maintenance in different expansion sequences, and on the basis of which the minimum-cost alternatives for the two demand hypotheses used were chosen.

- 6.83 The medium-and long-term plan covers the period between 1997 and 2010, and was studied with the investment in the projects of the short-term plan taken as given.
- 6.84 The short-term plan considered the possible sequence of entry, between 1990 and 1996, of three principal projects complemented by lesser hydroelectric and/or thermal generation projects; these principal projects are Daule-Peripa, Paute C 1 and 2, and Paute Mazar.
- 6.85 The only restriction introduced for the evaluation of each short-term plan, was the latest possible entry dates based on the periods required for studies, financing, bidding and construction; for the evaluation of each short-term plan, the medium- and long-term plan has been kept unchanged.
- 6.86 The Daule-Peripa power station figures as one of the minimum-cost alternatives for expansion in the short term for both demand hypotheses, with an entry date between 1991 and 1993. The costs of these short-term alternatives, discounted at 12% a year, and the related sequences, are summed up as follows:

Optimal Alternatives * for a Short-Term Expansion

Project	Pow (MW)	Middle Demand				High Demand			
		1 2/	2	3	4	1*	2	3	4
Agoyán	156	88	88	88	88	88	88	88	88
D-Peripa	130	93	91	93	NO	92	91	93	NO
Paute C 1	200	92	92	91	92	91	92	91	91
Paute C 2	300	94	93	92	94	93	93	92	92
Mazar	174	96	96	96	96	96	96	96	96
Apaqui	36	97	97	97		92	93	93	93
Caluma	13				93	94	94	94	94
Angamarca	25				93	93	93	93	
Gas	60				95	93.95	91.96	94.96	
Gas	25								96
Steam	125					95	95	95	
Steam	300								94
(in millions of US dollars of 1984)									
Costs PV		1,805.0	1,814.3	1,814.8	1,826.8	2,005.0	2,016.0	2,021.6	2,050.7

^{1/} The mathematical model used to analyze expansion of the electric power system.

^{2/} The optimal expansion alternative is No. 1 both for the middle and the high demand; however, there is no major difference in the discounted total cost of alternatives 2 and 3.

(c) Benefits attributable to the power station

- 6.87 The minimum-cost analysis for expansion of the capacity of the system suggests that Daule-Peripa is better than other alternatives for meeting a given demand, but does not establish the economic benefit of supplying that demand; the economic value of the energy supplied by Daule-Peripa has been estimated so as to assess the contribution of the Daule-Peripa power station to the system.
- 6.88 A simulation of the expansion and operation of the system was carried out with the Daule-Peripa power station coming on-stream in the year considered as optimal for each demand hypothesis and, alternatively, a simulation of expansion of the system was carried out without the Daule-Peripa power station, but leaving the rest of the Plan unchanged, both in the short and the long run; these simulations yielded quantifications for (1) the differential between total energy delivered (supply deficit) with and without Daule-Peripa, and (2) the differential between the costs of thermal energy supplied with and without Daule-Peripa.
- 6.89 The estimation of the generation cost differential was based on INECEL's simulations for the years 1993 to 2000; for the years thereafter, this simulation suffers from the limitation of being based on an expansion plan subject to a wide margin of uncertainty, whose results probably embody some underestimation of Daule-Peripa's contribution to the system. For this reason, the benefits after the year 2000 were evaluated under different hypotheses for development of the system in order to establish a reliable range for the analysis. The alternative chosen as a best estimate of Daule-Peripa's contribution was based on evaluation of the firm energy of the Power Station at the long-term marginal generation cost; this cost was estimated as the present value of the long-term investment cost based on the PV of the additional energy generated by the system, which is found to be US\$0.031 for the expansion plan both with the middle demand and with the high demand. The annual benefits so estimated are US\$13 million a year from the year 2000 on (a summary of the annual flows used in the analysis is given in Appendix VI-7).
- 6.90 The total differential energy amounts to a very small volume relative to the total annual energy, and to less than 5% of the benefits from the power station; its evaluation was based on the following considerations: a) the lack of this energy would chiefly reduce the reserve of the system; in other words, it would reduce reliability during the critical months (the dry seasons), and should thus be valued at power-failure cost; b) since it would be a "programmable" drop in the reliability of the system, for its volume is very small relative to the annual demand, it can be expected that possible power cuts would strike at consumers for whom the cost of a power failure is relatively low; that is, residential consumers have a range of flexibility in the programming of consumption over time; thus, this differential energy was

valued at the cost of a power failure to a residential consumer, that is, US\$0.20 per differential KWH. Since the incremental energy amounts to a very small volume, the results are not sensitive to changes in this value.

(d) Costs

- 6.91 The costs of the power station were included as adjusted by the opportunity cost of labor and fuels in the civil works component, in addition to which the maintenance costs, equivalent to US\$1.3 million/year, were also discounted.

(e) Results of the analysis of the hydroelectric component

- 6.92 The net present value of the benefits from the power station discounted at 12% a year (disregarding common costs of the project) is US\$12.0 million, calculated on the middle-demand hypothesis; this hypothesis has been chosen as the basis for the estimation of benefits chiefly because it is the one used by INECEL in its expansion decisions. Because of general financial conditions in the country, INECEL has decided to manage the demand by limiting works for the expansion of services to new areas. For the high-demand case, an NPV of US\$24.2 million is obtained. The assumed start-up date of the power station under the middle-demand hypothesis is 1993.

(i) Sensitivity analysis of the hydroelectric component

- 6.93 Sensitivity analyses were made of the benefits of the electricity under different hypotheses as to the contribution of Daule-Peripa to the system based on estimates of the thermal energy that would be needed in a situation without Daule-Peripa. The following cases were considered: a) annual thermal energy replaced by Daule-Peripa starting with the year 2000 equal to the average for 1993-1999; b) annual thermal energy replaced by Daule-Peripa from the year 2000 on, equal to the average for 1993-2010 estimated by INECEL; finally, c) an estimate was made of the maximum additional thermal energy that could be replaced by the Daule-Peripa power station; the result represents the upper limit of benefits from this component.
- 6.94 The results indicate that, in the worst case (case b) the net benefits would range between US\$4.76 million for a middle demand and US\$23.76 million for high demand; at the upper limit (case c) the net benefits would range between US\$30.2 million for middle demand and US\$46.3 million for high demand.

4. Drinking water component

- 6.95 By regulating the river flow, the Daule-Peripa dam generates significant benefits to this sector. Firstly, it assures the water volumes needed to satisfy the future drinking water demand of the greater Guayaquil

area, estimated at 12 m³/second for the year 2000. In turn, operation of the dam assures a continuous current needed to counteract the intrusion of salt water in the area of the offtake for the drinking water system. Lastly, a regulated flow affords the additional benefit of providing higher levels of dilution of used irrigation water.

- 6.96 On the last point, the CEDEGE compared four alternatives for the supply of water to the greater Guayaquil area, two of them based on use of the Daule river with its discharge regulated by the Daule-Peripa dam, the third alternative based on the utilization of groundwater available in the Yaguachi-Milagro sector; and in the forth, a mixed alternative assuming the combined use of regulated water from the Daule river and the aforementioned groundwater. The drinking-water benefits incorporated in the benefit-cost analysis reflect a comparison of the low-cost alternative, based on the Daule-Peripa dam, with the third alternative, the only one of the four considered that does not require the dam, that is, the saving of costs in expansion of the system attributable to the project.
- 6.97 This comparison yields the flow of benefits presented in Appendix VI-9, with a net present value of US\$10.1 million.
- 6.98 Despite the foregoing, it is important to set in motion measures and mechanisms to monitor the quality of the water and control pesticide use in order to ensure that agricultural activities under the project do not lead to practices contrary to those recommended for the use of pesticides, herbicides and other potentially injurious chemicals.

5. Results of the benefit-cost analysis of the project

- 6.99 The results of the benefit-cost analysis based on the scheme of analytical variants referred to in paragraph 6.40 are presented below (details given in Appendix VI-9). The principal result addresses the project as a whole, based on irrigation and flood control on 50,000 ha, the electricity benefits with economic values of the energy under "middle demand" assumptions, drinking-water benefits from supply of the needed discharge volumes and the control of saline intrusion, and including future costs net of the costs invested to date (end of 1984) as "sunk costs." This comparison of incremental benefits and costs of the total project yields an internal rate of economic return (IRER) of 11.7%, and a negative net present value (NPV) of -US\$8.5 million. These are the economic indicators that should be considered with respect to the decision to continue the project (see paragraphs 6.45, 6.105).

ECUADOR DAULE-PERIPA PROJECT

Benefits-Cost Analysis

<u>Variants</u>	<u>IRER</u>	<u>NPV at 12% ^{1/} US\$ millions</u>
Total project ^{2/} (Dam ^{3/} + Irrigation + Electric power)		
Future costs ^{4/}	11.7%	-8.5
Historical costs ^{5/}	8.8%	-124.2
Incremental Investments		
17,000 ha (right bank)	12.3%	1.4
33,000 ha (left bank)	21.1%	60.1
Hydroelectric power station	15.3%	12.0

6.100 For merely informative purposes, it should be noted that when all the historic costs invested in the project since its approval in 1979 are taken into account, expressed in 1984 US\$, the IRER drops to 8.8% and the NPV is negative at US\$124.2 million.

6.101 The indicators for the stage of the project being financed at present, the dam and right-bank irrigation area (17,000 ha) are an IRER of 2.5%, and a net present value of US\$196.2 million. Moreover, when the investments to date are counted as "sunk costs," the IRER of the project financed at present rises, but only to 4.8%, indicating that the project defined in such a limited way would not reach acceptable levels by any economic yardstick. When the investments of each component are considered separately, the implication of these results is confirmed, that is, the great importance of completing the project of the first stage with the complementary investments in the irrigation area on the left bank (33,000 ha) and the hydroelectric power station.

6.102 The economic indicators of these two components, evaluated for the immediate future, are more highly positive than the right-bank irrigation component. While the IRER of the latter is only 12.3%, marginally positive relative to the Bank's normal criterion, and its NPV

^{1/} At prices of 1984 discounted at 12%.

^{2/} Consisting of the first three stages of the Daule-Peripa program.

^{3/} The dam provides flood control and drinking water.

^{4/} All costs up to 1984 are considered as "sunk costs" (102.2 million U.S. dollars of 1984, equivalent to an NPV of \$115.7 million discounted to 1984 at 12%).

^{5/} Includes all costs since 1980, stated in U.S. dollars of 1984, adjusted by deflator of the GNP of the USA.

only US\$1.4 million, largely because of its relatively advanced state of development at present, the future left-bank irrigation project would have an IRER of 21.1% and an NPV of US\$60.1 million.

- 6.103 Moreover, the hydroelectric subproject yields and IRER of 15.3%, with an NPV of US\$12.0 million, on the assumption of a valuation of the energy based on the middle demand hypothesis.
- 6.104 Therefore, the analysis made for the project as a whole, including the costs already incurred, confirms the conclusions of the original analysis set forth in documents PR-969 and PR-969-A. In view of the present situation, however, with a substantial investment already made and construction of the dam already begun, the evaluation of additional investments, although yielding results below the Bank's customary criteria, does not fall significantly short of the acceptable minimum.
- 6.105 The decision whether or not to continue the works must be taken by comparing the results of the analysis made with the costs associated with halting the works in their present state. It may be noted that an economic case could be made for not continuing the works only if the NPV of the costs associated with stopping them was less than US\$8.5 million. There are here economic implications of a technical nature which have not been estimated, such as the fact that the river has already been diverted to permit construction of the dam. Other important considerations are the financial implications of unilateral cancellation of the works contract. Analysis of the pertinent clauses suggests that the costs that would have to be incurred for demobilization, compensation for loss of income, and the contractual obligation to acquire the equipment and machinery that the contractor has at the work site, are far in excess of US\$8.5 million.
6. Sensitivity analysis
- 6.106 All the variants considered were subjected to sensitivity tests, with changes successive in benefits, investment costs, and operating and maintenance costs, with the other two flows remaining constant. The detailed results of this analysis are presented in Appendix VI-10.
- 6.107 For the project as a whole, exclusive of "sunk costs," a 10% increase in benefits would raise the IRER from 11.7% to 12.6%, while a similar decrease in investment costs would also raise it, to 12.5%. An increase of only 4% in the benefits would raise the IRER to 12.0%. This would happen with a combination of more intensive land to use and slightly higher yields, and a demand for electricity greater than that assumed.
- 6.108 For the variant of the total project analyzed at historical costs, a 25% increase in benefits raises the IRER from 8.8% to 10.4%, and a similar decrease in benefits reduces the IRER to 6.8%. Moreover, a reduction of 25% in the investment costs had a similar effect, raising the IRER to 10.6%, while a 25% increase reduced it to 7.5%.

- 6.109 The adjustment needed to arrive at an IRER of 12% for the project with all historical costs would be a 55% increase in benefits or a 39% reduction in investment costs. A simultaneous improvement of 22% (greater benefits and lower costs) in all three flows would have the same result of raising the IRER to 12%.

7. Distributional analysis

- 6.110 The analysis of the distribution of benefits considers only the project financed by the Bank, namely, the dam plus the 17,000 ha irrigated area. That project provides additional benefits of flood control and potable water. Consequently, important future benefits of the irrigation of 33,000 ha and the hydroelectric plant are not taken into account, because they have not yet been financed.
- 6.111 The analysis starts from the low-income level agreed upon between the Bank and Ecuador: S/48,405 per capita (June 1984), equivalent to US\$4,600 for a family of six. It is considered that this level corresponds to a present 20 ha plot in the area. 1/ According to the land tenure pattern, this would reflect the situation of 95% of the beneficiaries, with an area representing 65% of the total. Based on the assumption that there are no economies of scale in this range, the distribution of agricultural benefits would be in the same proportion.
- 6.112 Moreover, the benefits of potable water would be absorbed by the public sector, in the form of savings in system expansion.
- 6.113 For the recovery of the investment in infrastructure in the irrigation area, it is assumed that only landowners with more than 6 ha would pay, at a rate of 100%, but with no interest.
- 6.114 For the investment in the dam, a percentage of payment was applied to the beneficiaries with plots of land larger than 30 ha, in proportion to their land compared with the total corresponding to the respective use (150,000 ha for irrigation and 50,000 ha for flood control), based on the proportion of the dam considered to be used for irrigation, estimated at 40%. Similarly, the proportion to be used for flood control was estimated at 10%. In this case also, interest was not calculated. The exclusion of interest from the calculation of recoveries is part of INERHI's policy, which results in an effective subsidy for the beneficiaries in the irrigation area, depending on the size of each of the plots.

1/ The low-income level represents the income from approximately 12 cultivated ha, which implies a 20 ha plot of land given the existing intensity of farming.

- 6.115 Using the approach described above, the results of the distributional analysis are shown in the following table, pursuant to the rules established by the Bank, with a breakdown of private and public costs.
- 6.116 That analysis shows that most of the investments are in the public sector, with a minimum recovery of investment within the outline of the current financing, especially of the dam, since it was designed to irrigate a substantially larger area than the present 17,000 ha.

ANALYSIS OF THE DISTRIBUTION OF BENEFITS AND COSTS
(In US\$ millions)

Investment	Private Groups		Public Sector	Total NPV
	Low-Income 1/	Other		
Dam (70 years) 2/	0	-0.7	-210.6	-211.3
Irrigation district (40 years) 3/	-4.6	-4.7	- 42.1	- 51.4
<u>Operation and maintenance (O & M)</u>				
Dam 4/		-0.1	- 2.4	- 2.5
Irrigation district 5/	-8.2	-4.5		- 12.7
<u>Benefits</u>				
Agriculture 6/	34.5	19.1	*	53.6
Water supply 7/			10.1	10.1
Flood control 8/	3.0			3.0
<u>Labor 9/</u>				
- Construction	4.5			4.5
- O & M	0.5			0.5
- Farm	13.5	-3.5		10.0
Total	43.2	5.6	-245.0	-196.2
	(89%)			

1/ Farmers with less than 20 ha, 64.4% of the area.

2/ A proportion of the investment in the dam, amortized at 70 years without interest, only for parcels of more than 30 ha, assessed in accordance with the part (31.9%), of the dam used for that particular purpose (40% for irrigation, 10% for flood control) and pro-rated for the 17,000 ha irrigation district ($17,000/150,000 = 0.11$ for irrigation; and $17,000/50,000 = 0.34$ for flood control).

3/ Irrigation district, with an amortization period of 40 years without interest, in proportion to the size of the parcel, with a differential rate (paid only by owners of more than 6 ha).

4/ O & M for the dam alone, collected only on parcels larger than 30 ha of the pro-rated area.

5/ One hundred percent of the irrigation O & M paid, in proportion to the size of the parcel, i.e. the cost per ha is the same for all.

6/ Farm benefits in proportion to the size of the parcel, 70% to low-income groups.

7/ Water supply benefits to the public sector resulting from savings in investment.

8/ Flood control benefits, in addition to those received by the irrigation district, to small farmers on banks of the river.

9/ Benefits from unskilled labor, adjusted by the shadow price. To tally the net economic costs, equal parts were added to these benefits for: (i) construction workers and O & M; and (ii) for the economic investment costs and O & M, and then divided between the public and the private sectors.

* The public sector may receive a share of these benefits as a result of its farm price policy, including possible levies on rice exports.

VII. EVALUATION OF LOAN 377/SF-EC

A. Background

- 7.01 Loan 377/SF-EC in the amount of US\$20.8 million for a total cost of US\$29.8 million, 1/ was granted to the Republic of Ecuador for the agricultural development of a tract of 11,500 ha in the Babahoyo area and the creation of a rice-processing infrastructure. Execution of the project has been entrusted to the CEDEGE. The project is 85% advanced, and the Bank's loan is totally disbursed.
- 7.02 To attain the set objectives, the following measures were planned: (a) Acquisition and redistribution of lands, (b) the organization of cooperatives, (c) the construction of works for: (i) irrigation and drainage infrastructure, (ii) on-farm irrigation facilities, (iii) flood control (dikes), (iv) internal roads, (v) community centers and housing for beneficiaries, 2/ and (vi) a service center; (d) the acquisition and installation of a rice-processing mill, (e) the acquisition of farm machinery and equipment and vehicles for the operation and maintenance of the project following conversional the track into an irrigation district, and (f) execution of a program of technical assistance to the CEDEGE.
- 7.03 Following are some of the basic dates:

	<u>Original</u>	<u>Actual</u>
Approval by Board of Executive Directors	11/73	-
Signature of contract	4/74	-
Physical commencement of works <u>3/</u>	10/81	10/81
First disbursement	10/74	1/75
Last disbursement <u>4/</u>	4/78	7/82

- 7.04 The delay in disbursement of the loan, which was completed in 7 and a half years instead of the scheduled 4, and the increase of the cost from US\$29.0 million to US\$52.2 million (on 12/31/82), associated chiefly with the irrigation infrastructure and the rice-processing mill, was caused chiefly by (i) problems in the bidding for areas A and B 5/ which was declared void twice, (ii) turnover in the CEDEGE management and a

1/ Amount discounted to 31 December 1982 = US\$52.2 million

2/ Project resources are to be used to provide sites and services; the dwellings will be built by the beneficiaries with resources that are not part of the financing of the project.

3/ This deadline was established in July 1980 at the time of presentation to the Board of Executive Directors of the extension for the last disbursement to 1982.

4/ About 1.7 million of the total loan amount (US\$20.8 million) has been cancelled.

5/ The 11,000 ha irrigation area was divided into 3 sections: A with 5,000 ha, B with 4,000 ha, and C with 2,000 ha.

shift of priority to the Daule-Peripa project, (iii) a lack of accuracy in the topographical studies and changes in the designs of some works, (iv) shortcomings of some contractors, (v) abnormalities of rainfall at different stages of execution, (vi) belated provision of counterpart funds by the government, and (vii) a lack of final designs for rural structures when the financing was approved (see paragraph 4.23 in Document PR-594).

B. Present Status of the Project

1. Acquisition and redistribution of lands

7.05 Expropriation of the project lands, begun in 1973, was completed in 1978 with the acquisition of about 13,000 ha. The acquisition procedure entrusted to the Ecuadorian Agrarian Reform Institute (IERAC), was brought to standstill in 1976 by the promulgation of Decree 916, which required that expropriated lands be paid for in cash. The acquisitions were renewed in mid-1977 when that Decree was rescinded.

7.06 The delays in the acquisition of lands did not hinder execution of the principal irrigation and drainage works, but did delay the start of the corresponding on-farm facilities. At this writing, the process of redistributing lands to the cooperatives set up in the project area is nearing completion. However, a total of only 3,000 ha, approximately, has been awarded to cooperatives and beneficiaries, and about 7,000 ha are still pending adjudication.

2. Organizational cooperatives

7.07 The work of promoting the organization of farmers' associations was begun in 1973 by technical teams of the IERAC and the CEDEGE. These associations began to take permanent form in 1976, and there are at present 25 legally constituted cooperatives embracing 934 members. The cooperatives are functioning as production and marketing organizations. They average 30 members with plots averaging 9 ha per family. One defect, however, has been that the beneficiaries selected for the project have not always been individuals with real farming ability.

3. Execution of works

(a) Irrigation and drainage infrastructure

7.08 The irrigation and drainage infrastructure works have been completed on 9,000 ha, constituting so-called areas A and B. These works include two diversion dams and one pumping station. Problems have been encountered in the dams owing to downstream erosion and difficulties in operation of the gates. The irrigation system in these two areas is in operation.

7.09 There has been a technical change in the original design for area C, of 2,000 ha, as approved by the Bank in 1980; the change consists in using the diversion dam that feeds area B. Following this change, the works

for area C consist of (i) an off take, (ii) a main channel 0.5 Km long, (iii) a network of irrigation and drainage channels, (iv) a flood-protection dike, and (v) a drainage pumping station. At this writing, only one 5-Km drainage channel has been built and progress has been made in the bidding for construction of the infrastructure, the invitation for which was issued in May 1984, with a deadline for the presentation of tenders on 25 June 1984. Since none of the prequalified firms presented tenders, the bidding committee declared the procedure void and decided to issue a fresh invitation, which has been submitted to review by the new administration that took over the agency starting in August of this year. 1/

(b) On-farm irrigation works

- 7.10 Work in this important aspect of preparation of the lands for use under irrigation has proceeded slowly, at first because of delays in the acquisition and redistribution of the land by IERAC, and later because, as beneficiaries have been admitted to the project and plantings have begun in much of the area, the requisite works have had to be executed during the times between harvesting and new plantings.
- 7.11 Cleaning, grading and preparation work is required on 8,000 of the 11,000 ha. This work is not needed on the other 3,000 ha, partly because it has already been done or because they are under permanent crops, are part of smaller holdings, or are areas set aside for the service center and communal centers. So far, about 4,000 ha - 50% of the envisaged total - have been prepared 1/

(c) Dikes and roads

- 7.12 All the flood-protection dikes and the roads in areas A and B have been built. The quality and effectiveness of the former were tested during the rain and flood seasons of 1979, 1980 and 1983. The roads are in use and are regularly maintained.

(d) Rural structures

- 7.13 This heading covers the urban development works already carried out in the service center, which already has the administration building of the Irrigation and Drainage Commission, the health subcenter, two housing modules for technicians, and the dining hall and family housing units. The works built are in use by the CEDEGE project personnel and for campesino training courses. One service center has been built, but none of the five envisaged community centers. 2/

1/ The preliminary plan of action proposed by the CEDEGE to complete the project is presented in Section D of this chapter.

2/ See Section D.

(e) Rice-processing mill

- 7.14 The supply and installation of the rice-processing mill, a very important component of the project, were contracted for in mid-July 1979 about three years behind the original schedule owing to repeated delays and complications that arose in the course of the bidding and contracting for it. At this writing, it has just gone into operation, and the first tests were conducted in September of this year. The mill, which will be operated by a mixed company capitalized by private interests and the CEDEGE, is an integrated complex whose installed and rated capacity makes it the country's largest and most modern such facility. It has a capacity for the reception of 100 t/h, for the drying of 40 t/h and for the storage of 30,000 tons. In addition, it has capacities for seed treatment (2 t/h) and for milling and hulling (300 q/h).

4. Acquisition of machinery and equipment

- 7.15 The agricultural machinery envisaged for the project was acquired in bidding procedures conducted between 1974 and 1981, and consists of intermediate-size and small farm tractors, rice combines, corn harvesters, seeders, plows, harrows, cutters, wagons, graders and miscellaneous implements. The precarious state of the stock of machinery is due to problems of maintenance and availability of replacement parts, and because of little utilization and operating difficulties. ^{1/}

5. Supporting services

(a) Operation of the irrigation district

- 7.16 The Babahoyo Irrigation and Drainage Commission, organized in 1983 as the highest authority in the project, has administered the system directly since 1977. The commission has not functioned as effectively as could have been expected, and much of the stagnation of the project stems from a lack of entrepreneurial ability, of autonomy, and the fact that the commission lacks the rank and authority needed for the pursuit of its goals.

C. Fulfillment of Contractual Conditions

- 7.17 The clauses of the contract have been complied with except for (i) the auditing of financial statements, a problem that ties in with paragraph 5.25 in Chapter V, above; (ii) while it is difficult to establish the extent to which the rate clauses have been fulfilled because the works have not yet been completed, this clause is not being satisfactorily complied with; and (iii) completion of the project, with part of the on-farm irrigation facilities in areas A and B and all the irrigation works in area C still pending. This matter was studied in conjunction

^{1/} See Section D.

with the CEDEGE authorities during analysis of the financing to decide on the measures and timetable for completion of the works, the outcome of which was the subject of the next section.

D. Results and Conclusions

- 7.18 According to the goals of the project, on completion of the on-farm irrigation facilities, rice production would rise to about 75,000 tons. This increase was to be brought about by three factors: (i) a total of 15,000 ha would be planted on 8,400 physical hectares; (ii) on-farm irrigation facilities would be in place on 8,000 ha, which would increase productivity accordingly; and (iii) two crops would be planted in areas A and B and only one in area C.
- 7.19 In the Babahoyo project area, 8,000 ha (53% of the target total) are being planted at present, of which 5,000 are winter and 3,000 summer plantings. The yield obtained is 42 bags/ha (4.1 t/ha), more than in adjacent areas outside the project area, where 35 bags have been harvested. This points to a rice production of 32,800 t/year (43% of the established target). This production amounts to about 9.5% of the country's production in 1983 (352,000 tons). Soy beans, corn and clover are also grown in the area, though in very small quantities.
- 7.20 At present, the project embraces about 1,000 families for a total of about 8,000 persons directly benefited.
- 7.21 The situation as to fulfillment of the original goals and the present state of the project in aspects still pending completion may be summarized as follows:

<u>Target</u>	<u>Present Status of Pending Execution</u>
Construction of irrigation infrastructure on 11,000 ha.	Irrigation infrastructure still pending construction on 2,000 ha in area C.
Construction of on-farm irrigation facilities on about 8,000 ha.	These facilities still pending construction for about 4,000 ha.
Awarding of about 10,000 ha of lands to cooperative members and the beneficiaries.	About 7,000 ha remain to be awarded to cooperative members and beneficiaries.
Construction of 5 community centers.	All 5 community centers remain to be built.
Construction of about 1,250 sites with services.	Construction 1,250 sites with services pending.

Constitution of enterprise to administer and operate the stock of farm machinery.

A procedure needs to be established for the administration of this equipment or alternative solutions to the present situation proposed.

- 7.22 The result of the project and the experience in its execution prompt the following conclusions: (i) it is important that, for this type of project, detailed designs be on hand at the time of its financing; (ii) realistic execution deadlines need to be set which take account of weather restrictions in the area; (iii) the program should be given a scope and targets that are realistic, for in the Babahoyo case they were too ambitious for the institutional capacity of the CEDEGE, which at the time was also starting stage I of the Daule-Peripa project; and (iv) a procedure must be established for the careful selection of beneficiares to make sure that they are real farmers.

E. Measures for Correction and to Complete the Project

- 7.23 As previously noted, at the end of August of this year a new administration took over the CEDEGE, and in September made a preliminary evaluation of the project. The purpose of this evaluation was to identify the measures required to complete it and attain its set goals.
- 7.24 Because of the little time available for doing in-depth work and because of the complexity of the problems involved, it was agreed with the CEDEGE that, before the financing were approved, the agency would make known to the Bank the general outlines of the measures to be taken, and that, prior to the first disbursement from the financing, it would submit a detailed plan for the completion of each of the following activities: (i) the on-farm irrigation facilities remaining to be provided in areas A and B; (ii) the irrigation infrastructure and on-farm plot installations in area C; (iii) the final adjudication of lands in the three project areas; (iv) the construction of community centers and sites with services; and (v) the arrangements for the administration and placement in operation of the available equipment and machinery and determination of the measures to be taken with their respective timetables (see Proposed Resolution).
- 7.25 In fulfillment of the first of these agreements, on 3 October this year the CEDEGE presented to the Bank a preliminary plan as the outcome of the recommendations of a special commission created for the purpose, and consisting essentially in the following activities:
- Concentration on efforts to complete the works pending execution in areas A and B so that the best use can be made of the works and investments already carried out in those areas.
 - Postponement of the investments pending execution in area C until completion of the works referred to in the preceding point.

- A revision of the Internal Regulations of the Irrigation and Drainage Commission to (i) streamline its structure, (ii) create a post of administrative manager under the executive director of the CEDEGE and appointed by the board of directors; and (iii) the creation of a control and collections department to oversee loans, recover investments, and make rate collections.
- Revision of the present land tenure situation to ensure that the beneficiaries are real campesinos.
- A review of the indebtedness situation of the cooperatives and the design of a plan for clearing up the situation.
- A review of the status of the stock of machinery and the framing of alternative solutions to the problem.

7.26 The aforementioned activities are regarded as constituting an important step forward and evidence of resolve to complete the project and set it properly into operation.

F. Aspects of the Babahoyo Experience Borne in Mind in the Daule-Peripa Case

7.27 The following points have been borne in mind or constitute major differences between the two projects that justify the expectation that many of the difficulties and problems encountered in Babahoyo can be better controlled in the Daule-Peripa case.

Babahoyo Project

1. The project beneficiaries were brought in from other areas and were not always real farmers.
2. The final designs had not been completed when the loan was approved.
3. The project had no priority during its execution.

Daule-Peripe Project

1. The beneficiarios are already in the area. They are proven farmers with farms in production.
2. The final designs for the irrigation and drainage system are complete for this new loan. Only the aspects relating to the pumps remain pending.
3. The project enjoys the full backing of the government, which is committed to its completion.

4. Delay in the execution of on-farm facilities works owing to land acquisition problems.
5. Weakness of the Irrigation Commission.
6. Establishment of a stock of machinery larger than the CEDEGE's management capacity.
7. A lack of experience of the agency in such works.
4. As noted in Chapter IV, the project's requirements in regard to land acquisition are minimal, under the related decrees are regarded as clear and to the point.
5. The regulations for the new commission will give particular attention to this matter based on the Babahoyo experience and the proposed reformulation, which is under study, and has been mentioned in Section E.
6. The machinery to be acquired will be only for maintenance of the works, and additional agricultural machinery services will be leased from the private sector.
7. The experience of Babahoyo will be of value in executing the project and to rectify quickly any deficiencies and problems that may arise.

E C U A D O R

MARCO DE REFERENCIA

1. Antecedentes Generales

- 1.01 El paulatino desgaste del gran impulso generado por el inicio de las exportaciones masivas de petróleo a partir de 1972, se reflejó, durante el período 1980-1983, en una constante desaceleración del crecimiento económico, que se intensificó fuertemente desde 1982 (el PIB sólo aumentó 2,2 por ciento comparado con 4,8 por ciento en 1981), registrando una disminución del 3,3 por ciento en 1983. Ello precipitó desequilibrios financieros fiscales y de liquidez internacional, que pasaron a constituirse entre los problemas más serios y urgentes de la economía ecuatoriana durante el período, principalmente a partir de 1982.
- 1.02 A esta desaceleración del crecimiento contribuyó un conjunto de factores, entre los que sobresalen: (a) el escaso dinamismo de la economía mundial, con sus concomitantes adversos efectos sobre la demanda y los precios de algunos de los principales productos de exportación del país; (b) el acelerado crecimiento del servicio de la deuda externa y la renuencia de la banca privada internacional a continuar prestando al Ecuador; (c) la salida de capitales creada por las atractivas tasas de interés de los mercados externos y la falta de confianza en el sucre; y (d) la sobrevaluación del sucre, resultante de mantener el tipo de cambio sin modificación por un largo período.
- 1.03 La acción conjunta de estos factores contribuyó al debilitamiento de la balanza de pagos, a una fuerte caída de las reservas monetarias y al deterioro financiero del sector público. La reducción del crecimiento fue acompañada por la aceleración de la inflación. Por otra parte, el programa de austeridad adoptado por el Gobierno en 1983 y los desastres naturales ocasionados por la corriente "El Niño" se sumaron a los desequilibrios financieros e influyeron en la inversión del proceso de expansión económica.
- 1.04 La situación financiera del sector público mostró un sostenido deterioro entre los años 1979 y 1982. El déficit global del sector público, expresado como proporción del PIB, aumentó desde un nivel equivalente al 5,5 por ciento, en el primero de los años mencionados, hasta el 7,3 por ciento en 1981, reduciéndose en el año siguiente al 6,5 por ciento. El debilitamiento financiero del sector público reflejó principalmente la disminución del ahorro en cuenta corriente, el cual después de registrar un nivel igual al 5,3 por ciento del PIB en 1980, se redujo al 2,6 por ciento en 1982. Este último fue el resultado de la caída de los ingresos corrientes sin la correspondiente reducción de los gastos corrientes. Los ingresos no sólo fueron afectados por el estancamiento de los recursos generados por el petróleo sino también por un deterioro de la base tributaria.

- 1.05 A lo anterior se sumaron crecientes dificultades para conseguir nuevos préstamos en los mercados financieros internacionales. En estas circunstancias, las autoridades ecuatorianas redujeron los gastos de capital desde el equivalente al 11,9 por ciento del PIB en 1980 al 9,7 por ciento en 1982.

2. Situación Económica Reciente

- 2.01 Al cierre del año 1983, la economía ecuatoriana podía caracterizarse por la primera contracción de la producción en 17 años (una disminución del 3,3 por ciento en el PIB), un incremento de la inflación (un crecimiento promedio anual del 48 por ciento en el índice de precios al consumidor), una significativa disminución de la inversión (reducción del 28,3 por ciento en la inversión bruta) y una baja en el consumo (reducción del 5,5 por ciento). Asimismo se estimaba que el desempleo y subempleo equivalían, en forma respectiva, al 9 y 30 por ciento de la población económicamente activa.
- 2.02 En sus aspectos positivos el programa financiero adscrito al acuerdo de crédito contingente (stand-by), de un año de duración (efectivo desde el 25 de julio de 1983), había contribuido al cumplimiento de la mayoría de los criterios de comportamiento correspondientes al tercer tramo del referido crédito. En efecto, el déficit global del sector público se redujo desde un nivel equivalente al 6,5 por ciento del PIB en 1982 al 0,3 por ciento en 1983; el déficit en cuenta corriente de la balanza de pagos fue inferior en \$235 millones a la cifra consignada en el programa financiero, disminuyendo desde el equivalente a 10,5 por ciento del PIB en 1982 a 1,6 por ciento en 1983; la pérdida de reservas internacionales netas fue de \$58 millones, inferior a los \$100 millones prescritos en el programa; el servicio de la deuda externa fue equivalente al 33 por ciento de las exportaciones de bienes y servicios. En ausencia de las renegociaciones de las deudas externas privadas y públicas llevadas a cabo durante el año 1983, el mencionado coeficiente hubiera representado el 111 por ciento de las mismas. Aunque el saldo de la deuda en mora se redujo de \$211 millones a fines de 1982 a \$102 millones en diciembre de 1983, no fue posible su eliminación total como se había previsto en el programa.
- 2.03 La recuperación de la producción agropecuaria y la rehabilitación de las principales vías de comunicación así como las importaciones de ciertos productos contribuyeron a mejorar el abastecimiento de los mercados y a regularizar los precios en el transcurso del primer semestre de 1984. Al mismo tiempo, el Gobierno instrumentó medidas destinadas a controlar la elevación de los precios (apertura de líneas de crédito destinadas a mejorar los procesos de almacenamiento y comercialización de bienes de consumo básico, la realización de un mayor número de ferias libre en algunas ciudades y la intensificación de las campañas de control de precios). Como resultado la inflación, en junio del año en curso, expresada en base anual llegó a 30,4 por ciento comparada con el 51,4 por ciento registrado hasta el mismo mes del año anterior.

- 2.04 Al comparar el comportamiento del sector externo del Ecuador durante el primer semestre de 1984 con el correspondiente al mismo período del año anterior se puede observar un aumento del 5,5 por ciento en el valor de las exportaciones las cuales muestran aumentos significativos en productos tales como el cacao y los elaborados del mar. Asimismo, el petróleo y sus derivados que en conjunto representaron el 72 por ciento del total exportado, registraron un crecimiento de \$728,3 a \$884,1 millones. Las importaciones, por su parte, se incrementaron en 9,2 por ciento estimuladas por las compras en el exterior de bienes de capital y productos agrícolas.
- 2.05 Los movimientos antes descritos resultaron en un superávit en la balanza comercial del orden de \$517 millones en el primer semestre de 1984. Por el contrario la balanza de servicios mostró un déficit equivalente de \$610 millones de los cuales el 60,7 por ciento, \$370 millones, correspondieron a pagos por concepto de intereses de la deuda externa. Finalmente, los ingresos de capitales fueron suficientes para cubrir el déficit en la cuenta corriente y generar una acumulación de reservas internacionales de \$37 millones.
- 2.06 El saldo de la deuda externa al 31 de diciembre de 1983 ascendía a \$6.685,5 millones. En el lapso comprendido entre enero y junio de 1984 se efectuaron desembolsos por \$320,6 millones y pagos por concepto de servicio equivalentes a \$573,5 millones. Estos movimientos determinaron un saldo, al 30 de junio de 1984, igual a \$6.696,4 millones. Durante el mismo período se mantuvo el difícil acceso a nuevos créditos. En efecto, se contrataron préstamos por \$117,7 millones en comparación a \$241,6 millones obtenidos en el primer semestre de 1983.
- 2.07 Al persistir los problemas creados por elevado servicio de la deuda externa, las autoridades mantuvieron negociaciones destinadas a refinanciar los compromisos pendientes y obtener un nuevo préstamo de la banca privada por un total de \$350 millones.
- 2.08 El 26 de abril de 1984, el gobierno del Ecuador solicitó al Club de París el refinanciamiento de \$250 millones correspondiente a obligaciones de capital e intereses vencidos o por vencer en el período comprendido entre el 1o. de julio de 1984 y el 31 de diciembre de 1985.
- 2.09 En agosto 7 de 1984 se firmó un acuerdo entre el gobierno del Ecuador y la banca privada internacional en el cual se incluyó:
 - (a) El refinanciamiento de \$350 millones correspondiente a saldos adeudados por el sector público con vencimientos comprendidos entre el 31 de enero y el 31 de diciembre de 1984. Se estableció como fecha de conversión el 15 de febrero de 1985, otorgándose ocho años a partir de dicha fecha, con cuatro años de gracia y 17 pagos trimestrales iguales comenzando el 15 de febrero de 1989 y efectuándose el último el 15 de febrero de 1993, a las tasas LIBOR + 1,75 por ciento o PRIME + 1,5 por ciento. Se estableció una comisión de 7/8 del 1 por ciento sobre el total de los préstamos.

- (b) La extensión hasta el 31 de diciembre de 1984 de \$159 millones correspondiente a la deuda restructurada de 1983 con vencimientos comprendidos entre el 30 de abril y el 31 de octubre de 1984. El monto señalado se pagará en su totalidad y devengará la tasa LIBOR + 2-1/4 por ciento o PRIME + 2-1/8 por ciento.
 - (c) La extensión del pago de \$200 millones correspondientes a letras de crédito con vencimientos comprendidos entre el 31 de enero y el 31 de diciembre de 1984. Se otorgó una extensión de 90 días a partir de la madurez original. El saldo se pagará en su totalidad al tipo LIBOR + 1-5/8 por ciento PRIME + 1,5 por ciento.
- 2.10 El otorgamiento de un nuevo préstamo quedó condicionado a obtención de un nuevo "stand-by".
3. Política Económica
- 3.01 Las medidas económicas adoptadas por el gobierno del Ecuador el 4 de septiembre de 1984 tenían como propósitos principales: (a) estimular las exportaciones; (b) racionalizar las importaciones y estimular el ingreso de capitales; (c) mantener un nivel razonable de reservas internacionales; y (d) reducir el régimen de control de los precios.
- 3.02 El Decreto 86 junto con derogar las disposiciones que habían implantado un régimen de minidevaluaciones diarias del sucre, fijó la tasa oficial de cambio en 66,50 sucres por dólar de los Estados Unidos: dicho tipo de cambio será utilizado por las exportaciones de petróleo, importaciones de productos agrícolas, alimentos, medicinas, carburantes, pagos de utilidades y repatriación de capitales. En este mercado se utilizarán las divisas provenientes de las exportaciones de petróleo. Además, se mantiene la existencia de un tipo de cambio libre que será determinado por la oferta y demanda de divisas, el cual será utilizado para el resto de las exportaciones e importaciones.
- 3.03 Una segunda disposición estableció que el exportador entregará al Banco Central, las divisas provenientes de las exportaciones dentro de los siguientes plazos máximos: (a) exportaciones a la vista, así como las exportaciones de banano, café en grano, cacao en grano, frutas en general, camarón en cualquiera de sus formas de comercialización y otros productos del mar en estado natural, hasta 30 días contados a partir de la póliza de exportación; (b) los productos primarios excepto los mencionados en el literal anterior, siempre que se compruebe que la venta se ha efectuado a plazo, hasta 60 días a partir de la fecha de exportación; y (c) los demás productos, siempre que se compruebe que la venta se realiza a plazo, hasta 180 días contados a partir de la póliza de exportación.
- 3.04 El Banco Central del Ecuador liquidará la entrega de divisas por exportaciones al tipo de cambio vigente a la fecha en que el exportador debe entregar las mismas.

- 3.05 Exceptuando los automóviles se determinó la libre importación de todos los productos cuya compra en el exterior estaba prohibida. Además, se redujo la carga arancelaria para la Lista I segmento A y para ciertos productos proclives al contrabando. Los plazos para el pago de las importaciones se unificaron fijándose en 120 días para las Listas IA y II y en 180 días para la Lista IB.
- 3.06 Las autoridades eliminaron el control de precios para todos los productos exceptuando el azúcar procesada, la sal, la harina de trigo, la leche procesada, el arroz, los productos farmacéuticos y las cajas de cartón para exportaciones. Además, el Gobierno fijará precios mínimos para el arroz no procesado, el azúcar de caña, el maíz, la leche no pasteurizada, la soya, la semilla de algodón, la torta de soya, el aceite de pescado, el aceite de palma, el café, las bananas y las papas. Por otra parte, se incrementaron los precios de exportación correspondientes al banano (en 25 por ciento a 165 sucres por caja de 19,5 kilos), el cacao (en 18 por ciento a 8.740 sucres por bolsa de 100 libras) y el café (en 6 por ciento a 7.938 sucres por bolsa de 100 libras).

4. Perspectivas y Estimaciones Anuales para 1984

- 4.01 Proyecciones efectuadas por el Banco Central del Ecuador anticipan una moderada recuperación en la oferta agregada para el año 1984. El PIB crecería en 2,2 por ciento en términos reales estimulado principalmente por la recuperación del sector agrícola que se expandiría un 9 por ciento después de haberse contraído en 13,5 por ciento en 1983. La tasa de aumento de la producción del sector minero (esencialmente petróleo) sería del 7,4 por ciento. Las importaciones se mantendrían al mismo nivel del año (1983 (el cual fue 24 por ciento inferior en términos reales al de 1982)). En el lado de la demanda agregada las exportaciones aumentarían en 8,8 por ciento y el consumo en 1 por ciento. Sin embargo, la formación de capital fijo disminuiría en 0,8 por ciento debido principalmente a la escasez de materias primas y bienes de capital importados.
- 4.02 Por otra parte, se anticipa que continuarán las conversaciones con el FMI destinadas a establecer las condiciones para un nuevo acuerdo de crédito contingente que permita consolidar el equilibrio financiero del sector público y lograr un razonable superávit en la balanza de pagos, al tiempo que se restablece la confianza en el sucre. Esto último implica la revisión de la política de tasas de interés y la especificación de la forma en que se determinaría el tipo de cambio. El nuevo stand-by deberá asegurar que los programas de refinanciamiento de la deuda externa sean consistentes con las posibilidades de activar los programas de inversiones que permitan asegurar la recuperación económica del Ecuador.

DISEÑOS DEFINITIVOS CENTRAL HIDROELECTRICA

A. Central Hidroeléctrica Daule-Peripa

1. Estudios del Diseño Definitivo:

En reuniones mantenidas con los consultores Hidroservice-ASTEC-INELIN, se verificó el programa de entrega de los documentos como sigue: las especificaciones electromecánicas, mecánicas y eléctricas estarán disponibles en octubre, noviembre y diciembre del presente año, respectivamente. El informe final de los estudios se prevé entregarlo a mediados de febrero de 1985.

2. Programa de Ejecución:

El plazo de ejecución de la central está estimado en 40 meses. Considerando seis meses para la precalificación de contratistas y dieciocho para la licitación y firma del contrato, la fecha más temprana de entrada en operación de la central se ubicaría a mediados de 1990, en el supuesto que se iniciara la precalificación a fines del presente año. Cabe indicar sin embargo que los plazos estimados para el proceso licitatorio y contratación se han tomado con criterio optimista frente a los registrados en anteriores oportunidades, por lo cual la fecha más temprana de operación de la central se podría correr hasta principios de 1991.

3. Presupuesto Actualizado:

El presupuesto a marzo de 1984 había sido obtenido por indexación del elaborado en el año 1980, y de su examen surgieron dudas sobre la confiabilidad de su formulación. En consideración a lo citado se elaboró un nuevo, en base al análisis de los precios unitarios del proyecto, los que se compatibilizaron con los considerados en otros proyectos del plan de expansión, y el nuevo estimado de volúmenes de obra realizados por el consultor de los diseños. Se obtuvo de este modo el presupuesto de costo directo actualizado a junio de 1984 que se indica a continuación:

<u>Número</u>	<u>Rubro</u>	<u>US\$ miles equiv.</u>
1	Obra Civil	49.937
2	Equipos	60.109
3	Ingeniería	<u>11.005</u>
	TOTAL	121.052

El presupuesto indicado incluye un 10% de imprevistos para obra civil y un 12% para equipamiento, lo cual se considera razonable de acuerdo al avance de los estudios realizados. Los costos de ingeniería y administración se han estimado asimismo en el 10% del costo directo.

4. Programa de Inversiones:

El cronograma de inversiones de la central se indica a continuación (en US\$ miles):

Año 1	Año 2	Año 3	Año 4	TOTAL
6.585	34.137	44.014	36.316	121.052

TRASVASE DE AGUA DEL RIO DAULE A LA PENINSULA DE SANTA ELENA

1. Introducción

La Península de Santa Elena comprende el territorio de la provincia del Guayas ubicado al Suoreste de la cuenca hidrográfica del río Guayas. Su superficie es de 6.060 Km² y abarca los cantones de Salinas, Santa Elena y cinco parroquias rurales del Cantón Guayaquil. Geográficamente la Península de Santa Elena pertenece al trópico, no presentando variaciones significativas de temperatura con la altura, debido a que es una zona relativamente plana. Una de las limitaciones más importantes que presenta la Península para su desarrollo es la falta de recursos de agua dulce.

Desde el año 1970, en que le es encomendada a la Comisión de Estudios para el Desarrollo de la Cuenca del río Guayas (CEDEGE) la realización de estudios sobre el desarrollo integral de la Península de Santa Elena, dicha Institución le ha prestado una especial atención considerándola como una de las zonas potenciales más prometedoras de su área de influencia, cuyo desarrollo repercutirá de forma sensible en la economía del país. 1/

Con fecha 11 de agosto de 1979 se suscribió el Convenio de Estudios entre la Comisión de Estudios para el Desarrollo de la Cuenca del río Guayas (CEDEGE) y el Centro de Estudios y Experimentación de Obras Públicas de España, a través de su órgano especializado, el Centro de Estudios Hidrográficos (CEH), para la realización del diseño del Plan Hidráulico Acueducto de Santa Elena.

Los trabajos realizados en el marco de dicho Convenio se agrupan en tres partes bien diferenciadas de desarrollo paralelo:

-Diseño de acueducto, cuyo objetivo es elaborar los documentos de licitación de las obras de infraestructura básica del Acueducto de Santa Elena.

-Formulación del Plan Agropecuario, documento ordenador de la totalidad de las áreas regables, de los sistemas de explotación y de los equipamientos básicos.

-Diseño de la primera fase de riego, destinado a producir los documentos de licitación de las obras necesarias para la puesta en explotación de las primeras 10.000 Has. del Plan Hidráulico Acueducto de Santa Elena (PHASE).

El eje fundamental del esquema hidráulico del Proyecto lo constituye el Acueducto de Santa Elena, que extrae el agua del río Daule en las proximidades de su desembocadura y mediante una serie de obras de elevación, transporte y

1/ En fecha 28 de enero de 1970 la Comisión Legislativa Permanente expidió la Ley No. 239 que se publicó en el Registro Oficial No. 371 de 16 de febrero de 1970, por la que se incluía la Península de Santa Elena en la Cuenca del Río Guayas.

almacenamiento de agua permite suministrar las dotaciones requeridas en las cabeceras de las redes de distribución de cada una de las áreas de explotación.

Siendo el Plan Hidráulico Acueducto de Santa Elena (PHASE) un plan hidroenergético que incluye bombeos de cierta importancia una vez resuelto el fundamental problema hídrico, mediante la presa Daule-Peripa, el planteamiento formulado en el diseño actual se dirige a procurar el aprovechamiento de los recursos energéticos de menor valor posible en el contexto de la economía hidroenergética del Ecuador.

2. Objetivos del Plan Hidráulico Acueducto de Santa Elena

Lo que se denomina Plan Hidráulico Acueducto de Santa Elena consiste en una opción técnica para transferir agua desde un área donde este recurso es excedentario hacia otra en donde es cada vez más deficitario y que ofrece posibilidades para utilizar los suelos y clima con fines de producción agropecuaria, así como para dar potencia a la producción industrial y el desarrollo urbano.

Los objetivos del PHASE actualmente prevén la satisfacción de las siguientes demandas:

-Agua potable para consumo de los habitantes de la Península de Santa Elena, teniendo en cuenta tanto el crecimiento de la población en función del desarrollo industrial y agrícola programado, así como el crecimiento del turismo.

-Agua potable para consumo humano de los habitantes de Guayaquil, que complementa las provisiones de la Empresa Municipal de Agua Potable de Guayaquil (EMAP-G) al año 2000.

-Agua de uso industrial destinada a satisfacer los requerimientos de CEPE, tanto para las instalaciones prioritarias programadas en la localidad de Atahualpa, cuanto para las de las zonas de Posorja y Monteverde.

-Agua de uso industrial, tanto en lo relacionado con las industrias conexas a las instalaciones de CEPE, así como procesadoras de productos del mar, la agro-industria y la industria química básica.

Agua para regadío, que permitirá el desarrollo agropecuario en 10.000 Has., durante la primera etapa, ampliándose la superficie a unas 43.000 Has. con el desarrollo completo del proyecto. Las áreas bajo regadío estarán localizadas en las zonas de Chongón, Daular, Cerecita, San Lorenzo, Playas, Subeybaja, Azúcar-Zapotal, Villingota, Río Verde, Atahualpa y Javita

3. Los aspectos agropecuarios del proyecto

El proyecto permite la obtención de producciones necesarias para el país con las siguientes características:

-Incremento de la oferta de alimentos de consumo interno en una gama amplia de productos, que incluyen: gramíneas (maíz, trigo), leguminosas de grano (frijol, lenteja), oleaginosas (soya, maní, ajonjolí), hortalizas (tomate, cebolla, ajo, pimiento), frutales (cítricos, maracuyá), ganadería bovina de leche, ganadería porcina, entre productos agropecuarios de uso difundido en la dieta ecuatoriana.

-Contribución al crecimiento de la oferta interna de materias primas para industrias nuevas o existentes, particularmente en lo relacionado con algodón, oleaginosas, sorgo, maíz, trigo, higuera, etc.

-Generación de excedentes exportables, tanto de productos agrícolas en su estado natural como de productos industrializados. También será posible el ahorro de divisas, al disminuir el volumen de importaciones, sobre todo en trigo, aceites y grasas comestibles y leche en polvo.

-Aún cuando se prevé la utilización de tecnologías intensivas en el uso de maquinaria agrícola, será importante de todos modos la generación de empleo directo e indirecto, ya que se trata de áreas que en la actualidad no están en producción.

-El proyecto permitirá incorporar técnicas modernas de riego y manejo de agua, tanto en lo relacionado con aspersión convencional, aspersión mecanizada y riego por gravedad.

-De acuerdo con el subprograma de reforma agraria y redistribución de la propiedad de la tierra, será posible implantar una política de redistribución de los ingresos y de mejoramiento de la función de bienestar de los habitantes de la Península de Santa Elena.

-La complementariedad prevista entre desarrollo agropecuario, producción industrial y asentamientos urbanos, permitirá crear un modelo de actividades integradas de efectos deseables dentro de una política de ocupación territorial y desarrollo general del país.

-Las consideraciones anteriores ponen de manifiesto el impacto económico y social del proyecto de Trasvase en el contexto del desarrollo de la región y del país en su conjunto.

4. Demandas de agua

De acuerdo con los datos disponibles, la demanda de agua del Acueducto puede establecerse como sigue:

Península de Santa Elena:

	Demandas (3/seg)	
	<u>Máxima</u>	<u>Media</u>
Usos industriales	4,0	4,0
Usos domésticos	2,7	2,7
Usos agrícolas	<u>17,4</u>	<u>15,7</u>
Total Península	24,1	22,4

Ciudad de Guayaquil

6 m3/seg

ECUADOR- PROYECTO DAULE-PERIPA. PRIMERA ETAPA
ESTRUCTURA Y FORMAS DE TENENCIA DE LA TIERRA EN LA ZONA DE RIEGO (1984)
AREA BRUTA: 20.030 Ha AREA NETA DE RIEGO: 17.000 Ha.

FORMAS DE TENENCIA 1/	0-6 Ha	6-10 Ha	10-20 Ha	20-50 Ha	50-100 Ha	100-200Ha	+ de 200 Ha	Totales	%
Propietarios									
- Número	501	63	91	58	29	7	6	725	(26,7)
- Area (Ha)	1.011	486	859	1.866	2.041	1.026	1.598	8.887	(44,3)
Organizaciones Campesinas									
- (Número Organizaciones)	(32)	(13)	(10)	-	-	-	-	(55)	
- Número de Socios	951	279	228	-	-	-	-	1.458	(53,6)
- Area (Ha)	3.977	2.201	2.649	-	-	-	-	8.827	(44,0)
Posesionarios No Prescaristas									
- Número	252	38	14	6	1	-	-	311	(11,4)
- Area (Ha)	608	310	177	217	59	-	-	1.371	(6,8)
Posesionarios Precaristas									
- Número	176	-	-	-	-	-	-	176	(6,5)
- Area (Ha)	332	-	-	-	-	-	-	332	(1,7)
Posesionarios Sin Contratos									
- Número	-	5	5	3	-	-	-	13	(0,5)
- Area (Ha)	-	38	60	114	-	-	-	212	(1,1)
Arrendatarios									
- Número	9	20	2	5	-	-	-	36	(1,3)
- Area (Ha)	14	160	37	210	-	-	-	421	(2,1)
TOTALES: N° Tenedores	1.889	405	310	72	30	7	6	2.719	(100,0)
(%)	(69,5)	(14,9)	(11,4)	(2,7)	(1,1)	(0,2)	(0,2)	(100,0)	
Area (Ha)	5.942	3.195	3.782	2.407	2.100	1.026	1.598	20.050	(100,0)
(%)	(29,6)	(15,9)	(18,9)	(12,0)	(10,5)	(5,1)	(8,0)	(100,0)	

Para una explicación de las formas de tenencia, véase la página 7 de este Anexo.

ESTRUCTURA Y FORMAS DE TENENCIA DE TIERRA
EN SUBPROYECTO SAN JACINTO
AREA BRUTA: 2.997 Ha. AREA DE RIEGO: 2.450 Ha

FORMAS DE TENENCIA 1/	0-6 Ha	6-10 Ha	10-20 Ha	20-50 Ha	50-100 Ha	100-200Ha	+ de 200 Ha	Totales	
									%
1. Propietarios									
- Número	199	22	22	12	4	2	-	261	(53,6)
- Area (Ha)	396	173	317	396	278	220	-	1.780	(59,4)
2. Organizaciones Campesinas									
- (Número de Organizaciones)	(5)	(2)	(1)	-	-	-	-	(8)	-
- Número de Socios	118	32	15	-	-	-	-	165	(33,9)
- Area (Ha)	653	231	172	-	-	-	-	1.056	(35,2)
3. Posesionarios no Precaristas									
- Número	26	3	2	-	-	-	-	31	(6,4)
- Area (Ha)	50	26	26	-	-	-	-	102	(3,4)
4. Posesionarios Precaristas									
- Número	28	-	-	-	-	-	-	28	(5,7)
- Area (Ha)	45	-	-	-	-	-	-	45	(1,5)
5. Posesionarios Sin Contratos									
- Número	-	2	-	-	-	-	-	2	(0,4)
- Area (Ha)	-	14	-	-	-	-	-	14	(0,5)
6. Arrendatarios									
- Número	-	-	-	-	-	-	-	-	-
- Area (Ha)	-	-	-	-	-	-	-	-	-
TOTALES: N° Tenedores	371	59	39	12	4	2	-	487	(100,0)
(%)	(76,2)	(12,1)	(8,0)	(2,5)	(0,8)	(0,4)	-	(100,0)	-
Area (Ha)	1.144	444	515	396	278	220	-	2.997	(100,0)
(%)	(38,2)	(14,8)	(17,2)	(13,2)	(9,3)	(7,3)	-	(100,0)	-

1/ Para una explicación de las formas de tenencia, véase la página 7 de este Anexo.

**ESTRUCTURA Y FORMAS DE TENENCIA DE TIERRA
EN SUBPROYECTO HIGUERON**

AREA BRUTA: 3.719 Ha.

AREA DE RIEGO: 3.236 Ha

FORMAS DE TENENCIA 1/	0-6 Ha	6-10 Ha	10-20 Ha	20-50 Ha	50-100 Ha	100-200Ha	+ de 200 Ha	Totales	%
Propietarios									
- Número	21	5	8	14	2	3	2	55	(10,4)
- Area (Ha)	33	40	108	415	108	448	571	1.723	(46,3)
Organizaciones Campesinas									
- (Número de Organizaciones)	(8)	(3)	-	-	-	-	-	(11)	-
- Número de Socios	295	93	-	-	-	-	-	388	(73,5)
- Area (Ha)	1.223	585	-	-	-	-	-	1,808	(48,6)
Posesionarios No Precaristas									
- Número	34	2	-	-	-	-	-	36	(6,8)
- Area (Ha)	68	14	-	-	-	-	-	82	(2,3)
Posesionarios Precaristas									
- Número	47	-	-	-	-	-	-	47	(8,9)
- Area (Ha)	71	-	-	-	-	-	-	71	(1,9)
Posesionarios Sin Contratos									
- Número	-	1	-	1	-	-	-	2	(0,4)
- Area (Ha)	-	8	-	27	-	-	-	35	(0,9)
Arrendatarios									
- Número	-	-	-	-	-	-	-	-	-
- Area (Ha)	-	-	-	-	-	-	-	-	-
TOTALES: N° Tenedores	397	101	8	15	2	3	2	528	(100,0)
(%)	(75,2)	(19,1)	(1,5)	(2,8)	(0,4)	(0,6)	(0,4)	(100,0)	-
Area (Ha)	1.395	647	108	442	108	448	571	3.719	(100,0)
(%)	(37,5)	(17,4)	(2,9)	(11,9)	(2,9)	(12,0)	(15,4)	(100,0)	-

/ Para una explicación de las formas de tenencia, véase la página 7 de este Anexo.

**ESTRUCTURA Y FORMAS DE TENENCIA DE TIERRA
EN SUBPROYECTO EL MATE**

AREA BRUTA: 3.143 Ha.

AREA DE RIEGO: 2.563 Ha

FORMAS DE TENENCIA 1/	0-6 Ha	6-10 Ha	10 -20 Ha	20-50 Ha	50-100 Ha	100-200 Ha	+ de 200 Ha	Totales	
									%
1. Propietarios									
- Número	57	4	3	1	-	-	2	67	(18,0)
- Area (Ha)	227	27	42	23	-	-	447	766	(24,4)
2. Organizaciones Campesinas									
- (Número de Organizaciones)	(3)	(2)	(5)	-	-	-	-	(10)	-
- Número de Socios	80	74	104	-	-	-	-	258	(69,4)
- Area (Ha)	354	624	1.292	-	-	-	-	2.270	(72,2)
3. Posesionarios No Precaristas									
- Número	21	1	1	-	-	-	-	23	(6,2)
- Area (Ha)	32	9	13	-	-	-	-	54	(1,7)
4. Posesionarios Precaristas									
- Número	22	-	-	-	-	-	-	22	(5,9)
- Area (Ha)	33	-	-	-	-	-	-	33	(1,1)
5. Posesionarios Sin Contratos									
- Número	-	-	2	-	-	-	-	2	(0,5)
- Area (Ha)	-	-	20	-	-	-	-	20	(0,6)
6. Arrendatarios									
- Número	-	-	-	-	-	-	-	-	-
- Area (Ha)	-	-	-	-	-	-	-	-	-
TOTALES: N° Tenedores	180	79	110	1	-	-	2	372	(100,0)
(%)	(48,0)	(21,2)	(29,6)	(0,3)	-	-	(0,5)	(100,0)	-
Area (Ha)	646	660	1.367	23	-	-	447	3.143	(100,0)
(%)	(20,6)	(21,0)	(43,5)	(0,7)	-	-	(14,2)	(100,0)	-

1/ Para una explicación de las formas de tenencia, véase la página 7 de este Anexo.

ESTRUCTURA Y FORMAS DE TENENCIA DE TIERRA
EN SUBPROYECTO AMERICA

AREA BRUTA: 6.806 Ha.

AREA DE RIEGO: 5.836 Ha

FORMAS DE TENENCIA 1/	0-6 Ha	6- 10 Ha	10-20 Ha	20-50 Ha	50-100 Ha	100-200 Ha	+ de 200 Ha	Totales	%
<u>Propietarios</u>									
Número	132	3	11	14	14	2	-	176	(18,8)
Area (Ha)	130	25	156	526	1.015	358	-	2.210	(32,6)
<u>Organizaciones Campesinas</u>									
Número de Organizaciones	(13)	(5)	(4)	-	-	-	-	(22)	-
Número de Socios	428	70	109	-	-	-	-	607	64,8
Area (Ha)	1.681	696	1.185	-	-	-	-	3.562	(52,3)
<u>Arrendatarios No Precaristas</u>									
Número	104	16	2	6	-	-	-	128	(13,7)
Area (Ha)	294	136	30	217	-	-	-	677	(9,9)
<u>Arrendatarios Precaristas</u>									
Número	10	-	-	-	-	-	-	10	(1,1)
Area Ha	16	-	-	-	-	-	-	16	(0,2)
<u>Arrendatarios Sin Contratos</u>									
Número	-	1	-	2	-	-	-	3	(0,3)
Area (Ha)	-	8	-	87	-	-	-	95	(1,4)
<u>Arrendatarios</u>									
Número	4	4	-	5	-	-	-	13	(1,3)
Area (Ha)	3	33	-	210	-	-	-	246	(3,6)
<hr/>									
<u>TOTALES: N° Tenedores</u>	678	94	122	27	14	2	-	937	(100,0)
(%)	(72,4)	(10,0)	(13,0)	(2,9)	(1,5)	(0,2)	-	(100,0)	-
Area (Ha)	2,124	898	1.371	1.040	1.015	358	-	6.806	(100,0)
(%)	(31,2)	(13,2)	(20,1)	(15,3)	(14,9)	(5,3)	-	(100,0)	-

Para una explicación de las formas de tenencia, véase la página 7 de este anexo.

**ESTRUCTURA Y FORMAS DE TENENCIA DE TIERRA
EN SUBPROYECTO LOMAS**

AREA BRUTA: 3.385 Ha.

AREA DE RIEGO: 2.915 Ha

FORMAS DE TENENCIA 1/	0-6 Ha	6-10 Ha	10-20 Ha	20 -50 Ha	50-100 Ha	100 -200Ha	+ de 200 Ha	Totales	
									%
1. Propietarios									
- Número	92	29	17	17	9	-	2	166	(42,
- Area (Ha)	225	221	236	506	640	-	580	2.408	(71,
2. Organizaciones Campesinas									
- (Número de Organizaciones)	(3)	(1)	-	-	-	-	-	(4)	-
- Número de Socios	30	10	-	-	-	-	-	40	(10
- Area (Ha)	66	65	-	-	-	-	-	131	(3,
3. Posesionarios No Precaristas									
- Número	67	16	9	-	1	-	-	93	(23,
- Area (Ha)	164	125	108	-	59	-	-	456	(13,
4. Posesionarios Precaristas									
- Número	69	-	-	-	-	-	-	69	(17,
- Area (Ha)	167	-	-	-	-	-	-	167	(4,
5. Posesionarios Sin Contratos									
- Número	-	1	3	-	-	-	-	4	(1,
- Area (Ha)	-	8	40	-	-	-	-	48	(1,4
6.-Arrendatarios									
- Número	5	16	2	-	-	-	-	23	(5,
- Area (Ha)	11	127	37	-	-	-	-	175	(5,
TOTALES: N° Tenedores	263	72	31	17	10	-	2	395	(100,0
(%)	(66,6)	(18,2)	(7,8)	(4,3)	(2,5)	-	(0,5)	(100,0)	-
Area (Ha)	633	546	421	506	699	-	580	3.385	(100,0
(%)	(18,7)	(16,1)	(12,4)	(14,9)	(20,6)	-	(17,1)	(100,0)	-

1/ Para una explicación de las formas de tenencia, véase la página 7 de este Anexo.

ESTRUCTURA Y FORMAS DE TENENCIA DE LA TIERRA
EN LA ZONA DE RIEGO
EXPLICACIONES DE LAS FORMAS DE TENENCIA

1. Propietarios: Se refiere a los dueños legales de los predios correspondientes sea en forma individual o colectiva, exceptuando a las organizaciones campesinas. Es decir, incluye posesión legalmente establecida de personas naturales o jurídicas sobre un predio sea en forma individual o conjunta. En los casos a que la propiedad es conjunta (ej. herederos) el número de propietarios se ha establecido como el número de personas conocido con derecho a la herencia. El área contabilizada para cada propietario se refiere solamente a la superficie que no se encuentra bajo ninguna otra forma de tenencia.
2. Organizaciones Campesinas: Todo tipo de organización campesina se incluye en esta categoría: cooperativas, asociaciones campesinas, e, incluso, grupos campesinos que no tengan personería jurídica pero que realicen sus labores agrícolas en forma asociativa o cooperativa. Normalmente estas organizaciones se encuentran en posesión de predios (total o parcialmente) de propiedad particular o del Estado. En el primer caso, no se contabiliza al propietario correspondiente en la categoría anterior. En esta categoría se ha contabilizado tanto el número de organizaciones campesinas, como el número de agricultores pertenecientes a las mismas. Por lo general, el IERAC afecta los predios particulares en los casos correspondientes para adjudicarlos a las organizaciones campesinas.
3. Posecionarios No Precaristas: Son aquellos agricultores que se encuentran en posesión efectiva de un terreno sin efectuar ningún pago al propietario correspondiente. Esta forma de tenencia por lo general conduce a la adjudicación del terreno al posesionario por parte del IERAC a través de la afectación del predio.
4. Posecionarios Precaristas: Más conocidos como "precaristas" se refiere a todos los campesinos posecionarios de terrenos con extensión menor a 5 hectáreas y que pagan dinero o especies al propietario por el usufructo de la tierra sin que medie contrato legal por ello. Por lo general, el IERAC afecta los terrenos y los adjudica a los campesinos.
5. Posecionarios Sin Contratos: Es la misma definición del "precarista" pero con la diferencia de que este tipo de posecionario ocupa terrenos con extensiones mayores a 5 hectáreas. Es decir, el propietario cobra dinero o especies al campesino por uso de la tierra sin que medie contrato ni autorización del IERAC por lo que éste último puede afectar y adjudicar los terrenos.
6. Arrendatarios: Cuando los posecionarios mantienen una relación contractual de arrendamiento reconocida por el IERAC. En estos casos, al terminar el tiempo de arrendamiento, termina la vinculación legal entre las partes por lo que el IERAC no afecta ni adjudica estos terrenos.

TERMINOS DE REFERENCIA PARA LA REALIZACION DEL DISEÑO DEL SISTEMA DE
RIEGO DRENAJE Y CAMINOS PARA 33.000 Ha. EN EL VALLE DEL DAULE

1. Objetivos

El objeto de este trabajo es realizar los diseños a nivel de construcción con su correspondiente preparación de planos, detalles, especificaciones técnicas, costos y documentos de licitación que permitan la contratación de todas las obras civiles, fabricación e instalación de los equipos necesarios para las estaciones de bombeo y líneas de distribución eléctrica del sistema.

2. Descripción General

La zona programada de 33.000 Ha. a ser implementada con el sistema de riego, drenaje y caminos está ubicada: Al Norte de la población de Colimes, al Sur de la unión del río Daule con el Pula, al Este el río Pula y al Oeste el río Daule.

El método de riego previsto es el riego por gravedad, y la red de riego constará, como elementos principales del diseño, de estaciones de bombeo, canales de conducción y distribución principales y secundarios y las obras de arte necesarias en este tipo de sistema.

La red de drenaje deberá evacuar a través de canales colectores, secundarios y terciarios los excedentes de riego y los provenientes de las precipitaciones en la estación invernal, su descarga al río se la realizará por gravedad y en forma mecánica (estaciones de bombeo) según las circunstancias.

La red de caminos proveerá de acceso a las parcelas de las áreas regables y complementará la red vial existente, de modo que la zona de riego, además de disponer de infraestructura vial interna, quede fácilmente comunicada con la carretera Guayaquil-Balzar.

3. Datos disponibles

Como base para los diseños del Sistema de Riego-Drenaje y Caminos, se dispone de investigaciones y estudios a nivel de factibilidad realizados por CEDEGE, cuyos informes constan como anexos y que estarán a disposición del Consultor.

4. Estudios complementarios en la zona del proyecto y áreas de prestamo y canteras

Para el diseño final de las obras, el Consultor realizará un programa de investigaciones adicionales, directamente o por intermedio de subcontratistas, para lo cual preparará las respectivas especificaciones. El programa deberá contar con la aprobación de CEDEGE.

Información sobre los rubros principales:

- a) Edafología: Preparación de parámetros técnicos y económicos necesarios para la planificación del desarrollo agrícola del área.
- b) Sociales y socio-económicos: Investigación de la infraestructura existente y tenencia de la tierra.
- c) Topografía: Los estudios de topografía contemplarán los levantamientos necesarios para la importación de las obras, ligadas a la red de triangulación nacional, así como los replanteos, nivelación y ubicación de los lugares para los trabajos de información geotécnica y de suelo, zonas de préstamo, canteras, etc.
- d) Geotécnica y de suelos: Se llevarán a cabo trabajos de investigación para la ubicación de depósitos de materiales finos y gruesos, tanto para la construcción de terraplenes, como para vías y agregados del concreto. Se realizarán los ensayos convenientes como: granulometría, límites de Atterberg, humedad natural, pesos específicos, resistencia del suelo, ensayos de expansión, etc. a fin de determinar las características del suelo en los sitios por donde cruzarán los canales, estén ubicadas las casas de bombeo y estructuras importantes del sistema.

5. Diseños definitivos

Para la preparación de los diseños definitivos, se prevé anterior a ello una fase que se ha denominado diseños preliminares, la que comprende una revisión de la información básica existente y la preparación del diseño de: estaciones de bombeo para riego y drenaje, sistema principal y secundario de canales tanto para riego como para drenaje, sistema vial interno del proyecto y todas las estructuras mayores y menores que sean necesarias construir para regulación, distribución, paso y protección del sistema; y los diseños definitivos que contendrán los cálculos hidráulicos estructurales, geotécnicos, etc. que sean necesarios para el desarrollo y definición de todos y cada uno de los siguientes componentes del sistema: (i) Red de riego: con sus componentes captación, medición, conducción, regulación, distribución y entrega a nivel terciario; (ii) Red de drenaje: canales a nivel terciario, secundario, colectores y su obra de descarga al río; (iii) Red de caminos: Caminos terciarios, secundarios y la red principal interna del sistema con sus obras de arte; (iv) Obras de protección: Diques y obras hidráulicas que sean necesario implementar; (v) Líneas de conducción y distribución de energía eléctrica.

Los diseños se concretarán como documento final en los siguientes volúmenes: Memoria general, especificaciones técnicas, planos, presupuestos y documentos de licitación.

6. Información disponible

- a) Informe sobre Cartografía y Topografía.
- b) Informe de Suelos en la zona III de la Cuenca del Guayas.
- c) Informe del Estudio de Operación del Embalse Daule-Peripa, Agua superficial disponible en la sub-cuenca del río Daule en el período 1950-1975, CEDEGE. Julio 7 de 1978.
- d) Areas inundables y sus frecuencias en la sub-cuenca del río Daule, entre Pichincha y Petrillo. CEDEGE, Departamento de Hidrología. Agosto 8 de 1979.
- e) Informe de Operación del Embalse Daule-Peripa para Control de Inundaciones. CEDEGE, Reporte # 10, enero 10 de 1979.

7. Términos de referencia y diseños a nivel preliminar y definitivos, que se presentan en las páginas siguientes.

8. Presupuesto de los estudios, que se presentan a continuación de los términos de referencia y cronograma.

ESTUDIOS Y DISEÑOS DEL SISTEMA DE RIEGO-DRENAJE Y CAMINOS
PARA 33.000 Ha. EN EL VALLE DEL DAULE

PRESUPUESTO GENERAL ESTIMADO DEL CONTRATO

<u>Concepto</u>	<u>Moneda Extranjera</u>	<u>Moneda Local</u>
I. PERSONAL		
A.1 Sueldos personal extranjero	226.900	-
A.2 Costos indirectos sobre A.1 114% moneda extranjera	258.666	
B.1 Sueldos personal nacional		38.182.000
B.2 Costos indirectos sobre B.1 (100%)		38.182.000
Subtotal	485.566	76.364.000
II. HONORARIO FIJO		
Moneda local 10% (B.1 + B.2)		7.636.400
Moneda extranjera 10% A.1 + A.2	48.557	
III. VAJES Y VIATICOS		
En el país		384.000
En el extranjero	37.550	
Total en cada moneda (I+II+III)	571.673	84.384.400
IV. SUBCONTRATOS Y SERVICIOS VARIOS		40.000.000
V. COSTOS DIRECTOS Y MISCELANEOS	140.000	17.900.000
Subtotal (IV+V)	140.000	57.900.000
Total en cada moneda (I+II+III+IV+V)	711.673	142.284.400

ESTUDIOS Y DISEÑOS
DEL SISTEMA DE RIEGO-DRÉANJE Y CAMINOS
PARA 33.000 Ha. EN EL VALLE DEL DAULE

DISEÑOS DEFINITIVOS

SUELDOS DEL PERSONAL DIRECTIVO Y TECNICO EXTRANJERO

ACTIVIDAD EN EL PROYECTO	TITULO UNIVERSITARIO	SALARIO MENSUAL	H/M	TOTAL DOLARES
DIRECTOR	ING. CIVIL	5.200	14	72.800
SUB-DIRECTOR	ING. CIVIL	-	-	
JEFE DE EST. AGRO- NOMICOS	ING. AGRONOMO	-	-	
EDAFOLOGIA	ING. AGRONOMO	-	-	
JEFE DE HIDROLOGIA Y METEOROLOGIA	ING. CIVIL	-	-	
ING. DE ESTUDIOS	ING. CIVIL	-	-	
JEFE DE DISEÑO SIST. DE RIEGO	ING. CIVIL	-	-	
DISEÑOS DE RIEGO Y DRENAJE	ING. CIVIL	-	-	
JEFE DE DISEÑO EST. DE BOMBEO	ING. CIVIL	4.700	4	18.800
DISEÑO ELECTRICO	ING. ELECTRICO	-	-	
DISEÑO MECANICO	ING. MECANICO	4.700	2	9.400
DISEÑO HIDRAULICO	ING. CIVIL	4.200	3	12.600
DISEÑO CASA DE MAQUINAS	ING. CIVIL	-	-	
ESTUDIOS VIALES	ING. CIVIL	-	-	
ESTUDIOS GEOTECNICOS Y DE SUELOS	ING. CIVIL	-	-	
COSTOS Y PROGRAMACION	ING. CIVIL	-	-	
ESPECIFICACIONES TECNICAS	ING. CIVIL	-	-	
DOCUMENTOS DE LICITACION	ING. CIVIL	-	-	

TOTAL

\$ 113.600

ESTUDIOS Y DISEÑOS
DEL SISTEMA DE RIEGO-DREANJE Y CAMINOS
PARA 33.000 Ha. EN EL VALLE DEL DAULE

DISEÑOS DEFINITIVOS

SUELIDOS DEL PERSONAL DIRECTIVO Y TECNICO NACIONAL

ACTIVIDAD EN EL PROYECTO	TITULO UNIVERSITARIO	SALARIO MENSUAL	H/M	TOTAL SUCRES
DIRECTOR	ING. CIVIL	-	-	-
SUB-DIRECTOR	ING. CIVIL	150.000	14	2'100.000
JEFE DE EST. AGRO- NOMICOS	ING. AGRONOMO	90.000	2	180.000
EDAFOLOGIA	ING. AGRONOMO	75.000	2	150.000
JEFE DE HIDROLOGIA Y METEOROLOGIA	ING. CIVIL	90.000	3	270.000
ING. DE ESTUDIOS	ING. CIVIL	80.000	3	240.000
JEFE DE DISEÑO SIST. DE RIEGO	ING. CIVIL	110.000	14	1'540.000
DISEÑOS DE RIEGO Y DRENAJE	ING. CIVIL	90.000	80	7'200.000
JEFE DE DISEÑO EST. DE BOMBEO	ING. CIVIL	-	-	-
DISEÑO ELECTRICO	ING. ELECTRICO	90.000	4	360.000
DISEÑO MECANICO	ING. MECANICO	90.000	4	360.000
DISEÑO HIDRAULICO	ING. CIVIL	120.000	6	720.000
DISEÑO CASA DE MAQUINAS	ING. CIVIL	90.000	4	360.000
ESTUDIOS VIALES	ING. CIVIL	75.000	2	150.000
ESTUDIOS GEOTECNICOS Y DE SUELOS	ING. CIVIL	80.000	8	640.000
COSTOS Y PROGRAMACION	ING. CIVIL	80.000	8	640.000
ESPECIFICACIONES TECNICAS	ING. CIVIL	80.000	8	640.000
DOCUMENTOS DE LICITACION	ING. CIVIL	80.000	8	640.000

TOTAL

S/16'190.000

ESTUDIOS Y DISEÑOS
DEL SISTEMA DE RIEGO-DRENAJE Y CAMINOS
PARA 33.000 Ha. EN EL VALLE DEL DAULE

DISEÑOS DEFINITIVOS

SUELDOS DEL PERSONAL TECNICO AUXILIAR Y ADMINISTRATIVO

ACTIVIDAD EN EL PROYECTO	SALARIO MENSUAL	H/M	TOTAL SUCRES
<u>TECNICO</u>			
DIBUJANTES	18.000	80	1'440.000
CALCULISTAS	20.000	100	2'000.000
JEFE DE DIBUJANTES	25.000	14	350.000
JEFE DE ARCHIVO	20.000	14	280.000
SUB TOTAL			4'070.000
<u>ADMINISTRATIVO</u>			
JEFE ADMINISTRATIVO	35.000	14	490.000
JEFE DE COMPRAS	20.000	14	280.000
CONTADOR	25.000	14	350.000
SECRETARIA EJECUTIVA	18.000	14	252.000
SECRETARIA TAQUIGRAFA	15.000	28	420.000
CONSERJE	7.800	28	218.400
CHOFERES	10.000	112	1'120.000
SUB TOTAL			3'130.400

T O T A L

S/. 7'200.400

ESTUDIOS Y DISEÑOS
DEL SISTEMA DE RIEGO-DREANJE Y CAMINOS
PARA 33.000 Ha. EN EL VALLE DEL DAULE

DISEÑOS PRELIMINARES

SUELDOS DEL PERSONAL DIRECTIVO Y TECNICO EXTRANJERO

ACTIVIDAD EN EL PROYECTO	TITULO UNIVERSITARIO	SALARIO MENSUAL	H/M	TOTAL DOLARES
DIRECTOR	ING. CIVIL	5.200	6	31.200
SUB-DIRECTOR	ING. CIVIL	-	-	-
JEFE DE EST. AGRO- NOMICOS	ING. AGRONOMO	-	-	-
EDAFOLOGIA	ING. AGRONOMO	-	-	-
JEFE DE HIDROLOGIA Y METEOROLOGIA	ING. CIVIL	-	-	-
ING. DE ESTUDIOS	ING. CIVIL	-	-	-
JEFE DE DISEÑO SIST. DE RIEGO	ING. CIVIL	4.700	6	28.200
DISEÑOS DE RIEGO Y DRENAJE	ING. CIVIL	-	-	-
JEFE DE DISEÑO EST. DE BOMBEO	ING. CIVIL	4.700	5	23.500
DISEÑO ELECTRICO	ING. ELECTRICO	-	-	-
DISEÑO MECANICO	ING. MECANICO	4.700	2	9.400
DISEÑO HIDRAULICO	ING. CIVIL	4.200	5	21.000
DISEÑO CASA DE MAQUINAS	ING. CIVIL	-	-	-
ESTUDIOS VIALES	ING. CIVIL	-	-	-
ESTUDIOS GEOTECNICOS Y DE SUELOS	ING. CIVIL	-	-	-
COSTOS Y PROGRAMACION	ING. CIVIL	-	-	-
ESPECIFICACIONES TECNICAS	ING. CIVIL	-	-	-
DOCUMENTOS DE LICITACION	ING. CIVIL	-	-	-

TOTAL

\$ 113.300

ESTUDIOS Y DISEÑOS
DEL SISTEMA DE RIEGO-DREANJE Y CAMINOS
PARA 33.000 Ha. EN EL VALLE DEL DAULE

DISEÑOS PRELIMINARES

SUELDOS DEL PERSONAL DIRECTIVO Y TECNICO NACIONAL

ACTIVIDAD EN EL PROYECTO	TITULO UNIVERSITARIO	SALARIO MENSUAL	H/M	TOTAL SUCRES
DIRECTOR	ING. CIVIL	-	-	-
SUB-DIRECTOR	ING. CIVIL	150.000	6	900.000
JEFE DE EST. AGRO NOMICOS	ING. AGRONOMO	90.000	2	180.000
EDAFOLOGIA	ING. AGRONOMO	75.000	8	600.000
JEFE DE HIDROLOGIA Y METEOROLOGIA	ING. CIVIL	90.000	3	270.000
ING. DE ESTUDIOS	ING. CIVIL	80.000	6	480.000
JEFE DE DISEÑO SIST. DE RIEGO	ING. CIVIL	110.000	6	660.000
DISEÑOS DE RIEGO Y DRENAJE	ING. CIVIL	90.000	60	5'400.000
JEFE DE DISEÑO EST. DE BOMBEO	ING. CIVIL	-	-	-
DISEÑO ELECTRICO	ING. ELECTRICO	90.000	3	270.000
DISEÑO MECANICO	ING. MECANICO	90.000	3	270.000
DISEÑO HIDRAULICO	ING. CIVIL	120.000	5	600.000
DISEÑO CASA DE MAQUINAS	ING. CIVIL	90.000	6	540.000
ESTUDIOS VIALES	ING. CIVIL	75.000	4	300.000
ESTUDIOS GEOTECNICOS Y DE SUELOS	ING. CIVIL	80.000	6	480.000
COSTOS Y PROGRAMACION	ING. CIVIL	80.000	1	80.000
ESPECIFICACIONES TECNICAS	ING. CIVIL	80.000	1	80.000
DOCUMENTOS DE LICITACION	ING. CIVIL	-	-	-

TOTAL

S/. 11'110.000

ESTUDIOS Y DISEÑOS
 DEL SISTEMA DE RIEGO-DRENAJE Y CAMINOS
 PARA 33.000 Ha. EN EL VALLE DEL DAULE

DISEÑOS PRELIMINARES

SUELDOS DEL PERSONAL TECNICO AUXILIAR Y ADMINISTRATIVO

ACTIVIDAD EN EL PROYECTO	SALARIO MENSUAL	H/M	TOTAL SUCRES
<u>TECNICO</u>			
DIBUJANTES	18.000	35	630.000
CALCULISTAS	20.000	72	1'440.000
JEFE DE DIBUJANTES	25.000	6	150.000
JEFE DE ARCHIVO	20.000	6	120.000
SUBTOTAL			2'340.000
<u>ADMINISTRATIVO</u>			
JEFE ADMINISTRATIVO	35.000	6	210.000
JEFE DE COMPRAS	20.000	6	120.000
CONTADOR	25.000	6	150.000
SECRETARIA EJECUTIVA	18.000	6	108.000
SECRETARIA TAQUIGRAFA	15.000	12	180.000
CONSERJE	7.800	12	93.600
CHOFERES	10.000	48	480.000
SUBTOTAL			1'341.600

T O T A L

S/. 3'681.600

ESTUDIOS Y DISEÑOS
DEL SISTEMA DE RIEGO-DRENAJE Y CAMINOS
PARA 33.000 Ha. EN EL VALLE DEL DAULE

VIAJES Y VIATICOS

CONCETO	CANTIDAD	COSTO DOLARES	TOTAL DOLARES	COSTO SUCRES	TOTAL SUCRES
A.					
Viajes y viáticos internacionales	13	1.100	14.300	-	-
Gastos de viaje y exceso de equipaje	3	250	750	-	-
Mudanzas de menaje personal	10	2.250	22.500	-	-
B.					
Viajes y viáticos en el Ecuador	648	-	-	600	384.000
TOTAL DE VIAJES Y VIATICOS			\$37.550		S/.384.000

SUBCONTRATOS Y SERVICIOS VARIOS

CONCEPTO	COSTO GLOBAL SUCRES
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1. TOPOGRAFIA	15'000.000
2. ESTUDIOS GEOTECNICOS Y DE SUELOS	15'000.000
3. ESTUDIOS SOCIALES Y SOCIO ECONOMICOS	10'000.000

VALOR TOTAL S/. 40'000.000

ESTUDIOS Y DISEÑOS
DEL SISTEMA DE RIEGO-DRENAJE Y CAMINOS
PARA 33.000 Ha. EN EL VALLE DEL DAULE

COSTOS DIRECTOS Y MISCELANEOS

CONCEPTO	CANTIDAD	V A L O R	T O T A L
		SUCRES	DOLARES
1. Suministro de materiales	global	2'000.000	5.000
2. Impresos, reproducciones	global	2'500.000	5.000
3. Teléfono, telégrafo, cables, correos y carga aérea	global	1'000.000	10.000
4. Traducciones	global	500.000	-
5. Seguros	global	1'000.000	-
6. Vehículos	8 u.	-	120.000
7. Operación y mantenimiento de vehículos	global	3'600.000	-
8. Muebles de Oficina	global	2'500.000	-
9. Máquinas y equipo de oficina	global	1'500.000	-
10. Arriendo de Oficina	20 meses	1'900.000	-
11. Computadora	global	1'000.000	-
12. Vigilancia y Limpieza de Oficina		400.000	-
T O T A L		17'900.000	140.000

DISEÑOS A NIVEL PRELIMINAR

[illegible]

SISTEMA DE RIEGO Y DRENAJE PARA 33.000 Ha. EN EL VALLE DEL DAULE

DISEÑOS A NIVEL PRELIMINAR

ACTIVIDAD	MESES	1	2	3	4	5	6	7	8	9	10	11
4 Diseño de la casa de máquinas y obras afines												
5 Viajes de reconocimiento a los lugares seleccionados												
6 Elaboración de planos.												
ESTUDIO Y DISEÑO DE LA RED DE DRENAJE												
1 Trazado, diseño y cálculo de los canales principales secundarios y ramales de drenaje												
2 Análisis y estudio de las alternativas de evacuación de caudales de drenaje, tanto por flujo directo por cauces naturales, como por bombeo seccional.												
3 Diseño preliminar de las estructuras de drenaje												
4 Viajes de inspección al campo												
5 Elaboración de planos.												
ESTACIONES DE BOMBEO PARA DRENAJE												
1 Selección del sitio, revisión, diseño hidráulico del sistema, selección preliminar del tipo de bomba.												
2 Diseño de casa de máquina												
3 Viajes de reconocimiento a los sitios seleccionados												
4 Elaboración de planos												
ESTUDIO Y DISEÑO VIAL												
1 Elaboración de Informe sobre el sistema vial existente y las necesidades que va a crear el proyecto.												
2 Diseño de la red vial del sistema, puentes vehiculares, peatonales y demás estructuras que el sistema así lo requiera.												
3 Elaboración de planos.												
CONTROL DE INUNDACIONES												
1 Revisión de los informes existentes, sobre áreas inundables en la zona Daule-Pula.												
2 Diseño de las obras necesarias para protección.												
ESTUDIOS SOCIALES Y SOCIO-ECONOMICOS												
1 Investigación de la Infraestructura de riego y drenaje existente												
2 Tenencia de la tierra												
3 Elaboración de planos.												

DISEÑOS A NIVEL DEFINITIVO

[illegible]

SISTEMA DE RIEGO Y DRENAJE PARA 33.000 Ha. EN EL VALLE DEL DAULE

DISEÑOS A NIVEL DEFINITIVO

ACTIVIDAD	7	8	9	10	11	12	13	14	15	16	17	18	19	20
7.5 Elaboración de Planos de diseño														
H. ESTACIONES DE BOMBEO PARA DRENAJE														
8.1 Diseño definitivo de las estaciones de bombeo														
8.2 Diseño estructural de la casa de máquina y obras auxiliares														
8.3 Elaboración de Planos de Diseño														
9. DISEÑO VIAL														
9.1 Revisión y diseño definitivo de los caminos principales y secundarios del sistema, puentes vehiculares.														
9.2 Diseño estructural de los puentes														
9.3 Elaboración de planos de diseño														
10. COSTOS DE CONSTRUCCION DEL PROYECTO														
11. CONSTRUCCION E INVERSIONES														
11.1 Cronograma de construcción														
11.2 Calendario de inversiones.														
12. ESPECIFICACIONES TECNICAS Y DOCUMENTOS DE LICITACION														

SUB-PROYECTO ESTUDIOS PARA DETERMINAR LOS IMPACTOS
Y EFECTOS DEL PROYECTO DAULE-PERIPA EN LA CALIDAD DE LAS AGUAS
DEL SISTEMA HIDROGRAFICO DEL RIO GUAYAS - (EC-0099)

A) INTRODUCCION

1.01 El proyecto de propósito múltiple Daule-Peripa forma parte del programa de desarrollo integrado de la cuenca del Río Guayas, del cual es uno de los principales aportantes. Comprende la construcción de una represa para el embalse por localizarse aguas abajo de la confluencia de los Ríos Daule y Peripa. Su finalidad primordial es facilitar la explotación agrícola intensiva de unos 1.000 Km² (500 Km² en la cuenca del Río Daule y otro tanto en la cuenca de la península de Santa Elena). Contempla además, la generación de energía hidroeléctrica y la regulación de los caudales del Río Daule para efectos de control de inundaciones y el mantenimiento de los caudales mínimos necesarios en la aducción para abastecer el sistema de agua potable de la ciudad de Guayaquil, así como para la contención de la penetración de aguas salinas debido al reflujo de las mareas.

B) EL PROBLEMA

1.02 El desarrollo de este proyecto, necesariamente inducirá cambios importantes causados por la modificación del régimen hidrológico del río y el embalse de sus aguas, el trasvase previsto de importantes caudales hacia otras cuencas, el uso intensivo de las aguas para efectos de riego y como consecuencia de todo ello, particularmente en lo referente al embalse y riego, el probable deterioro de la calidad del agua.

1.03 Teniendo en consideración que el proyecto en cuestión forma parte de un programa de gran importancia para el desarrollo económico integral de la región, mediante la utilización racional del recurso, y aunque su propósito fundamental va dirigido a incrementar la producción agropecuaria, su desarrollo debe considerar en forma integral los otros usos actuales y futuros del Río Daule, en cuanto a los efectos que sobre dichos usos, puedan tener los cambios en el régimen del río y en la calidad de sus aguas.

- 1.04 Entre los usos actuales y futuros más importantes que deberían ser tomados en cuenta por el proyecto, y cuyos efectos habrán que determinarse, pueden mencionarse el suministro de agua potable a la ciudad de Guayaquil y otras localidades; la utilización del Río Daule y más adelante del Río Guayas, como cuerpo receptor de aguas servidas de las localidades aledañas, particularmente Guayaquil, industrias alimenticias, así como su uso para el desarrollo de la pesca y recreación.
- 1.05 El cambio del régimen del río y la alteración de la calidad físico-química y bacteriológica del agua, podría generar mayores costos de tratamiento del agua para usos potables e industriales, aspectos éstos que el proyecto debe considerar en forma conjunta.
- 1.06 A la fecha se dispone de escasa información relacionada con la calidad natural de las aguas del Río Daule y de las fuentes actuales de contaminación y consecuentemente, es muy difícil estimar los cambios que se inducirían como resultado, por una parte por el represamiento, y por otra, por la contaminación agregada como resultado del arrastre de productos agro-químicos (tóxicos orgánicos) derivada de los retornos del riego.
- 1.07 Actualmente, las aguas del Río Daule son utilizadas, abajo de la zona de riego, como la fuente principal de abastecimiento de agua potable de la ciudad de Guayaquil y parcialmente para el desarrollo de la industria camaronera, entre otros usos. La degradación de la calidad del agua y su contaminación química podría tener efectos negativos en la ecología de los cuerpos de agua receptores, así como también podría obligar a realizar tratamientos correctivos previos a su uso para fines potables o en la industria alimenticia y, en casos extremos de presentarse alta contaminación química la podría hacer inutilizable para los usos aludidos.

C) CONCLUSIONES Y RECOMENDACIONES

1. Se considera indispensable que se lleve a cabo cuanto antes un estudio prospectivo de calidad del agua por medio de modelos matemáticos que permitan simular el impacto del proyecto Daule-Peripa sobre la misma, de manera que puedan definirse las acciones preventivas y correctivas que fueren necesarias para minimizar los efectos negativos del proyecto y asegurar una calidad del agua adecuada y sanitariamente segura para fines potables y otros usos.

DAULE-PERIPA (EC-0099)

CONTRATACION DE EXPERTOS PARA ESTUDIOS DE CALIDAD DE AGUAS

TERMINOS DE REFERENCIA PRELIMINARES

I) OBJETIVOS

Los objetivos específicos para la complementación de estudios de calidad de aguas en el Sistema Daule-Guayas como consecuencia de la operación de la presa Daule-Peripa son:

- 1.1 Conocer, con la aproximación que pueda lograrse en forma predictiva, la calidad de aguas resultante en el Embalse de la presa Daule-Peripa. Esta calidad de aguas resultará del efecto de posibles nutrientes y contaminantes en el agua embalsada. Esos nutrientes pueden ser naturales, llevados por aguas de escurrimiento o como aportes por vegetación. Especial énfasis, se dará a los procesos de eutroficación potencial que pueden originarse en el embalse.
- 1.2 Conocer las transformaciones que tendrá la calidad de agua en el embalse y en el Río Daule hasta los puntos de utilización y sus implicaciones tanto para el consumo humano, (agua potable para Guayaquil y otras localidades) como para el desarrollo de recursos hidrobiológicos (peces, camarones y otros) haciendo notar el impacto eventual que tendrán las variaciones en los niveles de salinidad en dichos recursos.
- 1.3 Estudiar el posible impacto de agro-químicos (especialmente pesticidas), como consecuencia del riego, en la calidad de agua de las tomas de agua actuales y previstas, incluyendo las que sirven al abastecimiento de agua potable a Guayaquil, así como cuáles serían los efectos potenciales de los mencionados pesticidas en los recursos hidrobiológicos, especialmente en los camarones.

II) REVISION DE LA INFORMACION DISPONIBLE

El equipo técnico nacional y los consultores deberán revisar la información disponible, entre la cual se encuentra el diseño de los estudios realizados para la elaboración del Plan Maestro de Alcantarillado de Guayaquil (Convenio ATN/SF-2190-EC), el cual contiene la información siguiente:

- 2.1 Se dispone actualmente, de modelos de calidad de aguas en el sistema de la cuenca del estuario del Guayas. Estos modelos han sido calibrados tomando como parámetros salinidad (cloruros) y bacterias coliformes.
- 2.2 El alcance de estos modelos incluye el Río Daule desde la población de Daule hasta su confluencia y el Río Babahoyo desde Samborondón hasta su desembocadura así como en toda la extensión del estuario del Guayas.
- 2.3 Para desarrollar estos modelos de carácter estacionario se contó con la información hidrológica, topográfica y batimétrica disponible y ampliada en los últimos años, así como con el resultado de muestras y análisis en 37 estaciones durante los últimos cuatro años. Además de ello, se midieron o estimaron las cargas de polución en los parámetros y períodos correspondientes y se efectuaron numerosas pruebas específicas.
- 2.4 Los modelos abarcan el período de verano y el de invierno. El sistema Daule-Babahoyo-Guayas se dividió en 77 segmentos.
- 2.5 Dada las características de estos modelos no se efectuaron determinaciones de tiempos de travesía, pruebas de descargas masivas de contaminantes (instantáneas), ni se determinaron áreas de sedimentación o lodos.
- 2.6 Tanto el modelo de salinidad como el de bacterias permiten conocer el impacto de los caudales estacionarios del período de estiaje que aporta el Río Daule, especialmente con referencia a la protección de la toma de la planta de agua potable que sirve a Guayaquil. También permiten apreciar los impactos que, en el mismo punto tendrán descargas actuales y futuras de aguas residuales, tratadas o no.

Como los modelos son lineales, pueden ser variados los caudales de aporte y efectuar simulaciones para apreciar impactos con diversas alternativas.

A este respecto, si varían los caudales o calidades de agua en los bordes superiores de los modelos en los parámetros citados, los modelos darán indicaciones de los nuevos escenarios resultantes en los puntos de interés.

- 2.7 Se deberá revisar la información que tiene el Instituto de Pesca relacionada al impacto que ocasionarían las variaciones de salinidad y el incremento de niveles de pesticidas en los recursos hidrobiológicos, especialmente en la zona del delta.

- 2.8 Se deberá revisar toda la información relacionada con la calidad de agua del sistema hidrológico Daule-Peripa-Guayas que pueda ser utilizada para los estudios propuestos, especialmente la que se encuentra en CEDEGE, EMAC-G, EMAP y otras instituciones ecuatorianas.

III) TAREAS A DESARROLLAR

La mayoría de las tareas a desarrollar están condicionadas por los siguientes aspectos:

- 3.1 Aunque los modelos desarrollados dan valores de constantes tales como dispersiones y transportes advectivos en los tramos o segmentos considerados, no pueden usarse para determinar concentraciones de tóxicos, especialmente pesticidas.
- 3.2 Las transformaciones o tasas de degradación complexivas de tóxicos en un cuerpo de agua son una combinación de tasas parciales tales como hidrólisis, evaporación, biólisis, fotólisis y sedimentación. A su vez, las tasas complexivas dependen de la proporción en que los tóxicos se dividen entre la materia suspendida en el agua y su disolución en el líquido.
- 3.3 En consecuencia, además de los trabajos de campo complementarios que exige el estudio del destino de pesticidas u otros tóxicos (tiempos de travesía, áreas de lodos y pruebas en el cuerpo de agua), habrá pruebas y ensayos de laboratorio que son indispensables para hallar y comprobar tasas de degradación, incluyendo los aspectos y parámetros que ocasionarían una eutroficación en el embalse.
- 3.4 Se considera que, con la guía de consultores cuya competencia así como la extensión de su eventual intervención se propone más adelante, deberían programarse como mínimo las siguientes tareas:
- 3.5 Trabajos de Campo
- 3.5.1 Estudios hidrológicos de tiempos de travesía (incluyen determinaciones de Rodamina B o WT con equipo de fluorometría así como determinaciones de longitudes, secciones y muestreos intensivos).
- 3.5.2 Determinaciones hidrológicas sobre caudales en diversos períodos (de complementación), áreas de lodos y secciones transversales de los cuerpos de agua.
- 3.5.3 Pruebas de descargas intensivas de contaminantes en ciertos tramos o de parámetros asociados, así como monitoreo de concentraciones actuales de pesticidas.

3.5.4 Monitoreo de sólidos suspendidos.

3.5.5 Establecer las variaciones en los niveles de salinidad y su posible impacto en los recursos hidrobiológicos, especialmente en el delta.

3.6. Trabajos de Laboratorio

3.6.1 Medición de los elementos orgánicos e inorgánicos que indiquen los diferentes grados y/o niveles de eutroficación en el embalse a construirse, en forma predictiva.

3.6.2 Determinaciones de coeficientes de partición del pesticida o tóxico predominante en aguas, lodos, peces y camarones.

3.6.3 Determinaciones de tasas (hidrólisis, evaporación, fotólisis, biólisis y sedimentaciones) en aguas y lodos. Incluye adquisición de datos meteorológicos y complementación con algunos datos de campo adicionales.

3.6.4 Determinación de los niveles de salinidad en diferentes tramos del sistema hidrológico del Río Daule.

3.7 Desarrollo del Modelo de Tóxicos

3.7.1 Estudio de la tasa complexiva.

3.7.2 Comprobaciones del modelo que se estructure.

3.7.3 Aplicación del modelo (en combinación eventual con los ya desarrollados respecto a bacterias y salinidad) para estudio de las cargas previstas y los límites de pesticidas a emplear.

3.8 Estudios Complementarios

3.8.1 Estudiar la posible calidad de agua resultante en el embalse de Daule-Peripa y su potencial para el desarrollo de recursos hidrobiológicos, especialmente peces.

3.8.2 Efectuar simulaciones con los modelos ya desarrollados y con el modelo de tóxicos para conocer el impacto de caudales derivados de la presa o los cursos de agua en la calidad de aguas en los puntos de interés.

3.8.3 Relacionar los resultados de los estudios de calidad de agua realizados en esta operación, con las simulaciones probabilísticas de la operación del embalse con el propósito de ayudar a establecer criterios y sistemas de manejo del mismo.

- 3.8.4 Elaborar un reglamento para el uso de agro-químicos para el sistema hidrográfico Daule-Peripa-Guayas que tenga el doble propósito de maximizar la producción agrícola e hidrobiológica y minimizar el impacto ambiental.

IV) INFORMES

El Consultor en Modelos de Calidad de Agua, en su calidad de Coordinador General de los estudios, conjuntamente con el Director del Equipo Técnico Nacional, deberán presentar a la Comisión Especial 1/, en tres ejemplares (destinados a cada una de las entidades representadas), con copia para el Banco, los informes que se detallan a continuación.

- a.- Un informe inicial en que se describa el plan de trabajo, metodología y cronograma para el desarrollo de los estudios.
- b.- Informes trimestrales de progreso, señalando las labores realizadas, avance de las diferentes actividades y la programación para el período siguiente.
- c.- Un informe final, en que se resuman las labores realizadas, los resultados obtenidos, y se formulen las conclusiones y recomendaciones pertinentes.

V) PLAZO DE EJECUCION

Se estima que los estudios de calidad de agua pueden ser desarrollados en un período de 18 meses y el estudio del impacto de agro-químicos en los recursos hidrobiológicos, en 12 meses, incluido en ambos casos el tiempo requerido para la presentación del Informe final.

CALIFICACION Y ALCANCE DE CONSULTORIAS

- 1) Se considera necesario contar con la asistencia de tres consultores y con la cooperación del Instituto de Pesca y disponer por lapsos limitados, de un asesor de amplia experiencia.

1/ Integrada por los Gerentes de CEDEGE, EMAP-G y EMAG

- 2) Los consultores y entidades a contratar serían:
 - a. Consultor en Modelos de Calidad de Aguas (incluyendo modelos de Tóxicos), quién actuará como Coordinador General de los estudios.
 - b. Consultor en Técnicas Agrícolas e impactos de pesticidas en recursos hidrobiológicos.
 - c. Consultor en Cromatografía de Gases.
- 3) El Asesor, del cual se retendrían sus servicios por lapsos limitados, debe ser un científico altamente capacitado en modelos y determinaciones relativas al destino de tóxicos en cuerpos de agua.
- 4) El Instituto de Pesca, quien firmaría un convenio o contrato con CEDEGE para estudiar los impactos y efectos que tendrán los pesticidas y otros agro-químicos, así como las variaciones de salinidad en el desarrollo de los recursos hidrobiológicos, especialmente en los camarones y peces. Además, el Instituto de Pesca apoyaría a CEDEGE para elaborar un estudio a nivel de factibilidad, para el desarrollo del embalse, bajo el punto de vista piscícola, el cual está considerado en el sub-proyecto de Manejo de Recursos Naturales Renovables del Sistema Hidrográfico Daule-Peripa-Guayas.
- 5) Las capacitaciones requeridas de los Consultores y de los profesionales del Instituto de Pesca serían las siguientes:

CONSULTOR A

- * Ingeniero Sanitario y/o Ambiental con experiencia amplia - 10 años mínimo - en el desarrollo y calibración de modelos de calidad de aguas en cuerpos de agua como embalses, estuarios y ríos, habiendo por lo menos intervenido en tres estudios realizados en cuerpos de agua de los tipos indicados anteriormente con rol preponderante.
- * Tendrá experiencia práctica en modelos de calidad de agua y/o tóxicos, sus técnicas conexas y en procesos de eutroficación.
- * En los trabajos anteriormente citados, deberá indicar algunas publicaciones o trabajos preparados a esos respectos.
- * El trabajo específico es desarrollar el modelo predictivo de concentraciones del tóxico en los puntos de interés, guiar los trabajos de campo, laboratorio y gabinete, así como los trabajos complementarios antes citados.

- * El alcance de la consultoría será la de guiar y supervisar periódicamente los trabajos citados, capacitar al personal local (excepto en el área de los otros consultores) y servir como Coordinador de la ejecución del Programa.

CONSULTOR B

- * Ingeniero Agrónomo o similar con experiencia en aplicaciones de técnicas de irrigación, así como en formas de empleo de agro-químicos especialmente pesticidas, y el impacto de éstos en los recursos hidrobiológicos.
- * Deberá programar algún trabajo de campo para conocer las relaciones e interacciones del riego en las áreas del proyecto, especialmente el impacto de las concentraciones de pesticidas de las aguas de retorno de proyectos de riego.
- * Contribuirá en la selección de los pesticidas preponderantes para ser usados en la forma que corresponda, en las áreas de irrigación, tomando en cuenta el impacto de éstos en los sistemas de abastecimiento de agua potable y en los recursos hidrobiológicos.
- * Asistirá en el asesoramiento del personal técnico de riego en el Proyecto Daule-Peripa en las técnicas de aplicación de pesticidas y su uso racional.
- * Deberá coordinar con el Instituto de Pesca, el establecimiento de un reglamento para el uso de agro-químicos, especialmente pesticidas, en la cuenca aportante del Río Guayas, con el propósito de evitar y/o mitigar impactos adversos a los sistemas de agua potable y a los recursos hidrobiológicos, especialmente camarones.

CONSULTOR C

- * Ingeniero Químico o similar, con 10 años de experiencia profesional, que deberá estar familiarizado, a través de actuación comprobada en la práctica, con las determinaciones de pesticidas y otros agro-químicos con cromatografía de gases y en el uso de manejo de este tipo de equipo y auxiliares.
- * El consultor deberá contribuir al entrenamiento de los técnicos locales a cargo de las determinaciones de concentraciones de pesticidas y otros agro-químicos en el agua.
- * Prestará asesoramiento en el uso del equipo seleccionado y, eventualmente, en las características del equipo más adecuado para las tareas a realizar.

- * La experiencia del Consultor deberá estar centrada en el uso de cromatografía en la determinación de concentraciones de pesticidas y otros agro-químicos en agua y en el alcance de los errores de estas determinaciones con los equipos que se seleccionen.

PROFESIONALES DEL INSTITUTO DE PESCA

- * Biólogo/s Marino/s o similar/es, con 10 años de experiencia en el manejo y desarrollo de recursos hidrobiológicos en zonas estuarinas tropicales y con amplios conocimientos del impacto que causan los agro-químicos, especialmente pesticidas, y las variaciones de niveles de salinidad, en el desarrollo y comportamiento de camarones, peces y otros crustáceos y moluscos.
- * Tendrá/n conocimiento/s y alguna experiencia práctica en modelos de tóxicos, técnicas conexas y en procesos de eutroficación de embalses tropicales, así como deberá/n indicar algunas publicaciones y trabajos preparados para tal efecto, relacionados éstos a los recursos hidrobiológicos.
- * La experiencia y conocimiento del/os consultor/es deberá/n ser focalizado/s al establecimiento de medidas y acciones que permitan el desarrollo continuo de los recursos hidrobiológicos, tanto en el embalse de Daule Peripa como en el delta del Río Guayas, tomando en cuenta principalmente el impacto de los pesticidas y niveles de salinidad en los camarones y peces del delta del Guayas y del embalse.
- * El alcance de la consultoría será el de elaborar un proyecto, a nivel de factibilidad, que incluya las medidas y acciones mencionadas en el punto anterior, estableciendo los modos operando técnico e institucional de dicho proyecto, así como guiar y capacitar en caso necesario al personal nacional de contrapartida (biólogo/s marino/s) en los métodos y procedimientos para mitigar y/o evitar el impacto de los pesticidas y de las variaciones de salinidad en los recursos hidrobiológicos, especialmente camarones.
- * Deberá/n coordinar con el Ingeniero Agrónomo o similar, el establecimiento de un reglamento para el uso de agro-químicos, especialmente pesticidas, en la cuenca aportante del río Guayas, con el propósito de evitar y/o mitigar impactos adversos a los recursos hidrobiológicos, principalmente camarones.

PROYECTO DE PROPOSITO MULTIPLE DAULE-PERIPA (EC-0099)

C E D E G E

ESTUDIOS DE CALIDAD DE AGUA

PRESUPUESTO TENTATIVO

(Miles de US\$ o su equivalente)

	<u>BID</u>	<u>LOCAL</u>	<u>TOTAL</u>
1. <u>CONSULTORES INDIVIDUALES</u>	<u>143.000</u>		<u>143.000</u>
1.1 <u>Emolumentos</u>			
a. Experto en modelos de calidad y coordinación del programa 100 días a US\$ 300/d.	30.000		30.000
b. Experto Agrícola 60 días a US\$ 275/d.	16.500		16.500
c. Experto en Técnicas de Labo- ratorio 60/d a US\$ 275/d.	16.500		16.500
1.2 <u>Servicios de Consulta de Alto Nivel</u>			
20 días experto a US\$ 1.000/d.	20.000		20.000
1.3 <u>Contratación del Instituto de Pesca</u>	60.000		60.000
2. <u>CONTRATACION Y NOMBRAMIENTO</u>	<u>43.000</u>		<u>43.000</u>
2.1 <u>Boletos de pasaje aéreo</u> 21 pasajes aéreos a US\$ 1.000 c/u	21.000		21.000
2.2 <u>Viáticos: 225 días a US\$ 80/d</u> 15 días a US\$ 120/d	18.000 1.800		18.000 1.800
2.3 <u>Otros Gastos (carga aérea, exceso equipaje, seguros, etc.</u>	2.200		2.200

	<u>BID</u>	<u>LOCAL</u>	<u>TOTAL</u>
3. <u>SERVICIO DE LABORATORIO DE AGUA ESPECIALES (GLOBAL)</u>	<u>20.000</u>		<u>20.000</u>
4. <u>ADQUISICION DE EQUIPOS DE LABORATORIO, MATERIALES, REACTIVOS, etc. (GLOBAL)</u>	<u>30.000</u>		<u>30.000</u>
5. <u>PERSONAL DE CONTRAPARTIDA</u>	<u>-</u>	<u>134.280</u>	<u>134.280</u>
5.1 Ingeniero Sanitario (18 m. a US\$ 1.300 US\$ 200/mes viático		27.000	27.000
5.2 Ingeniero Agrícola (18 m. a US\$ 1.300 US\$ 200/mes viático		27.000	27.000
5.3 Químicos 18 m. a US\$ 1.300		27.000	27.000
5.4 Técnico Sanitario Auxiliar 18 m x US\$ 750 US\$ 200/mes viático		17.100	17.100
5.5 Técnico Laboratorio 18 m x US\$ 750 US\$ 200/mes viático		17.100	17.100
5.6 Chofer 18 m x US\$ 360 US\$ 200/mes viático		10.080	10.080
5.7 Secretaria Bilingue 18 m. a US\$ 500		9.000	9.000
6. <u>APOYO GENERAL</u>		<u>27.000</u>	<u>27.000</u>
6.1 Facilidades de Oficina, Comunicaciones, Materiales, Informes, etc.		15.000	15.000
6.2 Transporte Local <u>1/</u>		<u>12.000</u>	<u>12.000</u>
SUB-TOTAL	236.000	161.280	397.280
IMPREVISTOS	<u>23.000</u>	<u>16.720</u>	<u>39.720</u>
<u>T O T A L</u>	<u>259.000</u>	<u>178.000</u>	<u>437.000</u>
%	59.3	40.7	100

1/ CEDEGE proporcionará un vehículo de transporte
 y una lancha pequeña con motor fuera de borda

SUBPROYECTO: ESTUDIOS PARA EL MANEJO Y CONSERVACION DE LOS RECURSOS
NATURALES RENOVABLES DEL SISTEMA HIDROGRAFICO DAULE-PERIPA GUAYAS

A) INTRODUCCION Y ANTECEDENTES

1. Impactos y Efectos Previsibles

- a) Para la construcción del embalse Daule-Peripa, será necesario reasentar unos 12,000 personas que se encuentran en las 30,000 Ha a ser inundadas, así como talar y quemar unas 10,000 Ha de vegetación permanente. Estas dos actividades son obviamente necesarias para evitar altos costos futuros que podrían derivarse del efecto de la putrefacción de biomasa. La tala, quema y si es posible el lavado de las cenizas, son acciones importantes para mitigar el proceso de eutroficación del embalse, garantizar su productividad piscícola y evitar cambios en la calidad del agua que podrían incrementar la corrosión metálica en las turbinas. Durante la tala y quema de la vegetación y llenado del embalse, será necesaria hacer actividades de salvamento de fauna silvestre, para lo cual tendrá que elaborarse un estudio a nivel de factibilidad, con la asistencia de consultores en dicha materia.
- b) Durante la operación del embalse, a construirse, los principales impactos previsibles están relacionados al ingreso de sedimentos y macrófitas al mismo, unos derivados de los procesos acelerados de erosión que hay en la cuenca aportante y los otros, por los aportes de plantas flotantes provenientes de aguas arriba y que podrían multiplicarse rápidamente, cubriendo grandes áreas del embalse. Otro posible impacto, es que el embalse y las áreas de riego podrán ser un medio para el desarrollo de vectores epidemiológicos que podrían generar y/o incrementar enfermedades tales como la malaria, oncocercosis, shistosomiasis y otras relacionadas con el agua.
- c) Si no se realiza la tala y quema de la vegetación de las 10,000 Ha. propuestas, hay posibilidades de que se incremente el riesgo de eutroficación del embalse a construirse, lo que afectaría la calidad físico-química y bacteriológica del agua, aumentando también los riesgos de corrosión y disminuyendo la capacidad de depuración del embalse.

B. SITUACION ACTUAL

1. Información Disponible

- a) Se dispone en CEDEGE de información, a nivel de semidetalle, de los subproyectos relacionados a la tala y quema de la vegetación y al establecimiento de la faja de protección del embalse, con vegetación permanente. El subproyecto de reasentamiento, se encuentra a nivel de factibilidad, pero estos tres proyectos deberán ser revisados para integrarlos en un Plan Ambiental, cuyo propósito final sea la ocupación del espacio. Los subproyectos relacionados al manejo de la cuenca aportante, el manejo de las macrófitas flotantes, y el desarrollo de la pesca en el embalse a construirse, el de medidas para la protección de la salud y el del salvamento de fauna, se encuentran como estudios a nivel de perfil (en algunos casos avanzado) y será necesario elaborarlos a nivel de factibilidad.
- b) Se considera que estos estudios y su implementación permitirán prevenir y/o mitigar los impactos y efectos ambientales negativos en el sistema hidrográfico Daule-Peripaguayas. Los mayores impactos se inician y podrían acelerarse, convirtiéndose en problemas de gran magnitud e importancia para la salud humana y el desarrollo de los recursos naturales renovables, si no se tomarían las medidas propuestas en los mencionados estudios.

2. Recomendaciones y Acciones a ser Implementadas

- a) Llevar a cabo los estudios siguientes:
 - (i) Manejo de los recursos naturales en la cuenca aportante.
 - (ii) Manejo de macrófitas flotantes, poniendo énfasis en el ingreso de las mismas al embalse a construirse.
 - (iii) Prevención de sectores epidemiológicos y mejoras en la salud humana.
 - (iv) Salvamento de fauna.

Paralelamente al estudio de manejo de macrófitas, se realizará un estudio para el desarrollo piscícola del embalse.

- b) Todos estos estudios deberán ser elaborados a nivel de factibilidad y/o diseño para su eventual financiamiento por parte de las instituciones internacionales y/o Gobierno de Ecuador.

C. TERMINOS DE REFERENCIA DE LOS CONSULTORES QUE COOPERARAN CON EL EQUIPO NACIONAL EN LA ELABORACION DE LOS ESTUDIOS A NIVEL DE FACTIBILIDAD PROPUESTOS EN EL PUNTO A.3.a

1. Objetivos

Los principales objetivos para la complementación de los estudios mencionados y que los Consultores tienen que tomar como marco de referencia, son los siguientes:

- a) Elaboración de un Plan de Ocupación del Espacio, basado en un ordenamiento territorial y la zonificación del uso de la tierra, que permita el uso sostenido y racional de los recursos naturales renovables; el control de los procesos de erosión, deforestación y otros en la cuenca Daule-Peripa aportante al río Guayas, así como las medidas y acciones que mitigarán los impactos y efectos ambientales negativos que podrán afectar la salud humana, como resultado del proyecto Daule-Peripa.
- b) Analizar la información referente al manejo y conservación de recursos naturales renovables, relacionada al sistema hidrológico Daule-Peripa-Guayas y otra pertinente que sea proporcionada por el equipo técnico nacional, CEDEGE u otra institución involucrada en el desarrollo de dicho sistema.
- c) El producto del Plan de Ocupación del Espacio, será un conjunto integrado de estudios a nivel de factibilidad, que permita a CEDEGE y otras instituciones nacionales, mitigar y/o prevenir los impactos y efectos ambientales negativos derivados de la construcción y operación del proyecto Daule-Peripa, así como el desarrollo de los recursos naturales renovables del sistema Daule-Peripa-Guayas, medido éste en términos y beneficios sociales, económicos y ambientales.

2. Tareas a Desarrollar

- a) Revisar el proyecto de reasentamiento para recomendar medidas para acelerar su implementación, así como revisar el convenio entre CEDEGE y el IERAC, el cual tiene como propósito el agilizar y facilitar la expropiación y/o intervención de las tierras, y acelerar la reubicación de los poblados que se afectarán con el embalse.
- b) Complementar a nivel de factibilidad, si este es el caso, el proyecto relativo a la tala y quema de aproximadamente 10,000 Ha de bosque húmedo tropical secundario y plantaciones de cacao, café, plátano, banano y otros cultivos permanentes. Habrá que reevaluar la necesidad de quemar la vegetación gramínea y arbustiva, principalmente entre las cotas 45 y 88 metros sobre el nivel del mar (m.s.n.m.). Este proyecto deberá realizarse inmediatamente después que

los terrenos sean expropiados y/o intervenidos por IERAC. Deberá analizarse la forma de acelerar el proceso de licitación y adjudicación de áreas para la tala y quema del bosque.

Estas son las acciones más importantes para mitigar los potenciales procesos de putrefacción de la vegetación y eutroficación en el embalse a construirse, lo que incide directamente en la calidad del agua y deberán estar finalizadas en 1987. Este Proyecto deberá ser planificado y coordinado con el del punto anterior para evitar demoras en su ejecución.

- c) Complementar a nivel de factibilidad, si así se requiere, el proyecto para la protección del embalse a construirse de los procesos de erosión, lo cual se realizará con el establecimiento de una faja protectora de vegetación permanente alrededor del embalse, con un ancho variable de 50 a 200 metros. Esta faja de vegetación deberá establecerse a partir de la cota 90 m.s.n.m. En la franja de protección, que tendría aproximadamente 6,200 Ha., se recomienda convenir con PRONAF un proyecto de reforestación y manejo, para lo cual será necesario establecer el convenio respectivo.
- d) Evaluar los criterios que CEDEGE ha esbozado para prevenir que la vegetación flotante entre al embalse a construirse y algunas investigaciones para el control de la misma. Se recomienda que el equipo técnico nacional y los consultores, elaboren a nivel de factibilidad, un estudio que tome las previsiones necesarias para evitar que a través de los ríos Daule-Peripa y otros, ingresen macrófitas, especialmente jacintos de agua (*Eichornia crassipes* o *speciosa*), lechuga de agua (*Pistia stratiotes*) y *Salvinia* sp. De no prevenirse el ingreso de vegetación flotante al embalse, ésta podría cubrir rápidamente el mismo, incrementándose la evapotranspiración afectando el sabor y calidad del agua, dificultando la operación del embalse y los costos económicos para el control y/o erradicación de dicha vegetación serían de gran magnitud.
- e) Los proyectos de manejo de recursos naturales de la cuenca aportante, de medidas preventivas para la protección de la salud, de salvamento de fauna y de desarrollo de recursos hidrobiológicos en el embalse mencionado están conceptualizados muy generalmente y diseñados para realizar investigaciones puntuales y obtener informaciones básicas para la conservación y manejo de recursos naturales renovables - suelo, agua, vegetación e hidrobiológicos - en la cuenca receptora del embalse, en el embalse y en el área de riego. En el caso del manejo de la cuenca aportante, el estudio deberá definir la forma de evitar los procesos acelerados

de erosión y se ordenará la cuenca en base del uso potencial del suelo, zonificándose los posibles usos de la tierra. Se recomienda que entidades como PRONAF y PRONACOS del MAG sean consultadas en este programa. Los programas de extensión agrícola y forestal deberán de ser prioritarios para minimizar el deterioro ecológico y ambiental.

- f) El recurso agua deberá ser sujeto de mediciones y análisis para vigilar sus características físicas y químicas y en general su calidad para garantizar el consumo humano, uso agrícola de riego y para desarrollo de recursos hidrobiológicos.
- g) Dentro de estas investigaciones, se recomienda realizar inventarios de peces y otros recursos hidrobiológicos, especialmente en el embalse a construirse, para determinar los impactos ecológicos de la presa y dicho embalse en la ictiofauna. Sin embargo, los aspectos hidrobiológicos están conceptualizados muy generalmente y CEDEGE a través del equipo técnico deberá convenir con el Instituto de Pesca y/o la Dirección General de Pesca, algunos criterios detallados para realizar el diagnóstico de la ictiofauna y las medidas preventivas y de control para mitigar los potenciales daños ecológicos.
- h) Dentro de los estudios de investigación, están contemplados los de salud, los cuales están a nivel de perfil. En el estudio se recomienda darle la máxima importancia a la acción preventiva, especialmente a las enfermedades que podrían derivarse de la construcción del proyecto y su operación. CEDEGE tendrá que presentar un Plan de Acción, convenido con el Ministerio de Salud u otra institución para implementar las investigaciones y estudios propuestos, incluyendo la medición de pesticidas y otros agroquímicos, así como las medidas preventivas y/o control para evitar riesgos a la salud humana.
- i) CEDEGE ha contemplado muy generalmente el proyecto de salvamento de fauna. Se deberá elaborar un estudio a nivel de factibilidad con su plan de contingencia para salvar in situ a la fauna, en el momento que se inicie el llenado del embalse, por lo que el estudio de factibilidad y la implementación del mismo, deberán ser prioritarios.

3. Aspectos Especiales y Recomendaciones que el Equipo Técnico Nacional y los Consultores tendrán que tomar en cuenta para la Elaboración de los Estudios a Nivel de Factibilidad y el Plan de Ocupación Especial.

- a) Se anticipan potenciales problemas de logística y financiamiento en la cooperación interinstitucional entre CEDEGE y las instituciones que están y tendrían que involucrarse en el manejo del embalse a construirse y de los recursos naturales renovables de la zona, así como en los programas de reasentamiento. Por consiguiente el equipo técnico deberá tratar de anticipar dichos problemas potenciales, incluirlos en los estudios y hacerlos del conocimiento de CEDEGE para que este tome las medidas necesarias para su corrección.
- b) En los estudios de manejo de recursos naturales renovables de la cuenca aportante, deberá incluirse la forma en que CEDEGE deberá promover la elaboración y aprobación de un decreto para desarrollar en el embalse mencionado y aguas arriba del mismo, zonas para bosques de protección, biotopos y bancos de germoplasma, así como reglamentos para el manejo y vigilancia de recursos naturales renovables, con el objeto de proteger el embalse de los procesos acelerados de erosión, sedimentación y contaminación.
- c) Sería conveniente que después que el equipo técnico y los consultores especializados revisen, complementen y/o elaboren los estudios de factibilidad propuestos, se traspasara a la Unidad Ejecutora del Proyecto, la responsabilidad de la implementación de los proyectos a ejecutarse, para evitar dispersión de esfuerzos y duplicidad de funciones. La CEDEGE deberá tomar las previsiones necesarias para contar con los recursos indispensables - económicos, logísticos y de personal capacitado - para ejecutar los programas y acciones que se deriven de los estudios del Plan Ambiental.
- d) CEDEGE deberá considerar la necesidad, reactivar y ampliar el convenio interinstitucional de cooperación y coordinación entre IEOS, EMAG y CEDEGE, firmado el 5 de junio de 1981 para el manejo del recurso agua y otros afines a largo plazo. En este nuevo convenio deberá darse especial énfasis al control de calidad y manejo múltiple del agua (hidroelectricidad, riego, control de inundaciones, agua potable para Guayaquil, como afectaría las aguas con pesticidas, sin sedimentos y con muy pocos nutrientes la pesca en el delta del Guayas etc.) para lo cual se recomienda que se continúe con la implementación de modelos matemáticos que simulen las condiciones hidrológicas y otras del río Guayas y el impacto del desarrollo del Proyecto Daule-Peripa en el mismo. Sería conveniente que EMAP, INERHI y el Instituto de Pesca participaran en este nuevo convenio.

E. INFORMES

El Director del Equipo Nacional del Proyecto con el apoyo del Consultor en Manejo de Cuencas deberá presentar a CEDEGE, con copia al BID, los informes que se detallan a continuación:

1. Un informe inicial en el que se describa el plan de trabajo, metodologías y cronograma para la elaboración de los estudios de factibilidad.
2. Informes trimestrales de progreso, señalando las labores realizadas, el avance de los diferentes estudios, detallando las actividades ejecutadas, así como la programación para el período (trimestre) siguiente:
3. Un informe final, en el que se resuman las labores realizadas, los resultados obtenidos, se formulen las conclusiones y recomendaciones y se anexen los estudios de factibilidad.

F. PLAZO DE EJECUCION

Se estima que los estudios de referencia, incluido el tiempo requerido para la presentación del informe final, pueden ser desarrollados en un periodo de 15 meses. Se reitera que el estudio de salvamento de fauna debe ser elaborado e implementado prioritariamente.

G. CALIFICACIONES Y ALCANCES DE LAS CONSULTORIAS

1. Para elaborar, a nivel de factibilidad, los estudios mencionados anteriormente, se necesita contratar a los consultores siguientes:
 - a) Un Consultor en Manejo y Conservación de Cuencas, con especialidad en desarrollo de Recursos Naturales Renovables.
 - b) Un Consultor en Manejo de Macrófitas Flotantes y Desarrollo de Recursos Hidrobiológicos en Embalses.
 - c) Un consultor en Salud Pública y Control de Vectores Epidemiológicos.
 - d) Un Consultor en Salvamento de Fauna
 - e) Un Consultor en Economía Agrícola.
2. Las calificaciones y capacidades de los consultores son las siguientes:

A. Consultor en Manejo y Conservación de Cuencas

- i) Será el co-responsable de los aspectos técnicos del sub-proyecto y sus programas; co-responsable de la elaboración de los estudios de factibilidad de los diferentes programas contemplados, especialmente de los estudios de factibilidad para el manejo y conservación de la cuenca aportante, así como de la preparación de la eventual documentación para las solicitudes de financiamiento que se deriven de la cooperación técnica.
- ii) Supervisará las actividades de los consultores que participarán en la elaboración de los estudios de factibilidad y realizará las actividades administrativas de la parte correspondiente del sub-proyecto.
- iii) De preferencia será un Ingeniero Agrónomo, especializado en Planificación y Manejo de Cuencas y/o Conservación de Suelos y Agua. Debe tener una experiencia práctica de diez (10) años de servicios en actividades y regiones similares a la Cuenca del Río Guayas. Su nivel profesional mínimo debe ser la Maestría. Debe conocer y dominar el idioma español. Su salud debe ser excelente.
- iv) Deberá tener conocimiento y experiencia en los siguientes aspectos:
 - Dirección y administración técnica y gerencial de proyectos de manejo de cuencas, desarrollo rural y conservación de recursos naturales renovables.
 - Diseño y ejecución de obras y sistemas de conservación de suelos y agua, así como conocimiento general de manejo forestal.
 - Propuesta de políticas, mecanismos y estrategias de desarrollo rural, incluyendo incentivos legales, fiscales y técnicos para la conservación de recursos naturales.
 - Interpretación de fotografías aéreas, análisis cartográfico y de mapas temáticos de uso potencial de la tierra, suelos, hidrología general, bosques y en inventarios de suelos.

- Aplicación de métodos y sistemas para cuantificar el deterioro y pérdidas de recursos naturales, especialmente del suelo.
- Sistemas de extensión para promover y hacer a la población participar en el manejo, conservación y desarrollo de los recursos naturales renovables.
- Diseño de planes de ocupación del espacio, ordenamiento territorial y zonificación del uso de la tierra para su manejo racional.

B. Consultor en Manejo de Macrófitas Flotantes

- i) Será el asesor de los aspectos técnicos y co-responsable en la elaboración de los estudios de factibilidad relativos al ingreso y/o manejo de las macrófitas flotantes en el embalse y su prevención, así como en la elaboración del estudio de factibilidad para el desarrollo de los recursos hidrobiológicos del embalse.
- ii) Supervisará las actividades del personal nacional (biólogos) que serán responsables de la elaboración de los estudios mencionados en el punto precedente y revisará el estudio de factibilidad respectivo, elaborado por el equipo técnico nacional.
- iii) De preferencia será un biólogo, especializado en desarrollo de recursos hidrobiológico y en manejo de macrófitas en embalses. Su experiencia práctica deberá ser de un mínimo de cinco (5) años en embalses similares a los de Daule-Peripa y en habitats como el delta del Guayas. Su nivel profesional mínimo debe ser la Maestría. Su conocimiento del idioma español y su salud deberán ser excelentes.
- iv) Deberá tener conocimiento y experiencias en los siguientes aspectos:
 - Elaboración de estudios a nivel de factibilidad sobre desarrollo de recursos hidrobiológicos en embalses tropicales y sobre manejo de macrófitas y sus métodos de control.
 - Diseños y ejecución de proyectos piscícolas y otros afines en áreas tropicales, con especial énfasis en acuicultura.

- Especies hidrobiológicas de agua dulce de mayor rendimiento económico y menor impacto ambiental para embalses tropicales.
- Impactos de macrófitas en las obras de ingeniería de proyectos hidroeléctricos y experiencia en el manejo y control de vegetación flotante en embalses.
- Conocimiento de huéspedes que pueden generar vectores epidemiológicos que deterioren la salud pública y cuyo habitat sean los embalses y/o distritos de riego.
- Propuesta de mecanismos y estrategias de desarrollo de recursos hidrobiológicos por medio de incentivos.
- Conocimiento y experiencia sobre el impacto de pesticidas en los recursos hidrobiológicos.

C. Consultor en Salud Pública

- i) Será el asesor de los aspectos técnicos y co-responsable en la elaboración de los estudios de factibilidad relativas a la salud. Cooperará con el personal de CEDEGE y con el Ministerio de Salud.
- ii) Supervisará las actividades del personal nacional de contrapartida que serán responsables del estudio mencionado en el punto anterior y revisará el estudio de factibilidad respectivo, elaborado por el equipo nacional.
- iii) De preferencia será un médico, especializado en enfermedades tropicales derivadas de la construcción y operación de embalses y tendrá conocimientos de los impactos y efectos de los vectores epidemiológicos asociados al recurso agua. Tendrá una experiencia práctica de diez (10) años en áreas similares a las del embalse Daule-Peripa y su área de influencia. Su conocimiento del idioma español y salud deberán ser excelentes.
- iv) Tendrá que tener conocimiento y experiencia en los siguientes aspectos:
 - Elaboración de estudios a nivel de factibilidad de planes y programas de salud, especialmente preventivos del tipo esbozado por CEDEGE-Ministerio de Salud.

- Diseño de ejecución de programas sanitarios y de salud, especialmente los relacionados con enfermedades asociadas a recursos hídricos (embalses y distritos de riego) y las formas de prevenirlas.
- Experiencia en el impacto y efectos de los proyectos hidroeléctricos en la calidad de vida humana y las medidas para evitar dichos impactos.
- Evaluación de los impactos de contaminantes, especialmente pesticidas en la salud humana.

D. Consultor en Salvamento de Fauna

- i) Será el asesor de los aspectos técnicos y co-responsable de los estudios de factibilidad de salvamento de fauna.
- ii) Supervisará las actividades del personal nacional (biólogo y agrónomo) que serán responsables de la elaboración de los estudios mencionados en el punto precedente. Revisará el estudio de factibilidad elaborado.
- iii) De preferencia será un biólogo o similar, especializado en proyectos de salvamento de fauna en regiones tropicales y en particular en áreas a ser embalsadas y/o quemadas. Su nivel profesional deberá ser la maestría y tener una experiencia práctica en áreas similares a las del embalse Daule-Peripa de cinco (5) años. Debe conocer el español fluidamente y tener una excelente salud.
- iv) Deberá tener conocimiento y experiencia en los siguientes aspectos:
 - Elaboración de estudios de factibilidad de proyectos de salvamento de fauna, así como de su implementación.
 - Haber ejecutado proyectos de salvamento de fauna en países con habitats similares a los del río Guayas.
 - Traslado y reubicación de fauna silvestre a zonas de refugio.
 - Establecimiento de zonas de protección y de refugio de vida silvestre.
 - Desarrollo de metodologías y sistemas para salvamento de fauna.

E. Consultor en Economía Agrícola

- i) Sus funciones serán principalmente las de analizar económica y financieramente los diferentes programas y subprogramas del Plan de ocupación del espacio y colaborará con el equipo técnico nacional y los consultores del proyecto en la elaboración de los estudios de factibilidad.
- ii) Será el co-responsable de los aspectos económicos y financieros del referido plan y sus sub-proyectos, así como del análisis institucional de los organismos nacionales que ejecutarán el Plan.
- iii) De preferencia será un Economista Agrícola o Ingeniero especializado en Economía Agrícola. Su experiencia práctica debe ser como mínimo de diez (10) años y haber elaborado análisis económicos y financieros en proyectos agrícolas, agropecuarios, forestales y de manejo de recursos naturales. Su nivel profesional debe ser a nivel de Maestría o Superior. Debe hablar, escribir y leer perfectamente el idioma español y ser capaz de sintetizar información. Su salud debe ser excelente.
- iv) Deberá tener experiencias en los siguientes aspectos:
 - Planificación agrícola y formulación de proyectos de desarrollo agropecuario forestal y de recursos hidrobiológicos y en menor grado, de salud.
 - En análisis de costo/beneficio, cuantificación de beneficios sociales y ambientales, cálculos de costos de producción, cultivos, comercialización y programas de extensión rural.
 - Procesos y sistemas de evaluación económica para proyectos ambientales y de zonificación del uso de la tierra.
 - Análisis económico que permita recomendar áreas mínimas que sean rentables, a nivel de finca, y en base a diversos usos de la tierra.
 - Desarrollo de incentivos conservacionistas para programas de manejo y conservación de recursos naturales.
 - Presentación de solicitudes de financiamiento a entidades internacionales de desarrollo.

ECUADOR - (0099-EC)

PROYECTO DE PROPOSITO MULTIPLE DAULE PERIPA

C E D E G E

ESTUDIOS A NIVEL DE FACTIBILIDAD PARA ELABORAR UN PLAN DE OCUPACION

DEL ESPACIO DEL SISTEMA HIDROGRAFICO DAULE-PERIPA-GUAYAS

A TRAVES DE PROGRAMAS DE MANEJO Y CONSERVACION DE

RECURSOS NATURALES

	<u>BID</u>	<u>Local</u>	<u>Total</u>
1. CONSULTORES INDIVIDUALES			
1.1 Emolumentos	150.000		150.000
a) Consultor en Manejo y Conser- vación de Cuencas <u>1/</u> (15 meses x US\$3.500/mes + gastos generales, insta- lación, viáticos, etc.)	75,000		75,000
b) Consultor en Manejo de Macró- fitas flotantes <u>2/</u> 60 días a US\$250/día	15,000		15,000
c) Consultor en Salud Pública <u>1/</u> 90 días a US\$250/día	22,500		22,500
d) Consultor en Salvamento de fauna <u>1/</u> 60 días a US\$250/día	15,000		15,000
e) Consultor Economista Agrí- cola <u>5/</u> 90 días a US\$250/día	22,500		22,500
2. TRANSPORTE	41,400		41,400
2.1 Pasajes aéreos -15 pasajes a US\$1.000 c/u	15,000		15,000
2.2 Viáticos en Ecuador -300 días a US\$80	24,000		24,000
2.3 Otros Gastos -(carga aérea, seguros, exceso de equipaje)	2,400		2,400

	<u>BID</u>	<u>Local</u>	<u>Total</u>
3. SERVICIOS DE LABORATORIO DE SUELOS (global)	<u>2,000</u>		<u>2,000</u>
4. ADQUISICION DE EQUIPO DE LABORATORIO (portátil) de suelos	<u>5,000</u>		<u>5,000</u>
5. PERSONAL NACIONAL DE CONTRAPARTIDA		<u>162,300</u>	<u>162,300</u>
5.1 Ingeniero Agrónomo (Manejo de Cuencas -(15 m a US\$1.300 y US\$ 200/m.viático)		22,500	
5.2 Biólogo o similar (Manejo de Macrofitas y desarrollo piscícola del embalse) -(12 m a US\$1.300 y US\$200/m. viáticos).		18,000	
5.3 Médico o similar (Proyecto Salud Pública) -(12 m a US\$1.500 y US\$200/mes viáticos).		20,400	20,400
5.4 Biólogo, Ing. Agrónomo o similar (Salvamento de fauna) -(12 m a US\$1.300 y US\$200/m, viáticos).		18,000	18,000
5.5 Economista Agrícola o similar (Análisis económico) -(12 m. a US\$1.300 y US\$200/m viáticos).		18,000	18,000
5.6 Ing. Hidrólogo (Director del Proyecto y responsable de estudios de calidad de agua y factibilidad -(15 m a US\$1.500/m y US\$200/m viáticos).		25,500	25,500
5.7 2 Técnicos Auxiliares -(2 x 15 meses x US\$600/m y US\$200/m viáticos).		24,000	24,000
5.8 Chofer(15 meses x US\$360/mes y US\$200/mes viáticos).		8,400	8,400
5.9 Secretaria (15 meses x US\$500/mes)		7,500	7,500

	<u>BID</u>	<u>Local</u>	<u>Total</u>
6. APOYO GENERAL		27,000	27,000
6.1 Facilidades de comunicaciones, materiales, informes etc.		15,000	15,000
6.2 Transporte local <u>7/</u>		12,000	12,000
E. <u>Subtotales:</u>	<u>198,400</u>	<u>189,300</u>	<u>387,700</u>
Imprevistos	<u>19,600</u>	<u>18,700</u>	<u>38,300</u>
<u>GRAN TOTAL:</u>	<u>218,000</u>	<u>208,000</u>	<u>426,000</u>
	=====	=====	=====
	51.2%	49.8%	100%

- 1/ Este consultor estará durante todo el período de elaboración del plan de ocupación del espacio y los proyectos de manejo y conservación de recursos naturales.
- 2/ Este consultor participará tres veces durante los doce meses de duración del estudio. Una vez, al inicio del estudio para orientar a la parte nacional; la segunda vez para revisar el desarrollo del mismo y la tercera vez, para revisar el estudio de factibilidad, previo a su aprobación final por CEDEGE.
- 3/ Igual al anterior, específicamente en el campo de salud.
- 4/ Igual al número 2 precedente, específicamente en Salvamento de Fauna.
- 5/ Igual al número 2 precedente, específicamente para orientar y revisar los estudios de factibilidad.
- 6/ Este profesional será el Director del Proyecto y responsable de este grupo de proyectos del plan de ocupación del espacio, y de los estudios de agua.
- 7/ CEDEGE proporcionará un vehículo de transporte y una lancha pequeña con motor fuera de borda para apoyar la elaboración de los estudios correspondientes.

PLAN AMBIENTAL DEL PROYECTO DE PROPOSITO MULTIPLE " JAIME ROLDOS AGUILERA "

CUADRO DE COSTOS (US\$)

REGISTRACION DE SUB-PROYECTOS

	Salario Consult.	Viático Consult.	Contrat. Servicios	Equipo y Mat.	Pasajes Aéreos	O. Gtos. Transp.	Transp. Local	Salario Prof.Nac.	Viático Prof.Nac.	Apoyo Gral.	Imprev.	Totales
Indicadores de Calidad de Agua	83.000	19.800	80.000	30.000	21.000	2.200	12.000	112.680	21.600	15.000	39.720	437.000
Indicadores de Manejo y Servicio Rec. Nat.	150.000	24.000	2.000	5.000	15.000	2.400	12.000	137.700	24.600	15.000	38.300	426.000
Totales:	233.000	43.800	82.000	35.000	36.000	4.600	24.000	250.380	46.200	30.000	78.020	863.000

PROGRAMA DE DESEMPEÑOS

1985	172.000	32.200	14.750	33.000	25.200	2.400	17.000	198.240	34.400	21.000	57.120	607.310
1986	61.000	11.600	47.250	2.000	10.800	2.200	7.000	52.140	11.800	9.000	20.900	235.690
1987			20.000									20.000
Totales:	233.000	43.800	82.000	35.000	36.000	4.600	24.000	250.380	46.200	30.000	78.020	863.000

	1985		1986		1987		TOTAL		GRAN TOTAL			
	BID	LOCAL	BID	LOCAL	BID	LOCAL	BID	LOCAL				

FINANCIAMIENTO DEL PLAN AMBIENTAL

glosario

Consultores												
a) Salarios	172.000		61.000				233.000					
b) Viáticos	32.200		11.600				43.800					
Contratación de Servicios	14.750		47.250		20.000		82.000					
Equipos y Materiales	33.000		2.000				35.000					
Transporte y Pasajes												
a) Pasajes Aéreos	25.200		10.800				36.000					
b) Carga y Otros	2.400		2.200				4.600					
c) Transporte Local		17.000		7.000				24.000				
Personal Nacional												
a) Salarios		198.240		52.140			250.380					
b) Viáticos		34.400		11.800			46.200					
Apoyo General		21.000		9.000				30.000				
Sub-Totales	279.550	270.640	134.850	79.940	20.000		434.400	350.580		784.980		
Imprevistos	27.450	27.360	13.150	8.060	2.000		42.600	35.420		78.020		
TOTALES:	307.000	298.000	148.000	88.000	22.000		477.000	386.000		863.000		

Modelo

Términos de Referencia Modelo de Operación del Sistema Eléctrico Interconectado Incluyendo Daule Peripa

Para la correcta operación del embalse de Daule Peripa así como para conocer la medida en que usos del agua adicionales a los considerados afectan la utilización del embalse en la generación de energía eléctrica, es necesario disponer de un modelo matemático que permita simular su operación en forma conjunta con el resto del sistema eléctrico interconectado.

Dicho modelo debe permitir la comparación de diferentes reglas de operación del embalse de tal manera que puedan establecer criterios para la selección de aquello que maximice los beneficios de la utilización del agua del embalse dentro de las limitaciones impuestas por cada uso.

A continuación se detallan algunas de las principales características que debería poseer el modelo requerido.

1. Debe ser un modelo de simulación que permita investigar varias reglas de operación. La complejidad del problema no hace aconsejable por el momento un modelo de optimización global. Sin embargo, métodos de optimización podrían ser utilizados como submodelos en la solución de aspectos específicos.

2. La naturaleza aleatoria de la hidrología es de especial importancia siendo necesario utilizar la generación multivariada de trazas de caudales en cada uno de los sitios de los posibles desarrollos hidroeléctricos (incluyendo el embalse de Daule Peripa). El modelo podría constar por lo tanto de un submodelo de generación aleatoria de caudales y de un submodelo de operación propiamente dicho.
3. Puesto que las características del sistema, demandas, proyectos, área regada en Daule, cambian con el tiempo, el modelo debe ser dinámico y estar en condiciones de simular un horizonte de planeamiento de por lo menos 10 años.
4. El modelo de generación de caudales debe ser tal que permita preservar las estadísticas principales de las series de tiempo de los caudales, tales como medias, variantes, correlaciones cruzadas y en serie etc.
5. El submodelo de operación del sistema debe contener un módulo de operación del embalse que permita simular diversas configuraciones de proyectos hidroeléctricos en serie o en paralelo, siguiendo reglas de operación preestablecidas determinando la generación eléctrica asociada a cada configuración. Para una demanda de electricidad dada y una generación de plantas hidroeléctricas, el submodelo de operación debe contener un segundo modelo que efectúe el despacho económico del parque térmico del sistema y estimar los

costos de combustibles utilizados. Para efectuar este despacho podrían utilizarse subrutinas de optimización tales como programación lineal etc.

6. Dentro del conjunto anterior el proyecto de Daule Peripa se representará en forma más detallada, estableciendo las demandas estacionales de riego, agua potable etc. y definiendo diferentes desembalses para energía con el objeto de evaluarlos estableciendo sus implicaciones sobre el cumplimiento en las metas de los otros usos.

7. El modelo no determina automáticamente la expansión de la generación del sector eléctrico, sin embargo puede ser utilizado para comparar diferentes senderos de expansión determinado con otros modelos más generales.

8. El modelo debe producir como resultados para cada mes de la simulación por lo menos: generación esperada de cada planta del sistema. Costo esperado de generación térmica. Probabilidad de atender la demanda de electricidad total de cada uno de los otros usos de Daule Peripa. Magnitud del deficit esperado clasificado de acuerdo al tamaño del mismo.

9. El modelo debe ser montado en un computador a disposición de CEDEGE y del INECCEL que serían los usuarios y debe contar con un cuidadoso manual del usuario indicando datos de entrada, diagramas de flujo, listados del programa. El lenguaje de programación a utilizar debe ser convenido con el INECCEL y CEDEGE. Personal técnico del INECCEL y CEDEGE debe participar en la definición de los aspectos conceptuales y estar debidamente entrenado de tal manera que pueda introducir cambios y ajustes del programa.
10. El modelo debe tener la capacidad de operar en por lo menos las condiciones generales o módulos. El módulo 1 contempla la simulación detallada del embalse de Daule Peripa y el sistema interconectado y deberá ser utilizado para definir las reglas de operación estableciendo los trade-off entre energía y otros usos. El Módulo 2 considera una simulación detallada del sistema del Daule Peripa solo sin la operación el sistema eléctrico el cual es representado por una demanda dada de electricidad. La utilidad de este módulo permitiría a CEDEGE analizar las alternativas del sistema Daule siempre que cumpla con una restricción eléctrica.

En forma análoga el Módulo 3 representaría las restricciones en el Daule Peripa en forma más simplificada conservando el sistema interconectado y le permitiría al INECCEL comparar alternativas futuras de expansión considerando la operación del proyecto Daule como determinante.

CATEGORIA I - (DESAGREGACION)

1.1	<u>Ingeniería y Administración - US\$ 14'960</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>
	Unidad Ejecutora	0.33	1.00	2.03	1.42	1.20	1.20	1.20	1.20	0.70
	Convenios						0.06	0.06	0.06	
	Estudios R.N.						0.37	0.06		
	Estudios Calidad Agua						0.24	0.20		
	Modelo Simulación						0.01	0.01		
	Asist. Técnica Agr.						0.12	0.17	0.19	0.22
	Estudios 33.000 Ha.							1.50	1.41	
	US\$ 14'96	0.33	1.00	2.03	1.42	1.20	2.0	3.20	2.86	0.92
1.2	<u>Estudios Presa - US\$ 2'340</u>									
	US\$ 2'34	0	1.42	0.08	0	0.01	0.23	0.23	0.24	0.13
1.3	<u>Estudios de Riego - US\$ 0'100</u>									
	US\$ 0'10	0	0	0	0	0.05	0.05	0	0	0
1.4	<u>Supervisión Const. Presa - US\$ 12'19</u>									
	US\$ 12'19	0	0	1.05	2.13	2.10	2.12	2.23	2.01	0.55
1.5	<u>Supervisión Const. Zona Riego - US\$ 3'16</u>									
	US\$ 3'16	-	-	-	-	0.32	0.85	0.85	0.85	0.29
1.6	<u>Junta de Consultores - US\$ 0'30</u>									
	US\$ 0'30	0	0.01	0.03	0.05	0.09	0.05	0.05	0.02	
1.7	<u>Consultor U.E.P. - US\$ 0'04</u>									
	US\$ 0'04	-	0.04	-	-	-	-	-	-	-
1.8	<u>Consultores Administración Financiera - US\$ 0'33</u>									
	US\$ 0'33	-	-	-	-	0.13	0.20	-	-	-
	TOTAL CAT. I - US\$ 33'42	0.33	2.47	3.19	3.60	3.90	5.50	6.56	5.98	1.89

E C U A D O R

Daule-Peripa (EC-0099)

Costos Totales por Sub-Categorías

<u>Categoría II: Costos Directos</u>		<u>204.36</u>
2.1	Caminos, Campamentos y Varios	11.08
2.2	Túneles	18.53
2.3	Tomas y Accesorios	19.40
2.4	Represa	41.41
2.5	Vertedero	32.02
2.6	Diques y Vert. Emergencia	33.84
2.7	Estaciones de Bombeo Riego	8.74
2.8	Estaciones de Bombeo Drenaje	4.59
2.9	Canales Riego y Drenaje	30.62
2.10	Obras Complementarias	4.13
Sub-total		<u>204.36</u>

<u>Categoría III: Equipos y Maquinaria</u>		<u>2.86</u>
3.1	Vehículos Operación y Mantenimiento	0.26
3.2	Equipos de Mantenimiento y Operación	2.50
3.3	Vehículos Supervisión Obras	0.10
Sub-total		<u>2.86</u>

<u>Categoría IV: Preparación Tierra a Nivel de Granja</u>		<u>6.80</u>
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<u>Categoría V: Costos Concomitantes</u>		<u>22.93</u>
5.1	Terrenos	
	Compra terrenos, presa, campamento y caminos, y bancos de préstamo	2.30
5.2	Programa de Reubicación de Zona Inundada	
a)	Expropiación en el vaso	14.9
b)	Reubicación poblados	3.5
		<u>18.40</u>
5.3	Reasentamiento en la Zona Riego	
a)	Derechos vía (canales, vías, estaciones de bombas y campamentos (1350 has)	1.50
b)	Expropiación para redistribuir a cooperados	0.73
		<u>2.23</u>

E C U A D O R

Daule-Peripa (EC-0099)

Cronograma de Inversión (sin Imprevistos)

<u>Categorías</u>	<u>Costo</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>
<u>I. Ingeniería, Administración y Supervisión</u>	<u>33.42</u>	<u>0.33</u>	<u>2.47</u>	<u>3.19</u>	<u>3.60</u>	<u>3.90</u>	<u>5.50</u>	<u>6.56</u>	<u>5.98</u>	<u>1.89</u>
1.1 Ingeniería y Administración	14.96	0.33	1.00	2.03	1.42	1.20	2.00	3.20	2.86	0.92
1.2 Estudios presa	2.34	-	1.42	0.08	0	0.01	0.23	0.23	0.24	0.13
1.3 Estudios de Riego	0.10	-	-	-	-	0.05	0.05	-	-	-
1.4 Superv. Construcción Presa	12.19	-	-	1.05	2.13	2.10	2.12	2.23	2.01	0.55
1.5 Superv. Const. Obras Riego	3.16	-	-	-	-	0.32	0.85	0.85	0.85	0.29
1.6 Junta Consultores	0.30	-	0.01	0.03	0.05	0.09	0.05	0.05	0.02	-
1.7 Consult. UEP	0.04	-	0.04	-	-	-	-	-	-	-
1.8 Consult. Admón. Fin.	0.33	-	-	-	-	0.13	0.20	-	-	-
<u>II. Costos Directos</u>	<u>204.36</u>	-	<u>1.92</u>	<u>24.72</u>	<u>18.09</u>	<u>32.79</u>	<u>34.47</u>	<u>48.37</u>	<u>41.52</u>	<u>2.48</u>
2.1 Caminos, Camp. y Varios	11.08	-	1.92	2.32	0.54	2.59	1.60	1.60	0.51	-
2.2 Túneles	18.53	-	-	2.60	8.52	7.41	-	-	-	-
2.3 Tomas y Accesorios	19.40	-	-	8.00	7.26	2.00	2.14	-	-	-
2.4 Represa	41.41	-	-	4.56	0.90	5.95	11.00	10.00	9.00	-
2.5 Vertedero	32.02	-	-	3.52	0.87	6.63	5.00	9.00	7.00	-
2.6 Diques y Vert. Emerg.	33.84	-	-	3.72	-	4.11	4.40	10.00	11.61	-
2.7 Estac. Bombeo Riego	8.74	-	-	-	-	-	-	4.34	3.23	1.17
2.8 Estac. Bombeo Drenaje	4.59	-	-	-	-	-	0.60	1.92	1.40	0.67
2.9 Canales Riego y Drenaje	30.62	-	-	-	-	4.10	7.83	10.58	7.71	0.40
2.10 Obras Complementarias	4.13	-	-	-	-	-	1.90	0.93	1.06	0.24
<u>III. Equipos y Maquinaria</u>	<u>2.86</u>	-	<u>0.06</u>	<u>0.09</u>	<u>0.21</u>	-	-	-	<u>1.25</u>	<u>1.25</u>
3.1 Vehículos Operación y Mto.	0.26	-	0	0.05	0.21	-	-	-	-	-
3.2 Maquinaria Mantenimiento	2.50	-	-	-	-	-	-	-	1.25	1.25
3.3 Vehículos Superv. Obras	0.10	-	0.06	0.04	-	-	-	-	-	-
<u>IV. Prep. Tierras Nivel Granja</u>	<u>6.80</u>	-	-	-	-	-	-	-	<u>3.80</u>	<u>3.00</u>
<u>V. Costos Concurrentes</u>	<u>22.93</u>	<u>0.15</u>	<u>0.24</u>	<u>0.04</u>	<u>1.46</u>	<u>4.84</u>	<u>8.29</u>	<u>6.07</u>	<u>1.84</u>	-
5.1 Terrenos	2.30	0.15	0.20	-	0.46	0.44	1.05	-	-	-
5.2 Prog. Rev. Zona Inundada	18.40	-	0.04	0.04	1.00	4.00	5.74	5.74	1.84	-
5.3 Reasent. Zona Riego	2.23	-	-	-	-	0.40	1.50	0.33	-	-
T O T A L	270.37	0.48	4.69	28.04	23.36	41.53	48.26	61.00	54.39	8.62

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X/9/84

E C U A D O R
Daule-Peripa (EC-0099)
Cálculo de Imprevistos

Categoría y/o Subcategoría	Porcentaje a Considerar	Total Inversión a Realizar a Partir 1984	1984	1985	1986	1987	1988
1. Ingeniería, Administración y Supervisión	5%	21.88 1.07 <u>22.95</u>	1.95 0.10 <u>2.05</u>	5.50 0.25 <u>5.75</u>	6.56 0.32 <u>6.88</u>	5.98 0.31 <u>6.29</u>	1.89 0.09 <u>1.98</u>
2. Costos Directos <u>1/</u>	10%	149.79 14.98 <u>164.77</u>	22.95 2.29 <u>25.24</u>	34.47 3.45 <u>37.92</u>	48.37 4.84 <u>53.21</u>	41.52 4.15 <u>45.67</u>	2.48 0.25 <u>2.73</u>
3. Equipo y Maquinaria	10%	2.50 0.25 <u>2.75</u>	- - <u>-</u>	- - <u>-</u>	- - <u>-</u>	1.25 0.12 <u>1.37</u>	1.25 0.13 <u>1.38</u>
4. Preparación de la Tierra	5%	6.80 0.34 <u>7.14</u>	- - <u>-</u>	- - <u>-</u>	- - <u>-</u>	3.80 0.19 <u>3.99</u>	3.00 0.15 <u>3.15</u>
5. Costos Concurrentes	5%	18.62 0.92 <u>19.54</u>	2.42 0.12 <u>2.54</u>	8.29 0.41 <u>8.70</u>	6.07 0.30 <u>6.37</u>	1.84 0.09 <u>1.93</u>	- - <u>-</u>
Total a Invertir en Categorías		199.59	27.32	48.26	61.00	54.39	8.62
Total Imprevistos		17.56 <u>217.15</u>	2.51 <u>29.83</u>	4.11 <u>52.37</u>	5.46 <u>66.46</u>	4.86 <u>59.25</u>	0.62 <u>9.24</u>

1/ La inversión estimada para el 2° semestre de 1984, para la categoría 2.0, es de un 70% de la estimada originalmente para el total del año. En las demás categorías es de un 50%.

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E C U A D O R

Daule-Peripa (EG-0099)

Cálculo de Escalamientos

A) Factores de Ajuste Anuales

$\frac{84}{4.3\%}$	$\frac{85}{5.5\%}$	$\frac{86}{6.1\%}$	$\frac{87}{5.4\%}$	$\frac{88}{5.5\%}$
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B) Inversiones por Semestres (incluyendo imprevistos).

Se ha considerado que de la Categoría II en cada año, en el primer semestre se ejecuta el 30% y en el 2° semestre el 70% del total de la inversión anual.

Los factores son compuestos por semestre:

<u>Factores Compuestos</u>			<u>Inversión/Semestre</u>	<u>Reajuste</u>
1984-1er Semestre	—	1.0000	14.21	0
2° Semestre	—	1.0108	29.83	0.32
1985-1er Semestre	—	1.0353	18.33	0.64
2° Semestre	—	1.0633	33.50	2.12
1986-1er Semestre	—	1.0928	22.49	2.09
2° Semestre	—	1.1255	43.78	5.49
1987-1er Semestre	—	1.1570	20.57	3.23
2° Semestre	—	1.1880	38.84	7.30
1988-1er Semestre	—	1.2200	4.07	0.89
2° Semestre	—	1.2531	<u>5.17</u>	<u>1.31</u>
			230.79	23.39

Inversión por realizar a partir de junio 1984 = 216.58

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ECUADOR

Daule-Peripa (EC-0099)

Costos Directos Totales (incluyendo Imprevistos)
y Cronograma de Inversiones

Categoría y/o Subcategoría	Total	1980	1981	1982	1983	1984	1985	1986	1987	1988
1. Ingeniería, Admón. y Supervisión	33.42	0.32	2.47	3.19	3.60	3.90	5.50	6.56	5.98	1.89
Imprevistos 5%	1.09	0	0	0	0	0.10	1/ 0.25	0.32	0.31	0.09
Subtotal	33.94	0.33	2.47	3.19	3.60	4.00	5.75	6.88	6.29	1.98
2. Costos Directos	204.36	0	1.92	24.72	18.09	32.79	34.47	48.37	41.52	2.48
Imprevistos 10%	14.98	0	0	0	0	2.29	2/ 3.45	4.84	4.15	0.25
Subtotal	219.34	0	1.92	24.72	18.09	35.08	37.92	53.21	45.67	2.73
3. Equipos y Maquinaria	2.86	0	0.06	0.09	0.21	0	0	0	1.25	1.25
Imprevistos 10%	0.25	0	0	0	0	0	0	0	0.12	0.13
Subtotal	3.11	0	0.06	0.09	0.21	0	0	0	1.37	1.38
4. Preparación de la tierra	6.80	0	0	0	0	0	0	0	3.80	3.00
Imprevistos 5%	0.34	0	0	0	0	0	0	0	0.19	0.15
Subtotal	7.14	0	0	0	0	0	0	0	3.99	3.15
5. Costos Concomitantes	22.93	0.15	0.24	0.04	1.46	4.84	8.29	6.07	1.84	0
Imprevistos 5%	0.92	0	0	0	0	0.12	0.41	0.30	0.09	0
Subtotal	32.85	0.15	0.84	0.04	1.46	4.96	8.70	6.37	1.93	0
Total de Categorías	270.37	0.48	4.69	28.04	23.36	41.53	48.26	61.00	54.39	8.62
Total de Imprevistos	17.56	0	0	0	0	2.51	4.11	5.46	4.86	0.62
Total Total	287.93	0.48	4.69	28.04	23.36	44.04	52.37	66.46	59.25	9.24

1/ En las categorías I, III, IV y V, la Inversión al 1er Semestre fue del 50%.

2/ En la categoría II, en 1984 la inversión del 1er Semestre fue de 30% del Total.

E C U A D O R

Daule-Peripa (EC-0099)

Quadro Total de Costos (con Imprevistos y Escalamiento)

Categoría y/o Subcategoría	Total	1980	1981	1982	1983	1984	1985	1986	1987	1988
I. Ingeniería, Admón. y Supervisión	33.42	0.33	2.47	3.19	3.60	3.90	5.50	6.56	5.98	1.89
II. Costos Directos	204.36	0	1.92	24.72	18.09	32.79	34.47	48.37	41.52	2.48
III. Equipos y Maquinaria	2.86	0	0.06	0.09	0.21	0	0	0	1.25	1.25
IV. Preparación Tierra	6.80	0	0	0	0	0	0	0	3.80	3.00
V. Costos Concurrentes	22.93	0.15	0.24	0.04	1.46	4.84	8.29	6.07	1.84	0
Sub-totales	270.37	0.48	4.69	28.04	23.36	41.53	48.26	61.00	54.39	8.62
Imprevistos	17.56	0	0	0	0	2.51	4.11	5.46	4.86	0.62
Sub-Total Costos Directos	287.93	0.48	4.69	28.04	23.36	44.04	52.37	66.46	59.25	9.24
Escalamientos	23.39	0	0	0	0	0.32	2.76	7.58	10.53	2.20
Escalamiento/Categoría										
Categoría I	2.59	0	0	0	0	0.02	0.25	0.73	1.12	0.47
Categoría II	17.31					0.27	2.08	6.15	8.15	0.66
Categoría III	0.56					0	0	0	0.24	0.32
Categoría IV	1.44					0	0	0	0.69	0.75
Categoría V	1.49					0.03	0.43	0.70	0.33	0
	<u>23.39</u>					0.32	2.76	7.58	10.53	2.20

ANALISIS DE COSTOS POR NATURALEZA

CATEGORIA II - Sub-Categorías -

2.0 - Presa

V/R Actual Proyecto: 386.00

Costo Directo Proyecto:

386' - 70 (costo financ.) - 47 (Imprev. y Escalam.) 269'0

P R E S A

1. Caminos, Camp. y Varios	11.08
2. Túneles	18.53
3. Toma y Accesorios	19.40
4. Represa	41.41
5. Vertedero	32.02
6. Diques y Vert. Em.	33.84

156'28

$\frac{156'28}{269} = 58\%$ del costo Dcto.

PARTIDA

1. Caminos, Camp. y Varios

		<u>% del Costo</u>
	(Terracerías	14%
<u>Camino:</u>	(O. Arte + Puente	30%
	(S. Base/	44%
US\$ Equiv.	(Base /	
2'5 = 22%	(Asfalto	12%
		<u>100%</u>
		<u>% Costo</u>
	(Urbanización	57%
<u>Campamentos</u>	(Edificaciones	43%
US\$ Equiv. = 4'371 = 40%		<u>100%</u>
<u>V a r i o s</u>	(Línea de Transmisión	12%
US\$ Equiv. = 4'210 = 38%	(Limpieza Vaso	56%
	(Fajas Forestal	30%
	(Aeropuerto	2%
		<u>100%</u>

Terracerías del Camino

Excav. = 56'000.000 = US\$ 240.000

Precio Unit. S 18.37 = US\$ 0.73 / m³

Equipo = 86% = 0.62 (M.Obra Op. = 20%) - de esto el 54% no calific.

AIU = 7% = 0.15

Util. = 7% = 0.05

100% 0.73

O. Arte + Puente

Hormigón - 2'300.000 = US\$ 88.000

P.Unit. 3.259.79 = US\$ 130/m³

Equipo 8% = US\$ 9.75 (Concretadora y Vibrador)

Materiales 47%

M. Obra 31% (No Calif. = 65% del 30%)

AI 7%

Util. 7%

100%

Sub-Base y Base = 6.287.000 = US\$ 251.500

P. Unit. = S 179 = US\$ 7.16 /m³

Equipo = 49% (M.Obra =17% y de ésta es no calificada el 53%)

Mat. = 37%

AI = 7%

U = 7%

Asfalto - 5.086.000 = US\$ 203.440

P.Unit.= S 44.23 = US\$ 1.77 /m²

Equipo = 35% (M.Obra Op. = 26% y de ésta es no calific. el 57%)

Asfalto = 27%

AI = 7%

Util = 7%

100%

Campamento

Urbanización (Pavimento Calles = 7.250.000
(= = US\$ 290.000

P. Unit. = S 385 = US\$ 15.40

Equipo = 9%
Mat. = 51%
M.O. = 17% (30% no calificado)
AIU = 23%

Edificaciones - Hormigón

P. Unit. S 5.000/ m³ = US\$ 200/m³

Equipos = 6%
Mat. = 42%
M.Obra = 29% (de ésta 48% no calif.)
AIU = 23%

V A R I O S

Línea de Transmisión

Mat. Eléctrico 72%
Mat. Locales 12% (M. Obra = 40%)
Equipo de Const. 12% (M. Obra = 50%)
AIU 4%

Limpieza Vaso

S 150.000.000 = US\$ 2.370.000 (63.20)

P. Unit. = S 15.000 = US\$ 237/Ha

Equipo = 74% (M. Obra = 22% y de ésta no calificada el 62%)

AIU = 26%

Faja Forestal - S 110.000.000 = US\$ 1.740.000 (63.20)

M. Obra = 100% (95% no calificado)

TUNELES = US\$ 18.53

Excavación	34%	-	6.33
Concretos	37%	-	6.90
Cemento	5%	-	0.90
Aceros	24%		4.40
			<u>18.53</u>

EXCAVACION: (Equipo 48% (incluye M.Obra Operación 100% calif.)
 (Materiales 9%
 P. Unit. = (M.Obra 16% (Sucres - de esto el 28% es no calif.)
 US\$ 27.55 (AIU 27% (46% Dólares - 54% Sucres)

CONCRETO: (Equipo 25% (Dólares)
 (Mat. 21% (Sucres)
 P.Unit.= (M. Obra 28% (Sucres - el 35% no califica)
 US\$ 128.51 (AIU 26%

CEMENTO:

P. Unit. = US\$ 168.64/Ton.

(Silos y Transp. 21% (Dólares - incluye M.Obra)
 (Cemento 52% (Sucres)
 (AIU 27% (46% en Dólares - 54% en Sucres)

ACEROS

(24%) (Soporte Túnel 54%
 (Refuerzo 46%

SOPORTE TUNEL

P. Unit. = US\$ 1.564/Ton.

Equipo + Transp. 4% (Dólares)
 Material 64% (Dólares)
 M. Obra 6% (Sucres - 56% no calific.)
 AIU 26% (Dólares - 46% / Sucres - 54%)

ACERO REFUERZO

P.Unit. - US\$ 803.30/Ton.

Equipo + Transp. 6% (Dólares)
 Material 56% (Sucres)
 M. Obra 11% (Sucres - 35% no calif.)
 AIU 27% (Dólares - 46% / Sucres 54%)

TOMAS Y ACCESORIOS

<u>19.400</u>	(Compuertas	32%	- 6.208
	(Excavaciones	16%	- 3.104
	(Estructura	32%	- 6.208
	(Otros Hormigones	20%	- 3.880

COMPUERTAS

(Compuertas	60%
(Mampostería	40%

1. (a) COMPUERTAS

P. Unit. 1.550.000

(Equipo + Transp.	4%	(Dólares)
(Material	57%	(Dólares)
(M. Obra	13%	(Suces 100% calif.)
(AIU	26%	(Dólares - 44% / Suces 56%)

1. (b) MAMPOSTERÍA - P. Unit. 1.037.000

(Equipos + Transp.	2%	(Dólares)
(Materiales	64%	(Suces)
(M. Obra	8%	(100% no calificada)
(AIU	26%	(Dólares 44% - Suces 56%)

2. EXCAVACIONES - P. Unit. US\$ 3.25

Equipos	63%	(Dólares - incluida M.O. de Op.)
M. Obra	11%	(Suces - 87% no calificada)
AUI	26%	(Dólares - 44 % / Suces 56%)

3. ESTRUCTURA

(Hormigón -	31%
(Cemento -	30%
(Acero -	39%

Hormigón - P. Unit. - US\$ 60.99

Equipo + Transp.	50%	- Dólares (incluye 100% M.O. Calif.)
Materiales	10%	- Suces
M. Obra	16%	- Suces - 35% no calif.
AIU	24%	(Dólares - 44% / Suces 50%)

F I L T R O S

P. Unit. US\$ 25.09/m³

Equipo	71%	- Dólares
M. Obra	3%	- Sucres
AIU	26%	- Dólares 44% / Sucres 56%

V E R T E D E R O

US\$ 33.02

Estructura de Compuertas	56%
Excavaciones	24%
Compuertas + Electromec.	9%
Hormigones Varios	11%

ESTRUCTURA DE COMPUERTAS

Hormigón - 45%
Cemento - 55%

Hormigón - P. Unit. - US\$ 53.72/m³

Equipo + Transp.	61%	- Dólares
Materiales	8%	- Sucres
M. Obra	4%	- Sucres - 24% no calif.
AIU	27%	- Dólares 44% / Sucres 56%

Cemento - Ya está analizado

E X C A V A C I O N E S

P. Unit. US\$ 3.25/m³

Equipo	63%	- Dólares
M. Obra	11%	- Sucres - 87% no calif.
AIU	26%	- Dólares 44% / Sucres 56%

COMPUERTAS Y ELECTROMECHANICOS

Aceros - 54%
Máquinas - 21%
Instalac. - 25%

Cemento - P. Unit. - US\$ 168.64

Silos + Transp.	21% - Dólares
Cemento	2% - Sucres (10% M.O. no calif.)
AIU	27% - (Dólares - 46% / Sucres 54%)

Acero Refuerzo - P. Unit. US\$ 803.30/ton.

Equipo + Transp.	6% - Dólares
Material	56% - Sucres
M.Obra	11% - (35% no calific.)
AIU	27% - (Dólares - 44% / Sucres 56%)

4. OTROS HORMIGONES

Cemento	13%)
Hormigón	36%) ya sabemos como se desagrega
Refuerzo	51%)

R E P R E S A

Excavación	34%
Terraplenes	35%
Filtros	31%
	<u>100%</u>

E X C A V A C I O N

P. Unit. - US\$ 3.44/m³

Equipo	72% - Dólares
M. Obras	2% - Sucres (100% no calif.)
AIU	26% - Dólares 44% / Sucres 56%

T E R R A P L E N E S

P. Unit. - US\$ 1.63/m³

Equipo	72% - Dólares
M. Obra	2% - Sucres
AIU	26% - Dólares 44% / Sucres 56%

Aceros - P. Unit. US\$ 384.800/Unidad

Equipo + Transp.	3%	- Dólares
Materiales	53%	- Dólares
M. Obra	15%	- Sucres (0% no calif.)
AIU	29%	- Dólares 44% / Sucres 56%

Máquinas - P. Unit. US\$ 603.840 / global

Equipo + Transp.	1%	
Materiales	60%	- Sucres
M. Obra	12%	- Sucres (0% no calif.)
AIU	27%	- Dólares 44% / Sucres 56%

Instalaciones Electromecánicas - P. Unit. US\$ 638.613/global

Equipo + Transp.	9%	- Dólares
Material Eléct.	52%	- Dólares
M. Obra	13%	- (0% no calif.)
AIU	76%	- Dólares 44% / Sucres 56%

HORMIGONES VARIOS - ver Análisis de Estructura de Toma

DIQUES Y VERTEDEROS EMERGENCIA - US\$ 33.840

Excavaciones	59%
Terraplén	18%
Protección	23%

Excavación - P. Unit. US\$ 2.59/m³

Equipo	68%	- Dólares
M. Obra	5%	- Sucres (69% no calif.)
AIU	27%	- Dólares 44% / Sucres 56%

Terraplén - P. Unit. US\$ 1.12 m³

Equipo	66%	
M. Obra	7%	(74% no calif.)
AIU	27%	

Protecciones - P. Unit. US\$ 14.88/m²

Equipo	30%	- Dólares
Materiales	42%	- Sucres
M. Obra	2%	- Sucres (57% no calif.)
AIU	26%	- Dólares 44% / Sucres 56%

ECUADOR

Daule-Peripa (EC-0099)

Análisis de Costos por Naturalezas

Categoría/Sub-Categoría	Costo	Desagregación	Costo	Componentes	Costo	M.O.N.C.	Com. y Lub.
0 CAMINOS, CAMPAMENTOS Y VARIOS							
2.1 Camino	2.500	Terracerías	300	Equipo Admón. Imp. Utilidad	258 21 21 <u>300</u>	28	16
		O. Arte-Puente	750	Equipo Materiales M. Obra Admón. Imp. Utilidad	60 353 233 52 52 <u>750</u>	152	4
		S. Base y Base	1.150	Equipo Materiales Admón. Imp. Utilidad	564 426 80 80 <u>1.150</u>	51	34
		Asfalto	300	Equipo Asfalto Material Admón. Imp. Utilidad	105 72 81 21 21 <u>300</u>	16	6
			2.500		2.500	247	60
2.2 Campamento	4.371	Urbanización	2.491	Equipo Materiales M. Obra AIV	224 1.270 424 572 <u>2.491</u>	127	13
		Edificaciones	1.880	Equipo Materiales M. Obra AIV	117 794 545 424 <u>1.880</u>	262	7
			4.371		4.371	389	20
2.3 Varios	4.210	Línea de Transmisión	505	Equipo Mat. Eléctrico Mat. Locales AIV	61 364 60 20 <u>505</u>	24	4

Categoría/Sub-Categoría	Costo	Desagregación	Costo	Componentes	Costo	M.D.N.C.	Com. y Lub.
		Limpieza del Vaso	2.370	Equipo AIU	1.754 616 2.370	239	105
		Faja Forestal	1.335 4.210	M. Obra	1.335 4.210	1.268 1.531	109
neles	18.530	Excavación	6.300	Equipo Materiales M. Obra AIU	3.038 570 1.013 1.679 6.300	284	182
		Concretos	6.856	Equipo Materiales M. Obra AIU	1.714 1.440 1.920 1.782 6.856	284 676	182 103
		Cemento	927	Equipo Cemento AIU	195 482 250 927	48	12 0 12
		Aceros de Soporte de Excavación	2.401	Equipo Material M. Obra AIU	96 1.537 144 624 2.401	81	6
		Acero de Refuerzo del Concreto	2.046	Equipo Material M. Obra AIU	123 1.146 225 552 2.046	79	7
ESTRUCTURAS DE TOMA Y ACCESORIOS					19.400		
puertas, Rejas y Estructuras Anexas	6.208	Compuertas y Rejas	3.725	Equipo Materiales M. Obra AIU	149 2.123 484 969 3.725	0	9
		Estructuras Anexas	2.483	Equipo Materiales M. Obra AIU	50 1.589 199 645 2.483	199	3
			6.208		6.248	199	112
excavaciones	3.104	Excavaciones	3.104	Equipo M. Obra AIU	1.956 341 807 3.104	297	117
						297	117

Categoría/Sub-Categoría	Costo	Desagregación	Costo	Componentes	Costo	M.O.N.C.	Com. y Lub.
Estructuras	6.208	Hormigón	1.924	Equipo	962		58
				Materiales	192		
				M. Obra	308	108	
				AIU	462		
					1.924	108	58
		Cemento	1.862	Equipo	391		23
				Cemento	968	97	
				AIU	503		
					1.862	97	23
		Acero R&F	2.422	Equipo	145		9
				Material	1.356		
				M. Obra	266	94	
				AIU	655		
as Hormigones	3.880	Cemento	504	Equipo	106		6
				Cemento	262	26	
				AIU	136		
					504	26	6
		Hormigón	1.397	Equipo	698		42
				Material	139		
				M. Obra	223	79	
				AIU	337		
					1.397	79	42
		Acero de Ref.	1.979	Equipo	119		7
				Material	1.108		
				M. Obra	218	80	
				AIU	534		
RESA resa	41.410	Excavación	14.080	Equipo	41.410		
				M. Obra	10.137		608
				AIU	282	282	
					3.661		
					14.080	282	608
		Terraplenes	14.494	Equipo	10.436		626
				M. Obra	290	290	
				AIU	3.708		
					14.494	290	626
		Filtros	12.863	Equipo	9.133		549
				M. Obra	385	385	
				AIU	3.345		
					12.863	385	549
			41.410		41.410	957	1.783

Categoría/Sub-Categoría	Costo	Desagregación	Costo	Componentes	Costo	M.O.N.C.	Com. y Lub.
ERTEDERO							
estructura de Compuertas	17.931	Hormigón	8.069	Equipo	32.020		
				Materiales	4.922		295
				M. Obra	645		
				AIU	323	77	
					2.179		
					8.069	77	295
		Cemento	9.862	Equipo	2.070		128
				Cemento	5.128	529	
				AIU	2.664		
					9.862	529	128
Excavaciones	7.925	Excavaciones	7.865	Equipo	4.955		299
				M. Obra	865	758	
				AIU	2.045		
					7.865	758	299
Compuertas y Equipos Electro Mecánicos	2.882	Aceros	1.556	Equipo	47		3
				Material	825		
				M. Obra	233		
				AIU	451		
					1.556		3
		Máquinas	605	Equipo	6		1
				Material	363		
				M. Obra	73		
				AIU	163		
					605		1
		Instalaciones	721	Equipo	65		4
				Material	375		
				M. Obra	94		
				AIU	187		
					721		4
Hormigones Varios	3.522	Hormigón	1.092	Equipo	563		34
				Materiales	113		
				M. Obra	180	63	
				AIU	270		
					1.092	63	34
		Cemento	1.057	Equipo	233		13
				Cemento	560	57	
				AIU	264		
					1.057	57	13
		Acero	1.373	Equipo	85		5
				Material	750		
				M. Obra	156	55	
				AIU	382		
					1.373	55	
			3.522		3.522	175	51

CATEGORIA - DIQUES Y VERTEDEROS DE EMERGENCIA

Categoría/Sub-Categoría	Costo	Desagregación	Costo	Componentes	Costo	M.O.N.C.	Com. y Lib.
Diques y Vertedero de Emergencia	33.840	Excavación	19.966	Equipo	13.577		814
				M. Obra	998	689	
				AIU	5.391		
					<u>19.966</u>	689	814
		Terraplén	6.091	Equipo	4.020		241
				M. Obra	426	316	
				AIU	1.645		
					<u>6.091</u>	316	241
		Protecciones	7.783	Equipo	2.335		140
				Material	3.269		
				M. Obra	156	89	
				AIU	2.023		
					<u>7.783</u>	89	140
			33.840		33.840	1.094	1.095

RESUMEN DE COSTOS POR NATURALEZAS
Categoría II

2.01 Camino	2.500	Equipo	987	Comb. y Lubr.	M.O.N.C.
		Materiales	860	60	247
		Asfalto	72		
		M.Obra	233		
		Adm. e Impl.	174		
		Utilidad	174		
			<u>2.500</u>		
2.02 Campamento	4.371	Equipo	341	20	389
		Materiales	2.061		
		M. Obra	969		
		A.U.	996		
			<u>4.371</u>		
2.03 Línea de Transmisión	4.210	Equipo	1.815	109	1.531
Limpieza Vaso		Mat. Eléctrico	364		
Faja Forestal		Mat. Locales	60		
		M. Obra	1.335		
		A.U.	636		
			<u>4.210</u>		
2.04 Túneles	18.530	Equipo	5.166	310	1.168
		Materiales	4.693		
		Cemento	482		
		M. Obra	3.302		
		A.U.	4.887		
2.05 Estructuras de Toma y	19.400	Equipo	4.576		
Accesorios		Materiales	6.507	274	980
		Cemento	1.230		
		M. Obra	2.039		
		A.U.	5.048		
2.06 Represa	41.410	Equipo	29.706	1.738	957
		M. Obra	957		
		A.U.	10.714		
2.07 Vertedero	32.020	Equipo	12.948	790	1.542
		Materiales	3.071		
		M. Obra	1.924		
		Cemento	5.688		
		A.U.	8.389		
2.08 Diques y Vertedero de	33.840	Equipo	19.932	1.195	1.094
Emergencia		M.Obra	1.580		
		Material	3.269		
		A.U.	9.059		

9 Canales de Riego y Drenaje *	30.620	Equipo	20.215	1.211	1.591
		M.Obra	2.145		
		A.U.	8.260		
0 Estac. de Bombeo y Obras **	17.460	Equipo	1.902	213	734
Arte.		Eq. Elect.	7.333		
		Material	1.746		
		M. Obra	2.289		
		A.U.	4.190		

Asimilado como la Sub-Categoría: "Terraplenes del Dique".

Asimilado a las Sub-Categorías: "Hormigones Varios en Estructuras de Compuertas" y Camp. y Equipos Electromecánicos en la Estructura de Compuertas del Vertedero".

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E C U A D O R

Declaración (EC-0099)

Resumen Final de Costos por Naturaleza de la Categoría II de Costo Directo

Categoría	Costo	Equipo	Materiales	Mano de Obras I/	Utilidad G.Gres.	C y L	M.O.N.C.	Impuestos
1 Caminos, Camamento y Varios	11.080	2.954	3.417	373	1.449	189	2.167	531
2 Túneles	18.530	4.856	5.175	2.134	3.998	310	1.168	889
3 Tomas y Accesorios	19.400	4.302	7.737	1.059	4.117	274	980	931
4 Represa	41.410	27.968	—	—	8.759	1.738	957	1.988
5 Vertedero	32.020	12.158	8.759	382	6.852	790	1.542	1.537
6 Diques y Vert. Emergencia	33.840	18.737	3.269	486	7.435	1.195	1.094	1.624
7, 2.8 y 2.10 Estac. Bombeo y Obras de Arte	17.460	1.689	9.079	1.555	3.352	213	734	838
9 Canales Riego y Drenaje	30.620	19.004	—	554	6.790	1.211	1.591	1.470
Sub-Totales	204.360	91.668	37.436	6.543	42.752	5.920	10.233	9.808
Imprevistos (10%) a partir de 1984		(44.86%)	(18.32%)	(3.20%)	(20.92%)	(2.90%)	(5.00%)	(4.80%)

DAULE PERIPA (EC - 0099)

COSTOS TOTALES Y CRONOGRAMA CON DESAGREGACION PARA CALCULOS ECONOMICOS

CATEGORIA Y/O SUB-CATEGORIA	TOTAL	1980	1981	1982	1983	1984	1985	1986	1987	1988
I. <u>Ing. Admin. y Sup.</u>	32.85	0.33	2.47	3.19	3.60	3.90	4.96	6.37	6.14	1.89
Imprevistos	1.09					0.10	0.25	0.32	0.31	0.09
Sub-Total	33.34	0.33	2.47	3.19	3.60	4.00	5.21	6.69	6.45	1.98
II. <u>Costos Directos</u>										
a. <u>Presa + O. Anexos</u>	156.28		1.92	24.72	18.09	28.69	24.14	30.60	28.12	
Imprevistos	10.28					2.90	2.41	3.06	2.81	
Sub-Total	166.56		1.92	24.72	18.09	30.69	26.55	33.66	30.93	
b. <u>Zona Riego 17.000 Ha.</u>	48.08					4.10	10.33	17.77	13.40	2.48
Imprevistos	4.69					0.26	1.04	1.78	1.34	0.25
Sub-Total	52.77					4.38	11.37	19.55	14.74	2.73
a. <u>Comb. y Lub./Presas+O.Anex.</u>	3.63		0.04	0.54	0.39	0.67	0.58	0.74	0.67	—
f. corrección:										
M.O.N.C. /Presas +O.Anex.	7.50		0.09	1.11	0.81	1.38	1.20	1.52	1.39	—
f. corrección:										
Impuestos/Presas+O.Anex.	6.46		0.07	0.96	0.70	1.19	1.03	1.31	1.20	—
f. corrección:										
b. <u>Comb. y Lub. (Z.R. 17.000 Ha)</u>	2.91					0.24	0.63	1.08	0.81	0.15
f. corrección:										
M.O.N.C. (Z.Rgo. 17.000 Ha)	3.76					0.31	0.82	1.39	1.05	0.19
f. corrección:										
Impuestos (Z.Rgo. 17.000 Ha)	4.33					0.36	0.93	1.11	1.21	0.22
III. <u>Equipos y Maquinaria</u>	2.86		0.06	0.09	0.21				1.25	1.25
Imprevistos	0.25								0.12	0.13
Sub-Total	3.11		0.06	0.09	0.21				1.37	1.38
IV. <u>Prep. Tierra - Finca</u>	6.80								3.80	3.00
Imprevistos	0.33								0.19	0.14
Sub-Total	7.14								3.99	3.14
V. <u>Costos Concurrentes</u>	22.93	0.15	0.24	0.04	1.46	4.84	8.29	6.07	1.84	
Imprevistos	0.92					0.12	0.41	0.30	0.09	
Sub-Total	23.85	0.15	0.24	0.04	1.46	4.96	8.70	6.37	1.93	
TOTAL CON IMPREVISTOS (incl. Comb. y Lub., M.O.N.C. e Impuestos)	287.36	0.48	4.69	28.04	23.36	44.04	51.83	66.27	59.41	9.23
TOTAL CON IMPREVISTOS (sin incl. Comp. y Lub., M.O.N.C. e Impuestos de Cat. II)	258.77	0.48	4.49	25.43	21.46	39.89	46.64	59.12	53.08	8.67
TOTAL COMP. y LUB. (A+B)	6.54		0.04	0.54	0.39	0.91	1.21	1.82	1.48	0.15
TOTAL M.O.N.C. (A+B)	11.26		0.09	1.11	0.81	1.69	2.02	2.91	2.44	0.19
TOTAL IMPUESTOS (A+B)	10.79		0.07	0.96	0.70	1.55	1.96	2.44	2.41	0.22

COSTO TOTAL CON IMPREVISTOS Y DESAGREGACION PARA CALCULOS ECONOMICOS

(30.000 Ha)

	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>TOTAL</u>
INVERSION TOTAL	13.16	21.94	27.43	27.43	19.74	109.70
Combustibles y Lubric.	0.72	1.21	1.51	1.51	1.09	6.04
Mano de Obra No Calif.	0.94	1.56	1.96	1.96	1.41	7.82
	0.38	0.77	0.78	0.78	0.56	3.13
Impuestos	1.08	1.80	2.25	2.25	1.62	9.00
TOTALES:	12.42	20.58	25.91	25.91	18.65	

E C U A D O R

MAQUINARIA PARA OPERACION Y MANTENIMIENTO DE LA PRESA DAULE PERIPA

(EC-0099)

<u>EQUIPOS</u>	<u>US\$</u>
Grúa de 10 ton.	105.000
Grupo Electrógeno de 150 Kw.	85.000
2 Botes fuera de borda	25.000
1 Lancha con grúa inst.	120.000
Cargadora de ruedas 130 HP	140.000
Motoniveladora 135 HP	132.000
Tractor 140 HP	183.000
Retroexcavadora	132.000
Rodillo	138.000
Tractor de Jardinería	35.000
Equipo de Jardinería	15.000
2 Camionetas Pick-Up	24.000
Cortadora de Césped	1.000
1 Camión Pick-Up	30.000
Camión tanque c/bomba y aspesores	<u>73.000</u>
TOTAL:	<u>1.238.000</u>

ECUADOR - PROYECTO DAULE PERIPA (EC-0099)

MAQUINARIA PARA OPERACION Y MANTENIMIENTO - 17.000 Ha.

<u>V/R de la Maquinaria</u>	<u>US\$</u>
4 Volquetes 8 m ³	292.000
1 D6D 140 H.P.	183.000
1 Retro (1 yd ³)	140.000
1 Rodillo Vibratorio Auto Prop.	138.000
1 Moto Rígida (120 E)	132.000
Tanque	65.000
Remolque	<u>84.000</u>
	1.034.000
7 camionetas 2.5 ton.	<u>84.000</u>
TOTAL:	<u>1.118.000</u>

ECUADOR - PROYECTO DAULE PERIPA (EC-0099)

COMPARACION DE COSTOS

I) PRESUPUESTO ORIGINAL

1.1 Indices resultantes de aplicación de la fórmula de reajuste pactada en el contrato con Agromán (los índices para el periodo 1979-1982 fueron extrapolados retrospectivamente a partir de las variaciones históricas de los diferentes componentes de la fórmula al presupuesto).

AÑO BASE DEL PRESUPUESTO ORIGINAL DE LA PRESA DAULE PERIPA - 1978

<u>Mes</u>	<u>Año</u>	<u>Indices</u>		<u>Crecimientos/Año</u>	
		<u>Sucres</u>	<u>US\$</u>	<u>Sucres</u>	<u>US\$</u>
Dic.	1978	1.000	1.000)		
Dic.	1979	1.073	1.050)	1.073	1.050
Jun.	1980	1.259		1.347	1.076
Dic.	1980	1.445	1.130		
Jun.	1981	1.516	1.160	1.099	1.053
Dic.	1981	1.588	1.190)		
Jun.	1982	1.653	1.221)	1.082	1.042
Dic.	1982	1.718	1.240)		
Dic.	1983	1.823	1.290)	1.1028	1.040
Jun.	1984	1.870	1.320)	1.026	1.023

1.2. La composición original del presupuesto de la Presa fué de un 55% en Sucres y un 45% en Dólares, y la tasa de cambio oficial era 25 Sucres por Dólar. Al introducir las variaciones en la tasa de cambio la cual se ha movido de 25 en 1978 hasta 63.20 en Junio 1984, se obtiene un factor ajustado para el índice de los Sucres así:

<u>Año</u>	<u>Factor Ajustado Suces</u>	<u>Factor Dólares</u>
1979	1.073	1.05
1980	1.445	1.13
1981	1.588	1.19
1982	1.300	1.24
1983	1.000	1.29
Jun. 1984	0.740	1.32

1.3 Por lo tanto, la suma de las categorías 2.2, 2.3, 2.4, 2.5 y 2.6 que a Dólares de 1978 valía 97.3 millones (sin imprevistos), convertido a Dólares de Junio 1984 vale:

SUCRES $97.3 \times 0.55 \times 0.74 =$ US\$ 39.60 millones 1984

DOLARES $97.3 \times 0.45 \times 1.32 =$ US\$ 57.80 millones 1984

TOTAL: US\$ 97.40 millones 1984

Sumando los imprevistos que se consideraron tenemos:

$97.40 \times 1.15 =$ US\$ 112.01 (1984)

II) PRESUPUESTO ACTUAL (CONTRATO AGROMAN)

2.1 Base - Junio 1981

Costo a Origen:

<u>Suces (x 000)</u>	+	<u>US\$ (000)</u>	=	<u>US\$ (000) Equiv.</u>
2.441.960 (Suces 81)		80.652 (US\$ 81)		178.330 (US\$ 81)

Por Ejecutar:

2.038.929 millones (Suces 84) + 66.118 millones (US\$ 84) =

97.380 millones (US\$ 84)

Ejecutado:

789.011 mill. (S. corrientes) + 17.401 mill. (US\$ corrientes)

Ejecutado:

51.990 millones (US\$ 84)

Costo Total a Junio 1984 (en US\$ 1984):

51.990 + 97.380 = US\$ 149.37 millones

Diferencia total en el costo de la Presa:

149.37 - 112.01 = US\$ 37.36

Estos US\$37.36 millones a Junio 1984 corresponden para cantidades de obra que se presentaron entre los diseños y los planos de construcción.

Los mismos índices de actualización se usaron para el resto de las categorías II y las categorías I, III, IV y V.

ECUADOR- PROYECTO DAULE-PERIPA PRIMERA ETAPA

ESTIMACION DE REQUERIMIENTOS DE CREDITO AGRICOLA (en US\$000)

<u>R U B R O S</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>
1. INVERSIONES CAPITAL									
a)- Maquinaria Agrícola	540	540	540	1.205	1.249	1.316	1.381	1.428	1.484
b)- Nivelación Tierras	-	200	300	200	200	-	-	-	-
c)- Instalaciones Agrícolas	260	260	260	510	536	564	592	612	636
TOTALES ANUALES	800	1.000	1.100	1.915	1.985	1.880	1.973	2.040	2.120
Menos: (Recuperaciones)	-	-	-	-	(720)	(900)	(990)	(1.724)	(1.786)
Totales netos/año	800	1.000	1.100	1.915	1.265	980	983	316	334
2. CAPITAL TRABAJO									
a)- Arroz	1.247	1.220	1.220	1.986	2.091	2.198	2.303	2.383	2.445
b)- Maíz, frijol, soya y sorgo	75	75	75	579	610	641	672	695	770
c)- Algodón, Tomate, Higuierilla	-	-	-	357	375	395	413	428	443
Totales Anuales	1.332	1.295	1.295	2.922	3.076	3.234	3.388	3.506	3.658
Menos: (Recuperaciones)	-	(1.190)	(1.166)	(1.166)	(2.630)	(2.768)	(2.911)	(3.049)	(3.155)
Totales Netos/año	1.332	105	130	1.756	446	446	477	457	503
3. Requerimientos Netos/año	2.122	1.105	1.230	3.671	1.711	1.446	1.460	773	837
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====

Notas: Se han realizado los siguientes supuestos: a) Reemplazo de 1 tractor/1000 Ha/año (US\$30,000 c/u) y 1 cosechadora/3,000 Ha/año (US\$50,000 c/u); 2) Nivelación de 3000 ha (1985-1989); 3) Otras inversiones a nivel de finca por US\$20/Ha/año; 4) financiamiento costos producción: arroz, US\$100/Ha; Maíz, frijol, soya y sorgo, US\$150/Ha; algodón, tomate e higuierilla, US\$200/Ha; 5) Recuperaciones de crédito a mediano y largo plazo de 90% a flos 5 años; 6) Recuperación créditos a corto plazo de 90% anualmente.

ECUADOR-PROYECTO DAULE PERIPA-PRIMERA ETAPA

CALCULO DE NECESIDADES DE PILADO Y ALMACENAMIENTO DE ARROZ EN EL AREA DE INFLUENCIA 1/
(En Miles de TM)

	1984	1987	1988	1989	1990	1991	1992	1993
- Producción incremental del Proyecto en Arroz Cáscara	55	74	107	119	130	141	151	155
- Capacidad actual de Pilado <u>2/</u>	300	300	300	300	300	300	300	300
Requerimientos adecuados de Pilado <u>3/</u>	-	-	-	4	15	26	36	40
- Capacidad actual de Almacenamiento <u>4/</u>	140	140	140	140	140	140	140	140
- Requerimientos adicionales de Almacenamiento <u>5/</u>	-	-	-	-	-	14	20	23

1/ Se refiere a las Provincias de los Ríos y Guayas.

2/ Existen cerca de 1.200 piladoras de diferentes tamaños y capacidades con capacidad de beneficiar aproximadamente 400 TM/Ha de arroz blanco (615 TM/hora de arroz en cáscara). Se supone que, en promedio, trabajan 6 horas diarias, 5 días a la semana, 4 meses/año.

3/ Se basa en el supuesto que la producción actual (incluyendo 55,000 TM del Daule) ocupan el 80% de la capacidad instalada de pilado.

4/ Se refiere a la capacidad estática de almacenamiento de arroz blanco o pilado.

5/ Se basa en el supuesto que la producción actual (incluyendo las 55,000 TM del Daule) ocupan el 70% de la capacidad instalada del almacenamiento.

ANEXO B

PROCEDIMIENTO DE LICITACIONES

A. LICITACIONES CON FONDOS DEL FINANCIAMIENTO DEL BANCO

A.1 GENERAL

El presente Procedimiento se aplicará en las licitaciones para construcción de obras y para adquisición de maquinarias, equipos y otros bienes, que se requieran en la ejecución del Proyecto, cuando el valor de dichos contratos o adquisiciones exceda del equivalente de cien mil dólares de los Estados Unidos de América (US\$100.000).

Cuando los bienes o servicios a adquirirse se costeen total o parcialmente con divisas provenientes del Financiamiento, las licitaciones deberán permitir la libre concurrencia de postores de bienes y servicios originarios de países miembros del Banco. En consecuencia, en los procedimientos y/o bases específicas no se establecerán condiciones que impidan o restrinjan la concurrencia de tales postores.

A.2 PROCEDIMIENTO DE LICITACION

El procedimiento de licitación será común en cuanto a la adjudicación de contratos para (i) la ejecución de obras y (ii) la adquisición de bienes. Sin embargo, el procedimiento para la licitación de obras se desdoblará en dos fases y se ajustará a disposiciones especiales, según se especifica a continuación:

(i) EJECUCION DE OBRAS

A.2.1. Fase: Precalificación para ejecución de obras

A.2.1.1 El Organismo Ejecutor y el Banco se pondrán de acuerdo sobre el texto de la convocatoria a precalificación de firmas constructoras a objeto de que éstas queden habilitadas para participar en la licitación o licitaciones que vayan a ser convocadas para la ejecución de las obras del Proyecto.

En esa convocatoria deberá establecerse la obligación de los interesados de proporcionar al Organismo Ejecutor, cuando menos la siguiente información:

- (a) Antecedentes jurídicos sobre la empresa o compañía, entre los que deberán incluirse:

- (i) clase de sociedad de que se trata, con indicación de dónde se la constituyó y organizó legalmente, y de la sede o asiento principal de sus negocios y operaciones;
 - (ii) estatutos y otros documentos relativos a la constitución de la sociedad, con especificación de si es filial o subsidiaria de alguna otra empresa o compañía;
 - (iii) demostración de que la sociedad es parte integrante de la economía de un país miembro del Banco conforme con este Procedimiento, y de que más del 50% de las acciones pertenece a ciudadanos de países miembros del Banco;
 - (iv) una declaración en que conste que la sociedad no ha celebrado ningún acuerdo, en virtud del cual una parte sustancial de sus ganancias o beneficios pasa a personas o entidades, que sean nacionales de países no miembros del Banco de conformidad con este Procedimiento, y
 - (v) en caso de consorcios: (1) nombre de cada uno de los componentes; (2) copia de los estatutos correspondientes y copia del instrumento constitutivo del consorcio; (3) cuestionario de precalificación que deberá llenarse separadamente por parte de cada uno de los componentes del consorcio; (4) aceptación de que la responsabilidad de cada uno de los componentes del consorcio será indivisible y solidaria; (5) aceptación de que el requisito de origen en país miembro expresado anteriormente se aplica a todos y cada uno de los componentes del consorcio y de que, en consecuencia, si uno o más miembros del consorcio provinieren de países que no sean miembros del Banco, el consorcio como tal quedará descalificado para presentar ofertas en licitaciones de obras financiadas con recursos del Banco; (6) si se trata de un consorcio en constitución, además de lo que se expresa en los numerales (1), (3), (4) y (5) anteriores, deberá presentarse la minuta de la escritura pública de constitución del consorcio si es adjudicatario de la licitación.
- (b) Antecedentes técnicos acerca de la empresa o sociedad, con detalle acerca del personal y equipo especializados de que dispone.
- (c) Experiencia en la construcción de obras similares a las del Proyecto.
- (d) Certificado o certificación sobre cumplimiento en la prestación de servicios u obras.
- (e) Nombre de la entidad bancaria o compañía que emitirá la póliza o garantía de cumplimiento del contrato.

(f) Certificados de solvencia emitidos por una entidad bancaria.

(g) Certificado de idoneidad emitido por la Cámara de Comercio u otra entidad similar del país de procedencia.

A.2.1.2 El plazo que se señalará para la presentación de los documentos de precalificación no será inferior a 45 días contados desde la fecha de la última de las publicaciones referidas en el inciso A.2.1.4.

A.2.1.3 Una vez que el Organismo Ejecutor y el Banco hayan aprobado los documentos de la convocatoria a precalificación de firmas, el Comité de Licitaciones del Organismo Ejecutor dispondrá su publicación.

A.2.1.4 La convocatoria a precalificación de firmas se efectuará mediante avisos publicados por lo menos en dos diarios de mayor circulación en el país, uno de Quito y otro de Guayaquil, durante tres días consecutivos. Simultáneamente, se cursará copia de la convocatoria a la embajada de cada país miembro del Banco, acreditada en el Ecuador. El texto del aviso correspondiente deberá contar con la previa aceptación del Banco.

Las bases y otros documentos para la precalificación serán puestos a disposición del interesado para consulta en la Secretaría del Comité de Licitaciones del Organismo Ejecutor desde el día en que se publique por primera vez la convocatoria.

A.2.1.5 Los sobres cerrados que contengan los documentos para precalificación serán recibidos por el Secretario del Comité de Licitaciones del Organismo Ejecutor hasta la hora del día fijado para ello en la convocatoria. La apertura de los sobres la realizará el Comité de Licitaciones en la sesión que para tal efecto convocará el Organismo Ejecutor, que deberá realizarse en el día y hora antes referidos.

A.2.1.6 El Comité de Licitaciones encargará el análisis de la documentación recibida al Departamento Técnico del Organismo Ejecutor. Dicha comisión deberá contar necesariamente con la asesoría de los consultores individuales o firmas consultoras que haya contratado el Prestatario.

A.2.1.7 El Departamento Técnico del Organismo Ejecutor, revisará la documentación recibida y preparará el informe correspondiente con las recomendaciones del caso, basándose en las informaciones a que se refiere el numeral A.2.1.1, dentro del plazo que en cada caso fijará el Comité de Licitaciones.

Una vez que el Comité de Licitaciones apruebe el informe éste será enviado al Banco para que exprese oportunamente su conformidad u observaciones. Si el Banco tiene observaciones las dará a conocer por escrito al Organismo Ejecutor y se las analizarán en conjunto hasta llegar a un acuerdo sobre la materia.

A.2.1.8 La decisión del Comité acordada con el Banco se comunicará por escrito a todas las firmas en el domicilio que hayan señalado, dentro de los tres (3) días de la aprobación del acta del Comité.

A.2.2 Fase 2: Presentación de ofertas

A.2.2.1. El Organismo Ejecutor enviará a consideración del Banco los documentos de licitación, entendiéndose por tales todas las especificaciones generales, técnicas y administrativas que el Organismo Ejecutor preparará en cada caso y que pondrá a disposición de las firmas precalificadas. Estos documentos contendrán básicamente: instrucciones a los proponentes, planos, especificaciones, que obligatoriamente deben estar redactadas en idioma castellano, pudiendo además, estarlo en idioma inglés, condiciones específicas, formulario de presupuesto, fórmulas de reajuste de precios y forma de contrato cuya suscripción se requerirá al contratista adjudicado.

Una vez que el Banco haya expresado por escrito su conformidad con estos documentos, y se hayan incorporado las observaciones que hubiera formulado, se someterán tales documentos a la aprobación del Comité de Licitaciones del Organismo Ejecutor y posteriormente, a los informes de los organismos oficiales que contempla la Ley de Licitaciones vigente.

Incorporadas las observaciones que pudieran haber efectuado los organismos oficiales y después de consultarse con el Banco sobre el particular, el Organismo Ejecutor solicitará por escrito ofertas a las firmas que hayan sido precalificadas y les comunicará, por ese mismo medio, el plazo de presentación de ofertas y el lugar, fecha y hora en que se realizará la apertura de los sobres que las contenga.

Inmediatamente después de enviada esa notificación, se publicará por tres días consecutivos en dos diarios de amplia circulación en el Ecuador, uno de Quito y otro de Guayaquil, la convocatoria a las firmas precalificadas por medio de la cual se las invitará a presentar ofertas. El texto de la convocatoria deberá ser aprobado, antes de su publicación, por las autoridades ecuatorianas con jurisdicción sobre la materia y por el Banco, y deberá incluir el lugar, horario y plazo dentro del cual deberán presentarse las ofertas, y el lugar, fecha y hora en que se llevará a cabo el acto de apertura del sobre uno referido en las Secciones A.2.2.3 y A.2.2.4.

Las bases, instrucciones a los proponentes, planos, especificaciones, condiciones específicas, formulario de presupuesto y otros documentos de la licitación serán puestos a disposición de las firmas precalificadas para consulta, en la secretaría del Comité de Licitaciones del Organismo Ejecutor desde el día en que se publique por primera vez la convocatoria a las firmas precalificadas.

- A.2.2.2 El plazo de que gozarán los oferentes para la presentación de sus propuestas se especificará en la convocatoria y en ningún caso será menor de cuarenta y cinco (45) días calendario contados desde la fecha de la última publicación de la convocatoria en diarios ecuatorianos.
- A.2.2.3 Las ofertas y demás documentos exigidos se presentarán en dos sobres cerrados en la forma que se indica en este Procedimiento.
- A.2.2.4 El sobre No. 1 contendrá lo que se especifica a continuación:
- (i) el certificado de precalificación, y
 - (ii) los documentos que les sean exigibles, de acuerdo con lo dispuesto en los incisos (a), (d), (e), (h) e (i) del artículo 44 y en el artículo 56 de la Ley de Licitaciones del Ecuador. Si por aplicación del referido artículo 56, procediere requerir a las firmas precalificadas la actualización de uno o varios documentos que sirvieron para la precalificación, el Organismo Ejecutor antes de que se recabe esa actualización, deberá solicitar el parecer del Banco sobre esa materia.
- A.2.2.5 Dentro del sobre No. 2 presentado por el oferente se incluirá la oferta propiamente dicha y la garantía de seriedad de la propuesta para asegurar la firma del contrato, la que se presentará por un valor no menor del 2% del monto total de la oferta y será bancaria, incondicional, irrevocable y de cobro inmediato, por un plazo no menor de noventa (90) días, con la obligación de renovarla, a pedido del Prestatario, hasta un plazo máximo de sesenta (60) días más. Esta garantía también podrá otorgarse mediante póliza de seguro, incondicional e irrevocable y de cobro inmediato, emitida por una compañía de seguros, por un plazo no menor de noventa días, con obligación de renovarla, y debiendo ser otorgada por una entidad legalmente constituida o domiciliada en Ecuador.
- A.2.2.6 El Comité de Licitaciones se reunirá en la fecha y hora señaladas para el efecto en el tercer párrafo de la parte A.2.2.1 de este Procedimiento, y procederá a la apertura de las ofertas. A esta reunión podrán asistir los representantes de las firmas precalificadas oferentes. Se tomará nota de los datos principales de las ofertas y, entre ellos, del valor total y plazo de entrega, y se levantará acta de todas esas actuaciones que podrá ser firmada por cualquiera de los participantes.
- A.2.2.7 Concluida la apertura y conocimiento de las ofertas, se encargará el análisis de las mismas a la Comisión Técnica designada para el objeto. Dicha Comisión deberá contar necesariamente con la asesoría del o de los consultores individuales o firmas consultoras que haya contratado el Prestatario, si correspondiese. La Comisión procederá a determinar

si existen errores de cálculo en las ofertas, si éstas se ajustan a los términos de los documentos de licitación, si se ofrecen las garantías solicitadas y si, en general, las ofertas cumplen con las condiciones requeridas. Toda oferta que no se ajuste a las bases, o esté incompleta, será eliminada.

A continuación, se efectuará un análisis técnico-económico con el objeto de evaluar las ofertas que reúnan las condiciones solicitadas y hacer una comparación de las mismas. Para facilitar esta comparación se tabularán cuadros comparativos.

Una vez que el Comité de Licitaciones apruebe ese informe, el cual expresamente indicará al postor recomendado, el mismo informe será enviado al Banco para que oportunamente haga las observaciones que creyere conveniente.

- A.2.2.8 Una vez que el Banco haya manifestado su conformidad con el informe enviado por el Organismo Ejecutor, el resultado del análisis de ofertas será puesto a consideración del Comité de Licitaciones para la aprobación final.
- A.2.2.9 Si el Comité de Licitaciones decidiere: (1) adjudicar la licitación a un postor diferente al recomendado en el informe que hubiera aprobado el Banco; o (2) introducir otros cambios sustanciales en el informe, se enviarán al Banco los documentos pertinentes a la adjudicación para que el Banco exprese su parecer o haga las observaciones del caso. Ello se hará previamente a la notificación de los resultados de la licitación.
- A.2.2.10 Una vez que el Organismo Ejecutor, y el Banco hayan concordado sobre la adjudicación, el Organismo Ejecutor la notificará oficialmente a la firma o firmas ganadoras.
- A.2.2.11 En el caso de que la forma de contrato referida en la Sección A.2.2.1, se hubiere modificado por hechos, acuerdos o disposiciones sobrevinientes, se enviará al Banco, para su aprobación previa, el proyecto o proyectos de contratos definitivos que el Organismo Ejecutor se propone firmar con el contratista adjudicado.
- A.2.2.12 Los contratos así aprobados se suscribirán con la firma o firmas adjudicatarias, una vez cumplidos los requisitos legales pertinentes.
- A.2.2.13 Cuando hayan subcontratos, los cuales deberán ser autorizados en cada caso por el Organismo Ejecutor, las empresas subcontratistas deberán cumplir con las normas de elegibilidad por razones de nacionalidad establecidas en este Procedimiento.

(ii) ADQUISICION DE BIENES

- A.2.3 En los casos de licitación convocada para adquirir bienes, el Organismo Ejecutor podrá prescindir del requisito de precalificación. En

consecuencia, se estará a lo dispuesto en la Sección A.2.2, "Fase 2: Presentación de Ofertas" de este Procedimiento, salvo las siguientes disposiciones especiales:

- A.2.3.1 La convocatoria, una vez aprobada por el Organismo Ejecutor, se publicará por lo menos en un diario de amplia circulación en Quito y en uno de Guayaquil, por tres veces consecutivas.
- A.2.3.2 Simultáneamente con la publicación de la convocatoria en la prensa, el Organismo Ejecutor deberá remitir copia de esa convocatoria a las representaciones diplomáticas acreditadas en el Ecuador de los países elegibles de conformidad con las normas de este Procedimiento.

B. LICITACIONES FINANCIADAS CON CONTRAPARTIDA NACIONAL O SUCRES PROVENIENTES DEL FINANCIAMIENTO DEL BANCO

B.1 GENERAL

Para la adquisición de maquinaria, equipos y otros bienes y en la adjudicación de los contratos para la ejecución de obras financiadas con recursos de contrapartida nacional o con sucres provenientes del Financiamiento del Banco, se podrá también aplicar lo estipulado en el presente capítulo.

B.2 PROCEDENCIA DE BIENES Y SERVICIOS

- B.2.1 La licitación podrá limitarse al ámbito nacional cuando las monedas de pago respectivas provengan de los recursos nacionales adicionales al Préstamo o sean sucres provistos por el Financiamiento del Banco, si los hubiere.
- B.2.2 El Organismo Ejecutor podrá permitir concurrencia de postores originarios o provenientes de cualquier país cuando la fuente del financiamiento sea el aporte nacional adicional al Préstamo.

C. REQUISITOS PARA LICITACIONES DEL PROYECTO

- C.2.1 Las ofertas deberán ser presentadas con indicación de los bienes a importarse con señalamiento de su origen y el costo estimado de esos bienes. Asimismo, deberá indicarse en esas ofertas el origen y costo de los servicios técnicos provenientes del exterior.
- C.2.2 Toda modificación o ampliación de las bases y especificaciones de la licitación o de variación de la fecha de presentación de las ofertas, deberá ser previamente aceptada por el Banco y comunicada por escrito a todas las firmas precalificadas, o en caso de que no haya precalificación a las empresas que hubieren entregado los documentos de licitación. En estos casos, el plazo entre la última notificación de modificación y la fecha de presentación de ofertas, no podrá ser inferior a treinta (30) días.

- C.2.3 Cualquier consulta dirigida al Organismo Ejecutor por parte de los interesados en presentar ofertas o por los eventuales oferentes, acerca de la interpretación de las bases y especificaciones de la licitación que no comportare ninguna modificación o ampliación de las mismas, deberá ser hecha hasta 15 días antes de la fecha prevista para presentación de las propuestas y será absuelta, por escrito, por el Organismo Ejecutor en un plazo no mayor de 15 días después de formulada y llevada a conocimiento, también por escrito, de todos los demás proponentes así como del Banco, por lo menos 10 días antes de la fecha de presentación de las propuestas.

La consulta y su respuesta no producirán efecto suspensivo en el plazo para la presentación de ofertas.

- C.2.4 El Organismo Ejecutor podrá declarar desierta cualquier licitación, previo envío al Banco de un informe razonado y de la aceptación por parte del Banco de la medida que al respecto se propone adoptar. En tal caso, el Organismo Ejecutor deberá convocar de nuevo a licitación, ajustándose a lo dispuesto en este Procedimiento. El derecho que se reserva el Organismo Ejecutor de declarar desierta la licitación deberá constar en las bases y documentos respectivos. Asimismo, el Organismo Ejecutor podrá rechazar una o varias de las propuestas, cuando ellas no se cifren a las bases de la licitación y/o al presente Procedimiento. Si por segunda vez se declarare desierta una licitación, el Organismo Ejecutor, y el Banco acordarán el procedimiento a seguir.

D. MARGEN DE PREFERENCIA

- D.1 Podrá aplicarse un margen de preferencia en favor de ofertas de bienes originarios del Ecuador o, según corresponda, de países miembros de la Asociación Latinoamericana de Libre Comercio (ALALC) y/o del Grupo Andino, conforme con las siguientes normas:

(a) Margen de preferencia nacional

- (i) Se considerará que un bien es originario del Ecuador cuando el costo de los materiales, mano de obra y servicios del Ecuador empleados en su fabricación represente por lo menos el 40% del costo total del bien.
- (ii) A los efectos de comparación de ofertas, se tendrá como precio de los productos de origen del Ecuador, el precio de éstos, puestos en obra, una vez deducidos los siguientes importes: (1) los derechos de importación pagados sobre materias primas principales o sobre componentes manufacturados; y (2) los impuestos nacionales sobre ventas al consumo y al valor agregado, incorporados al costo del artículo ofrecido. El oferente deberá proporcionar la prueba documentada de las cantidades que, de conformidad con los incisos (1) y (2) anteriores, deben deducirse con el solo objeto de facilitar el cotejo de propuestas.

(iii) También a los efectos de comparar las ofertas, se tendrá como precio de los productos de origen extranjero, el precio CIF del producto, sumándole los gastos de manipulación portuaria, y los de transporte desde el puerto o lugar fronterizo de entrada hasta la obra, y restándole el importe de los derechos de importación, consulares y portuarios.

(iv) Para comparar ofertas de productos de origen ecuatoriano y extranjero se observará lo siguiente:

(1) los costos expresados en moneda extranjera se expresarán en su equivalente en sucres, utilizando el tipo de cambio pactado entre el Prestatario y el Banco en el Contrato de Préstamo; y

(2) al precio de los productos extranjeros, calculado conforme se estipula en el inciso (iii) anterior, se sumará un margen del 15% o el derecho aduanero real, según cual sea menor.

(v) Cuando aplicando las normas anteriores resulte que la oferta del producto nacional es más conveniente que la del producto extranjero, podrá hacerse uso para su adquisición de las divisas que formen parte del Préstamo.

(b) Margen de preferencia regional

(i) Se considerará que un bien es de origen regional cuando sea producido en un país miembro de la ALALC y/o del Grupo Andino y cumpla con los requisitos establecidos en los instrumentos jurídicos que gobiernan la ALALC y/o el Grupo Andino, en cuanto a origen y otras materias vinculadas con los programas de liberalización del comercio regional.

(ii) Para los efectos estipulados en el inciso (i) precedente, el valor añadido en el país originario, no podrá ser inferior al 40% del costo total del producto.

(iii) A los efectos de comparar ofertas, al precio CIF del producto, se le sumará el importe de los gastos de manipulación portuaria y los de transporte desde el puerto o lugar fronterizo de entrada hasta la obra.

(iv) También a los efectos de comparar precios de productos originarios de países miembros de la ALALC y/o del Grupo Andino y de productos originarios de países no miembros de la ALALC y/o del Grupo Andino, se observará lo siguiente:

(1) se convertirán a su equivalente en sucres los precios expresados en moneda extranjera, sobre la misma base de cálculo establecida en el inciso (a)(iv)(1) anterior; y

- (2) se sumará al precio de los productos originarios de países no miembros de la ALALC y/o del Grupo Andino, un margen del 15%, o bien la diferencia entre los derechos aplicables a productos originarios de ese mercado y los derechos aplicables a bienes no originarios del mismo, cualquiera sea menor.
- (v) Cuando aplicando las normas anteriores resulte que la oferta del producto originario de un país miembro de la ALALC y/o del Grupo Andino es más conveniente que la del producto originario de un país que no sea miembro de la ALALC y/o del Grupo Andino, podrá hacerse uso para su adquisición de las divisas que formen parte del Préstamo.

E. PLAZOS

- E.1 En todos los casos que en virtud del presente Procedimiento se requiera la aceptación del Banco, éste comunicará su decisión dentro del plazo de 45 días contados desde la fecha en que el Banco reciba la respectiva documentación. En caso de que el Banco razonablemente requiera información adicional que considere indispensable para adoptar su decisión, el plazo quedará suspendido por una sola vez y volverá a correr desde la fecha en que el Banco reciba dicha información.

ANEXO C
SELECCION Y CONTRATACION DE FIRMAS CONSULTORAS
Y/O EXPERTOS INDIVIDUALES

En la selección y contratación de firmas consultoras y/o expertos individuales (en adelante denominados indistintamente "consultores") necesarios para la ejecución del Proyecto se estará a lo siguiente:

I. DEFINICIONES

Se establecen las siguientes definiciones:

- 1.01 Experto individual es todo profesional o técnico especializado en alguna ciencia, arte u oficio.
- 1.02 Firma consultora es toda asociación legalmente constituida, integrada principalmente por personal profesional, para ofrecer servicios de consulta, asesoría, dictámenes de expertos y servicios profesionales de diversa índole.

Para los propósitos de este Anexo, organizaciones sin fines de lucro tales como universidades, fundaciones, organismos autónomos o semiautónomos u organizaciones internacionales que ofrezcan servicios de consulta, se considerarán como firmas consultoras.

II. INCOMPATIBILIDADES

- 2.01 No podrán utilizarse recursos del Banco para contratar consultores del país del Prestatario si ellos pertenecen al personal permanente o temporario del Estado o de la institución que recibe el Financiamiento o que es beneficiario de los servicios de los expertos, o si han pertenecido a cualquiera de ellos dentro de los seis meses previos a una de las siguientes fechas: (a) la de la presentación de la solicitud, o (b) la de la selección del experto individual, a menos que el Banco acuerde reducir ese plazo.

III. ELEGIBILIDAD Y REQUISITOS SOBRE NACIONALIDAD

- 3.01 El Prestatario y el Organismo Ejecutor no podrán introducir en la aplicación de los procedimientos establecidos en este Anexo, disposiciones o condiciones que restrinjan o impidan la participación de consultores originarios de países miembros del Banco.
- 3.02 Sólo podrán contratarse consultores que sean nacionales de países miembros del Banco. Para determinar la nacionalidad de una firma consultora se considerarán los siguientes criterios:
 - (a) El país en el cual la firma esté debidamente constituida o legalmente organizada.

- (b) El país en el cual la firma tenga establecido el asiento principal de sus negocios.
- (c) La nacionalidad de las firmas o la nacionalidad o residencia "bona fide" de los individuos que tengan en la firma consultora la propiedad, con derecho a participar en las utilidades de dicha firma en exceso del cincuenta por ciento (50%), conforme con lo establecido mediante certificación extendida por un funcionario de la firma consultora, debidamente autorizado.
- (d) La existencia de arreglos en virtud de los cuales una parte sustancial de las utilidades o beneficios tangibles de la firma se destina a firmas o personas de una determinada nacionalidad.
- (e) La determinación por parte del Banco de que la firma constituye una parte integral de la economía de un país, comprobado por la residencia bona fide en el país de una parte sustancial del personal ejecutivo, técnico y profesional de la firma, y que la firma cuenta en el país con el equipo operativo u otros elementos necesarios para llevar a cabo los servicios por contratar.

3.03 Los requisitos de nacionalidad exigidos por el Banco serán también aplicables a las firmas propuestas para prestar una parte de los servicios requeridos, en virtud de asociación conjunta o de un subcontrato con una firma consultora calificada que satisfaga los requisitos de nacionalidad.

3.04 Para establecer la nacionalidad de un experto individual se estará a la que se determine en su pasaporte u otro documento oficial de identidad. El Banco, sin embargo, podrá admitir excepciones a esta regla en aquellos casos en que el experto individual, no siendo elegible por razón de nacionalidad: (i) tenga domicilio establecido en un país elegible, esté en situación legal de poder trabajar en él (fuera del status de funcionario internacional) y que haya declarado que no tiene intenciones de regresar a su país de origen en un futuro inmediato; o bien (ii) haya fijado su domicilio permanente en un país elegible y haya residido en él por cinco (5) años como mínimo.

IV. PROCEDIMIENTOS DE SELECCION Y CONTRATACION

A. Selección y contratación de firmas consultoras

4.01 En el caso de selección y contratación de firmas consultoras:

(a) Antes de efectuarse la selección de la firma el Organismo Ejecutor deberá someter a la aprobación del Banco lo siguiente:

- (i) El procedimiento que se utilizará en la selección y contratación de la firma. Si se estima que el costo de los servicios no excederá de cincuenta mil dólares de los Estados Unidos de América (US\$50.000) o su equivalente, calculado de

acuerdo con lo dispuesto en el Artículo 3.05(a) de las Normas Generales, bastará que se efectúe un concurso privado de servicios de consultoría, o que se aplique otro método similar. Si se prevé, en cambio, que el costo excederá esa suma, la selección y contratación deberá anunciarse en la prensa nacional y, si así procediere por la complejidad y grado de especialización del asesoramiento solicitado, en publicaciones extranjeras especializadas. Además, deberá informarse al Banco sobre esos anuncios y enviársele recortes de los mismos, con especificación de fecha y nombre de la publicación en que hayan aparecido.

- (ii) Los términos de referencia (especificaciones) que describan los trabajos que realizará la firma, junto con una estimación del costo, y
 - (iii) Una lista de por lo menos tres y no más de seis firmas a las cuales se proyecta cursar invitación para que presenten propuestas de trabajo.
- (b) Una vez que el Banco haya aprobado los requisitos anteriores, se solicitará a todas las firmas aprobadas, la presentación de propuestas, conforme con los procedimientos y términos de referencia aprobados.
- (c) En las invitaciones a presentar propuestas debe establecerse el uso de una de las modalidades siguientes, según sea pertinente.
- (i) En el primer caso, se presentará un solo sobre cerrado que contendrá la propuesta técnica, sin cotización de precios. El Organismo Ejecutor analizará las propuestas recibidas y establecerá el orden de mérito de éstas. Si la complejidad del caso así lo requiera, el Organismo Ejecutor podrá recurrir por su propia cuenta a un grupo de consultores para que examine las propuestas y proporcione asesoramiento técnico y especializado en la clasificación por mérito.

Una vez establecido este orden de mérito de las firmas, se invitará a negociar un contrato a la firma clasificada en primer lugar. En estas negociaciones se examinarán en forma completa los detalles de los términos de referencia a fin de que exista un pleno y recíproco entendimiento con la firma, se examinarán los requisitos contractuales y legales del acuerdo y, por último, se elaborarán costos detallados. Si no puede llegarse a un acuerdo con esta firma respecto de las condiciones contractuales, se le notificará por escrito que se ha rechazado su propuesta y se iniciarán negociaciones con la segunda firma y así sucesivamente hasta que se llegue a un acuerdo satisfactorio.

- (ii) En el segundo caso deberán presentarse dos sobres cerrados, el primero de los cuales con la propuesta técnica, sin indicación de costos, y el segundo con el costo ofertado por los servicios.

El Organismo Ejecutor analizará las propuestas técnicas y establecerá el orden de mérito de éstas. La negociación contractual comenzará con la firma que ofrezca la mejor propuesta técnica. El segundo sobre presentado por esta firma se abrirá en presencia de uno o más representantes de la misma, y se lo utilizará en la negociación contractual. Todos los segundos sobres presentados por las otras firmas continuarán cerrados y, de llegarse a un acuerdo con la primera firma, serán devueltos a las firmas respectivas. De no llegarse a un acuerdo con la primera firma respecto de las condiciones contractuales se le notificará por escrito ese desacuerdo y se iniciará la negociación con la segunda firma, y así sucesivamente, hasta llegar a un acuerdo satisfactorio.

El no poder llegar a un acuerdo respecto de los costos detallados o la remuneración de los servicios, o el que el Organismo Ejecutor considere que dichos costos o remuneración son inapropiados o excesivos, será causa suficiente para notificar el rechazo de la propuesta e iniciar negociaciones con la firma que le siga en orden de mérito. Cuando se haya rechazado a una firma, no se la volverá a llamar para ulteriores negociaciones correspondientes a ese contrato.

- (d) El texto del proyecto del contrato negociado con la firma consultora deberá ser sometido a la aprobación del Banco, antes de su firma y de la iniciación de los servicios. Copia fiel del texto firmado deberá enviarse prontamente al Banco.

B. Selección y contratación de expertos individuales

4.02 En el caso de selección y contratación de expertos individuales:

- (a) Antes de efectuarse la selección de los expertos, el Organismo Ejecutor deberá someter a la aprobación del Banco lo que sigue:
 - (i) el procedimiento de selección,
 - (ii) los términos de referencia (especificaciones) y el calendario referentes a los servicios a ser proporcionados,
 - (iii) los nombres de los expertos tentativamente seleccionados, señalando detalladamente su nacionalidad y domicilio, antecedentes, experiencia profesional y conocimiento de idiomas, y
 - (iv) el formulario del contrato que se utilizará para contratar a los expertos.
- (b) Una vez que el Organismo Ejecutor y el Banco hayan aprobado los requisitos anteriores, el Organismo Ejecutor deberá proceder a contratar los expertos. El contrato que haya de suscribirse con cada

uno de ellos deberá ajustarse al modelo de contrato que el Banco y el Organismo Ejecutor hayan acordado. Copia fiel del texto firmado de cada contrato deberá enviarse prontamente al Banco.

V. MONEDAS DE PAGO A LOS CONSULTORES

5.01 Se establecen las siguientes modalidades en cuanto a las monedas con que se pagará a los consultores.

(a) Pagos a firmas consultoras. Los contratos que se suscriban con las firmas consultoras deberán reflejar una de las siguientes modalidades, según sea el caso:

(i) Si la firma consultora está domiciliada en el país donde deba rendir los servicios, su remuneración se pagará exclusivamente en la moneda de ese país, con excepción de gastos incurridos en divisas para pago de pasajes externos o viáticos en el exterior, los que se reembolsarán en dólares o su equivalente en otras monedas que formen parte del Financiamiento, excepto la del país del estudio.

(ii) Si la firma consultora no está domiciliada en el país donde deba rendir los servicios, el máximo porcentaje posible de su remuneración se pagará en la moneda de ese país, y el resto en dólares, o su equivalente en otras monedas que formen parte del Financiamiento, excepto la de ese país, en el entendido que la partida correspondiente a viáticos deberá pagarse en la moneda del país o países en los cuales los respectivos servicios han de ser rendidos. En caso de que el porcentaje que vaya a pagarse en la moneda del país en que se va a rendir el servicio, sea inferior al treinta por ciento (30%) del total de la remuneración de la firma consultora, una justificación completa y detallada se someterá al Banco para su examen y comentarios.

(iii) Si se trata de un consorcio integrado por firmas domiciliadas en el país y firmas no domiciliadas en el mismo la parte de la remuneración que corresponda a cada uno de los integrantes se pagará de acuerdo con las reglas señaladas en los párrafos (i) y (ii) anteriores.

(iv) Se aplicará lo dispuesto en el Artículo 3.05(a) de las Normas Generales respecto al tipo de cambio.

(b) Pagos a expertos individuales. Deben seguirse las mismas reglas del inciso (a) anterior.

VI. RECOMENDACIONES DE LOS CONSULTORES

6.01 Queda establecido que las opiniones y recomendaciones de los consultores no comprometen al Prestatario, al Organismo Ejecutor ni al Banco, los que se reservan el derecho de formular al respecto las observaciones o salvedades que consideren apropiadas.

VII. ALCANCE DEL COMPROMISO DEL BANCO

- 7.01 Queda establecido que el Banco no asume compromiso alguno de financiar total o parcialmente ningún programa o proyecto que, directa o indirectamente, pudiera resultar de los servicios rendidos por los consultores o de las recomendaciones formuladas por ellos.

Embalse, reforestación y limpieza del área de inundarse

-La construcción de la presa y el posterior llenado del embalse generan un sinnúmero de problemas que deben ser analizados. Uno de los principales consiste en la eliminación del fenómeno de entroficación del agua embalsada, para lo cual debe eliminarse la vegetación en el área del vaso.

-La entroficación es un proceso de saturación de nutrientes en un embalse, que se caracteriza por la producción desmedida de fitoplankton, algas y malezas flotantes en el seno de la masa líquida. Además de producirse este fenómeno por la falta de eliminación de la vegetación previo el llenado del embalse, el mismo se origina también por las descargas de desperdicios y/o residuos orgánicos provenientes de la población viviente alrededor del embalse, erosión de orillas, etc.

-Consecuentemente, si no se elimina la vegetación y se llena el vaso, se incrementaría la materia orgánica que tiene efectos indeseables sobre la calidad del agua. Los árboles sumergidos incluyen problemas de acumulación de desechos en las tomas de agua de las torres de captación; habría interferencia en la navegación y pesca, favorecería el habitat para el crecimiento de maleza acuática y vectores de enfermedades.

-El embalse inundará alrededor de 77 Km. del río Daule y 98 Km. del río Peripa. El lago a formarse tendrá un ancho máximo de 4 a 5 Km. en el area de confluencia de los dos grandes ríos. El embalse será relativamente profundo con máximos de hasta 70 m. de altura sobre el talud de la presa. El area a inundarse será de 27.000 Has. al nivel máximo de operación. Durante los períodos de lluvia el embalse se mantendría en la cota 85 o alcanzaría su máxima cota de almacenamiento (88.4) pudiendose cubrir una superficie de aproximadamente 30.000 Has.

-La zona a deforestarse se ubica desde el nivel del río actual hasta la cota máxima de operación y en cuanto a superficie serán las pendientes de los dos ríos y sus afluentes. El total del area para deforestación y limpieza del material vegetal sería de 12.000 Has., siendo el 73% del terreno con pendiente de 25 a 50%.

-El uso del suelo en el interior del area del embalse está compuesto por bosques de crecimiento secundario, pastos y una variedad de cultivos agrícolas anuales y permanentes y su distribución es la siguiente:

<u>Distribución uso suelo</u>	<u>Has.</u>	<u>%</u>
Cultivos ciclo corto	1.3	5,4
Cultivos permanentes	5.2	20,5
Pastos naturales	4.3	17,1
Pastos mejorados	9.3	37,2
Bosques y montes altos	4.8	19,3
Viviendas	<u>0.1</u>	<u>0,5</u>
Total	25.0	100,0

-Del total anterior, la superficie que se deberá deforestar y limpiar alcanza a 10.000 Has. que se distribuyen en 5.200 Has. de cultivos permanentes y 4.800 de árboles y montes.

-Los cultivos permanentes están representados principalmente por café y cacao y en menor escala por banano, plátano, naranja, mandarina, achiote y mangos. Para su eliminación, este tipo de vegetación deberá ser cortado y sus residuos incinerados. Los propietarios deberán ser indemnizados.

-Existen 18 especies forestales distribuidas en un total de aproximadamente 510 mil árboles. Cerca de 90% de estas especies están representadas por caña gadúa (65,2%), laurel (13,5%) y balsa (10%). A su vez la vegetación arbustiva semileñosa está caracterizada por plantas dicotiledoneas y monocotiledoneas. Gran parte de esta vegetación será talada y utilizada y/o comercializada posteriormente, en el caso de los árboles en edad maderable productiva. El resto, será incinerado.

-Los cultivos de ciclo corto como el arroz, maíz, yuca, tomate, piña, no requerirán eliminación porque sus residuos abandonados desaparecerán. Los pastizales difícilmente podrán ser eliminados y en algunos casos que forman potreros densos podrán incinerarse con fuego controlado o de lo contrario quedarán sepultados por las aguas.

-Para establecer el aprovechamiento del recurso forestal se requiere desglosar la población forestal por edad. Así, del total de 510 mil árboles un 40% (aproximadamente 200 mil) se encuentran en edad productiva 1/, lo que permite su utilización para diferentes usos particularmente construcción de casas, postes, cercas y muebles. Se estima que el valor comercial que se recuperaría alcanzaría a S.28.8 millones.

-La tala del bosque será selectiva, previniéndose a cortar el bosque maderable y ciertas márgenes y áreas de navegación y pesca. Ello permitiría disminuir la intensidad de entrofización del agua, limpiar los carriles de navegación, hacer posible la pesca con red, mejorar áreas de cría y desove de peces, mejorar posibilidad de turismo. La tala e incineración deberá efectuarse durante la estación semi-húmeda y será (junio a diciembre).

-Se estima además una parte de los árboles no maderables (68.000) se podrían utilizar para carbón vegetal.

-Sobre el perímetro del área que se va a quemar, después de la tala selectiva, se despejará una faja de cuatro metros contra fuego, desbrozando la respectiva vegetación a mano. En el caso de los árboles maderables se deberán desmantelar primero las copas y luego cortarse en trozos de 4 a 5 metros de longitud para ser trasladados a los aserraderos. En el caso de árboles no maderable pueden ser talados y cortados el material del tronco que puede ser aprovechable para carbón vegetal. El resto de residuos vegetales será acumulado para la quema.

1/ Árboles con 40 cms. de DAP y 12-15 m. de altura.

-La tala selectiva se hará utilizando la mano de obra del area debidamente seleccionada y capacitada. Se utilizarán hachas y motosierras y también el tractor, que será de uso limitado, básicamente en zonas de cultivo agroforestales.

-Para la deforestación de las especies maderables en edad productiva se propone el remate de las existencias para que el contratista ejecute el corte y aprovechamiento de la madera. La recuperacion se invertirá en la deforestación total del area del embalse.

-El costo de la deforestación y limpieza se descompone así:

<u>Especie</u>	<u>Unidad</u>	<u>Costo por tumba y quema</u>	<u>Total (millones US\$)</u>
Cultivos permanentes	5.200 Ha	6.000	30.0
Foresta en edad no productiva	Arboles	20	4.6
Foresta no maderable	Arboles	15	0.2
Total			35.7

-Las actividad de deforestación y limpieza del embalse será dependiente del progreso de las expropiaciones de los predios, indemnización de bienes y mejoras y pagos que se hagan a los posesionarios y propietarios asentados en el área. Será necesario indemnizar y pagar para después deforestar. También esta actividad será dependiente del llenado del emablse, lo que deberá ocurrir en 1988, por tanto, la accion deberá llevarse a cabo hasta 1986 o máximo 1987.

EMBALSE. RELOCALIZACION POBLACION

La población total localizada en el área del embalse es de 14.965 personas. De acuerdo a la zonificación establecida por SACOM - CEDEGE se distribuye de la siguiente forma: 8.004 habitantes en el sector Peripa, 5.290 en el sector Río Daule y 1.651 en el sector Confluencia.

Los predios que serán afectados por la inundación alcanzan a 2.051, de los cuales 411 serán expropiados y 1.640 obtendrán indemnización por mejoras.

Se estima que la población a reasentar es de 1.592 familias, de las cuales 1.505 corresponden a familias localizadas actualmente en las áreas de inundación.

El cuadro a continuación presenta un detalle de la distribución de la población en el área del embalse de acuerdo a sectores y según sea la población total o parcialmente afectada. Del mismo se desprende que la población totalmente afectada por las obras del embalse alcanza a aproximadamente 9.500 personas, equivalente a un 63% del total:

Población total área del embalse

<u>Sectores</u>	<u>Total</u> <u>Afectados</u>	<u>Parcial</u> <u>Afectados</u>	<u>Total</u>
Alto Peripa	2.386	1.635	4.021
Bajo Peripa	2.387	1.636	4.023
Daule	3.139	2.151	5.290
Confluencia	1.631	-	1.631
Total	9.543	5.422	14.965

Es importante resaltar el hecho de que del total de la población indicada, 6.986 personas corresponde a población adulta, de las cuales 4.555 serán totalmente afectadas y 2.531 lo serán parcialmente. Desde el punto de vista familiar, el total de población en el área del embalse se distribuye en 2.360 familias, de acuerdo al detalle siguiente:

Familias Localizadas en el Area del Embalse

<u>Sectores</u>	<u>Total</u> <u>Afectados</u>	<u>Parcial</u> <u>Afectados</u>	<u>Total</u>
Alto Peripa	377	259	636
Bajo Peripa	378	259	637
Daule	493	337	830
Confluencia	257	-	257
Total	1.505	855	2.360

En el cuadro siguiente se aprecia un detalle de la población según edades y sectores.

Población por estratos según edad

<u>Edad</u>	<u>Area del Embalse</u>		
	<u>Total</u> <u>Afectados</u>	<u>Parcial</u> <u>Afectados</u>	<u>Total</u>
0 - 14	5.088	2.891	7.979
15 - 24	1.798	1.021	2.819
25 - 34	969	551	1.520
35 - 54	1.258	715	1.973
55 - +	430	244	674
Total	9.543	9.422	14.865

La situación de escolaridad indica que de las 4.555 personas adultas, que participarían en el proceso de toma de decisiones, existen 4.008 que tienen un nivel escolar primario y dentro de este grupo, un elevado sector sólo ha concurrido a cuarto o quinto grado de su escuela rural. Se debe tener presente que del total de la población un 16% es analfabeta y que corresponde a 2.384 personas, de las cuales 1.250 son hombres y 1.134 mujeres.

El sector de población que ha tenido oportunidad de una formación secundaria y universitaria la ha conseguido fuera del área ya que en la misma no existen colegios ni universidades. En el área hay sólo 25 establecimientos educacionales ubicados en poblados que quedan bajo la cota 85 y 9 están dispersos. De las 25 escuelas, 8 son utilizadas en la noche como centros de alfabetización.

ECUADOR- PROYECTO DAULE-PERIPA - PRIMERA ETAPA

CRONOGRAMA DE EXPROPIACIONES Y LIMPIEZA EN LA ZONA DEL EMBALSE

ACTIVIDAD	1984				1985				1986				1987			
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
<u>EXPROPIACIONES</u>																
Conocimiento topográfico	x	x	x	x	x	x	x	x	x	x						
Alfondo propiedades	x	x	x	x	x	x	x	x	x	x	x					
Indemnización y desalojo	x	x	x	x	x	x	x	x	x	x	x					
<u>ASENTAMIENTOS</u>																
Organización Población	x	x	x	x	x	x										
Construcción Poblados					x	x	x	x	x	x						
Asentamiento Poblados						x	x	x	x	x	x	x				
Asentamientos agrícolas							x	x	x	x	x	x				
<u>PREPARACIÓN DEL VASO</u>																
Rebrote y Tala					x	x	x	x	x	x	x	x				
Quema									x	x	x	x	x	x		
Rebrote y Quema Rebrote											x	x	x	x	x	x

ECUADOR- PROYECTO DAULE-PERIPA-PRIMERA ETAPA

ANALISIS FINANCIERO A NIVEL DE FINCA DE 6 HECTAREAS 1/

(En equivalente a US\$)

A. <u>COSTOS DE PRODUCCION</u>	<u>10.520</u>
1. Preparación de la tierra y labores de riego	1.500
2. Jornales contratados (800) 2/	3.200
3. Insumos agrícolas (semillas, fertilizantes, etc.)	2.000
4. Transporte y cosecha	2.000
5. Tarifas riego 3/	600
6. Intereses capital	720
7. Imprevistos	500
B. <u>INGRESOS</u>	<u>14.799</u>
1. Arroz: 63,5 toneladas (US\$215/TM)	13.653
2. Frijol: 1,5 toneladas (US\$500/TM)	750
3. Sorgo: 2,4 toneladas (US\$165/TM)	396
C. <u>UTILIDAD FINANCIERA</u>	<u>4.279</u>
D. <u>INGRESO PER CAPITA 4/</u>	<u>713</u>

NOTAS: 1/ Se basa en una finca en pleno desarrollo con el Proyecto en la cual se siembran 10 Ha/año de arroz y 1,5 Ha de otros cultivos (frijol y sorgo).

2/ Se refiere exclusivamente a la mano de obra no aportada por la familia (la familia aporta un total efectivo de 600 jornales/año)

3/ Cubriendo solamente operación y mantenimiento del sistema.

4/ Suponiendo 6 personas por familia.

EQUADOR- PROYECTO DAULE-FERIPA -PRIMERA ETAPA
ANALISIS FINANCIERO DE LA UTILIDAD POR HECTAREA/AÑO EN ARROZ (En US\$) 1/
 (No incluye tarifas por riego y drenaje, ni otras cargas tributarias)

Descripción	Unidad	Cantidad	Costo Unitario	Total
A. COSTOS DE PRODUCCION POR COSECHA 2/				
1. Preparación tierra	Hora/Tractor	12	10	120
2. Semilla	Kg	50	2	100
3. Transplante	Jornal	30	4	120
4. Fertilizantes	Kg	300	0,5	150
5. Aplicación fertilizantes	Jornal	10	4	40
6. Productos fitosanitarios	Kg	4	15	60
7. Tratamientos fitosanitarios	Jornal	5	4	20
8. Manejo del agua	Jornal	5	4	20
9. Deshierbe	Jornal	10	4	40
10. Cosecha	Hora/máquina	3	40	120
11. Transporte	Tonelada	6,5	10	65
12. Gastos financieros 3/	Global	-	-	102
<u>Total costos</u>	-	-	-	957
B. INGRESOS BRUTOS POR COSECHA				
Producción de arroz en cáscara 4/	TM	6,35	215	1,365
C. UTILIDAD FINANCIERA POR COSECHA				
	-	-	-	408
D. UTILIDAD FINANCIERA POR AÑO 5/				
	-	-	-	772

NOTAS: 1/ Situación promedio con proyecto en pleno desarrollo. Representa cerca del 77% del área beneficiada en 1.993

2/ Según el nivel tecnológico, algunos de los rubros pueden utilizar mayor uso de mano de obra o uso de maquinaria, siendo el impacto en el costo de menor importancia financiera.

3/ Se ha supuesto una financiación del 90% de los costos, a una tasa de interés del 20% anual, durante 8 meses.

4/ Rendimientos de verano alcanzan a 6,5 TM/Ha. En invierno la producción es de 6,2 TM/Ha.

5/ Se ha estimado un índice de uso de la tierra de 1,87 para el proyecto.

ASISTENCIA TECNICA (S/./000) REQUERIMIENTOS ADICIONALES (1985 - 1988)

CATEGORIA 1.1 (PARTE)

	<u>DISPONIBILIDAD</u>		<u>1985</u>		<u>1986</u>		<u>1987</u>		<u>1988</u>		<u>TOTALES</u>	
	<u>ACTUAL</u>	<u>1/</u>									<u>ADICIONALES</u>	
	<u>Nº</u>	<u>S/./000</u>	<u>Nº</u>	<u>S/./000</u>	<u>Nº</u>	<u>S/./000</u>	<u>Nº</u>	<u>S/./000</u>	<u>Nº</u>	<u>S/./000</u>	<u>Nº</u>	<u>S/./0</u>
tor (Ing. Agr.)	1	600	--	--	--	--	--	--	--	--	--	--
División (Ing. Agr.)	1	450	1	450	1	450	1	450	1	450	1	1.8
res (Ing. Agr.)	1	1,656	4	1,656	6	2,484	8	3,312	8	3,312	8	10.7
ntes (Técnicos Agrícolas)	--	--	4	1,080	8	2,160	10	2,700	12	3,240	12	9.1
s generales de asistencia												
ca (Ayudas audiovisuales,												
ies radiales, etc.)	--	--	--	2,000	--	2,000	--	2,000	--	2,000	--	8.0
asistida por contrato de												
encia técnica privada												
(áreas)	--	--	500	500	1,000	1,000	1,000	1,000	1,500	1,500	4,000	4.0
s operativos	--	812	--	1,706	--	2,428	--	2,838	--	3,151	--	10.1
T A L E S		3,518		7,392		10,522		12,300		13,653		43.8
DOLARES (63,20)		55.665		116.962		166.487		194.620		216.028		694.0

Disponibilidad actual no se suma al total por estar ya incluida en la categoría 1.1 (Se menciona solamente como valor referencial, conocer las necesidades totales de la asistencia técnica), es decir, para conocer el total requerido de asistencia técnica es necesario sumar la disponibilidad actual y mantenerlo anualmente hasta 1988.

ECUADOR-DAULE-PERIPA

Los Patrones de Cultivos y la Producción Agrícola

La vocación de los suelos agrícolas del Valle del Daule es principalmente arroceras. Existen posibilidades de diversificación de cultivos en suelos sedimentarios de las clases 1, 2, y 3. Tal como se observa en el (Cronograma de Incorporación de Tierras a la Producción por tipo de cultivo y tipo de agricultor), se estima que una vez consolidado el desarrollo agrícola de la zona de riego del Proyecto (año 1993) se cultiven 31.801 Ha (15.654 Ha durante la cosecha de invierno y 16.147 Ha durante la cosecha de verano), distribuidas de la siguiente manera por cultivo y tipo de productor:

Uso de la Tierra con Proyecto Consolidado (1.993)

Cultivo y Tipo de Productores	Cosecha (Ha)		
	Invierno	Verano	Total
1. <u>Arroz:</u>	12.665	11.784	24.449
2. <u>Maíz</u>	1.612	1.275	2.887
3. <u>Soya</u>	421	846	1.267
4. <u>Frijol</u> *	45	472	517
5. <u>Soya</u> *	180	285	465
6. <u>Algodón</u>	-	494	494
7. <u>Tomate</u> *	75	499	574
8. <u>Higuerilla:</u>	656	492	1.148
<u>TOTALES:</u>	15.654	16.147	31.801
	=====	=====	=====
<u>Intensidad Uso</u>	0,92	0,95	1.87

Evidentemente, los resultados anteriores han sido estimados teniendo en cuenta los incrementos paulatinos en el mejor aprovechamiento de los recursos agua y suelos por parte de los agricultores, toda vez que desaparecen las restricciones en el manejo de la relación agua-suelo-planta como resultado de las obras de riego y drenaje del Proyecto y que los agricultores van asimilando y adaptando nuevas y mejores técnicas de producción en sus parcelas.

La evolución en el proceso a que se hace referencia, se muestra claramente en el Apéndice IV-6. A continuación se presentan los rendimientos agrícolas obtenidos actualmente en la zona del Proyecto y aquellos estimados para el año de consolidación del Proyecto (1993):

Rendimientos Agrícolas (TM/HA)

<u>Cultivo</u>	<u>Actuales</u>	<u>Esperados</u>
Arroz	4,5	6,5 <u>a/</u>
Maíz	2,5	4,0
Soya	1,8	2,5 <u>b/</u>
Frijol	-	2,0
Sorgo	-	3,2
Algodón	-	2,5 <u>c/</u>
Tomate	-	35,0
Higuerilla	-	2,2

a/ En el verano. Durante la cosecha de invierno el rendimiento es de 6.2 TM/Ha.

b/ Continúa aumentando hasta 3 TM/Ha en el año 1996

c/ Solamente se siembra en el verano.

Es importante señalar que se han caracterizado tres patrones o niveles tecnológicos de producción en la zona del Proyecto: (i) Organizaciones Campesinas, las cuales utilizan tecnologías modernas aunque con uso intensivo de mano de obra; (ii) Grandes Productores, que utilizan un mínimo de mano de obra y la tecnificación de su producción se basa en el mayor uso del capital; y (iii) los pequeños productores para los cuales las tecnologías son más tradicionales con uso intensivo de mano de obra. Evidentemente, con el Proyecto en pleno desarrollo las diferencias tecnológicas tenderán a disminuir y, eventualmente, las diferencias entre niveles de productividad de los factores (capital y mano de obra) a desaparecer en la práctica.

ECUADOR- PROYECTO DAULE-PERIPA-PRIMERA ETAPA (17.000 Ha)
CRONOGRAMA DE INCORPORACION TIERRAS A LA PRODUCCION AGRICOLA

	Situación Actual	1987	1988	1989	1990	1991	1992	1993
Arroz (Ha)	<u>12.471</u>	<u>12.200</u>	<u>19.858</u>	<u>20.918</u>	<u>21.975</u>	<u>23.036</u>	<u>23.829</u>	<u>24.449</u>
- Cosecha Invierno (Ha)	6.446	6.100	10.555	11.119	11.681	12.245	12.665	12.665
- Cosecha Verano (Ha)	6.026	6.100	9.303	9.799	10.294	10.791	11.164	11.784
- Rendimiento (TM/Ha) Inv.	4,4	5,0	5,3	5,6	5,8	6,0	6,2	6,2
- Rend. (TM/Ha) Verano	4,5	5,2	5,5	5,8	6,0	6,3	6,5	6,5
Mais (Ha)	<u>415</u>	-	<u>2.055</u>	<u>2.165</u>	<u>2.275</u>	<u>2.386</u>	<u>2.468</u>	<u>2.887</u>
- Cosecha Invierno (Ha)	340	-	1.047	1.103	1.159	1.216	1.258	1.612
- Cosecha Verano (Ha)	75	-	1.008	1.062	1.116	1.170	1.210	1.275
- Rendimiento (TM/Ha)	2,5	-	2,8	3,1	3,5	3,8	4,0	4,0
Soya (Ha)	<u>92</u>	-	<u>1.018</u>	<u>1.072</u>	<u>1.126</u>	<u>1.181</u>	<u>1.222</u>	<u>1.267</u>
- Cosecha Invierno (Ha)	54	-	351	369	388	406	421	421
- Cosecha Verano (Ha)	38	-	667	703	738	775	801	846
- Rendimiento (TM/Ha)	1,8	-	1,8	2,0	2,2	2,3	2,4	2,5
Frijol (Ha)	-	-	<u>411</u>	<u>433</u>	<u>454</u>	<u>475</u>	<u>492</u>	<u>517</u>
- Cosecha Invierno (Ha)	-	-	38	40	42	43	45	45
- Cosecha Verano (Ha)	-	-	373	393	412	432	447	472
- Rendimiento (TM/Ha)	-	-	1,2	1,4	1,6	1,7	1,8	2,0
Borgo (Ha)	-	-	<u>375</u>	<u>395</u>	<u>416</u>	<u>435</u>	<u>450</u>	<u>465</u>
- Cosecha Invierno (Ha)	-	-	150	158	166	174	180	180
- Cosecha Verano (Ha)	-	-	225	237	250	261	270	285
- Rendimiento (TM/Ha)	-	-	2,3	2,6	2,9	3,0	3,2	3,2
Algodón (Ha)	-	-	<u>390</u>	<u>412</u>	<u>432</u>	<u>452</u>	<u>468</u>	<u>494</u>
- Rendimientos (TM/Ha)	-	-	1,8	2,0	2,3	2,4	2,5	2,5
Tomate (Ha)	-	-	<u>457</u>	<u>480</u>	<u>505</u>	<u>530</u>	<u>548</u>	<u>574</u>
- Cosecha Invierno (Ha)	-	-	63	65	69	73	75	75
- Cosecha Verano (Ha)	-	-	394	415	436	457	473	499
- Rendimiento (TM/Ha)	-	-	29,4	30,8	32,2	33,6	35,0	35,0
Higuerilla (Ha)	-	-	<u>936</u>	<u>985</u>	<u>1.037</u>	<u>1.085</u>	<u>1.123</u>	<u>1.148</u>
- Cosecha Invierno (Ha)	-	-	546	576	605	633	656	656
- Cosecha de Verano (Ha)	-	-	390	409	432	452	467	492
- Rendimiento (TM/Ha)	-	-	1,6	1,8	2,0	2,1	2,2	2,2
TOTALES ANUALES:	<u>12.978</u>	<u>12.200</u>	<u>25.500</u>	<u>26.860</u>	<u>28.220</u>	<u>29.580</u>	<u>30.600</u>	<u>31.801</u>
- Cosecha Invierno	6.840	6.100	12.750	13.430	14.110	14.790	15.300	15.654
- Cosecha Verano	6.138	6.100	12.750	13.430	14.110	14.790	15.300	16.150
Area Fisica (Ha) 1/	<u>8.000</u>	<u>8.400</u>	<u>17.000</u>	<u>17.000</u>	<u>17.000</u>	<u>17.000</u>	<u>17.000</u>	<u>17.000</u>
Indice de uso	1,62	1,45	1,50	1,58	1,66	1,74	1,80	1,87

1/ Se refiere al área disponible de ser cultivada con el proyecto. Para la situación actual se realizó una estimación basada en áreas actualmente con posibilidades de ser cultivadas aunque sujetas a problemas de inundaciones con problemas de riego y/o drenaje.

Apéndice V-2

COMISION DE ESTUDIOS PARA EL DESARROLLO DE LA CUENCA DEL RIO GUAYAS (CEDEGE)
ESTADO DE SITUACION FINANCIERA AL 31 DE DICIEMBRE DE LOS AÑOS 1983, 1982, 1981, 1980, 1979
(EXPRESADO EN MILES DE US\$)

	<u>1983</u>	<u>1982</u>	<u>1981</u>	<u>1980</u>	<u>1979</u>
<u>Propiedades y Equipos</u>	7.806	8.004	7.405	6.876	6.352
Menos: Depreciación Acumulada	<u>(3.694)</u>	<u>(3.218)</u>	<u>(2.831)</u>	<u>(2.389)</u>	<u>(1.909)</u>
	<u>4.112</u>	<u>4.786</u>	<u>4.574</u>	<u>4.487</u>	<u>4.443</u>
<u>Inversiones:</u>					
Estudios realizados	—	768	768	768	314
Estudios y obras en proceso	108.329	75.148	52.908	39.107	31.344
Bonos del Estado	—	9	17	43	53
	<u>108.329</u>	<u>75.925</u>	<u>53.693</u>	<u>39.918</u>	<u>32.311</u>
<u>Cargos diferidos</u>	263	381	485	491	397
Menos: Amortización Acumulada	<u>(80)</u>	<u>(118)</u>	<u>(134)</u>	<u>(127)</u>	<u>(119)</u>
	<u>183</u>	<u>263</u>	<u>351</u>	<u>364</u>	<u>278</u>
<u>Activo Corriente</u>					
Caja y Bancos	5.528	3.071	2.597	155	443
Cuentas por Cobrar	16.443	21.902	4.209	3.559	3.686
Inventarios	3.548	4.490	4.557	543	297
Gastos Pagados por anticipado	21	23	24	17	26
Depósito sector público y privado	146	—	—	—	—
	<u>25.686</u>	<u>29.486</u>	<u>11.387</u>	<u>4.275</u>	<u>4.452</u>
	<u>138.310</u>	<u>110.460</u>	<u>70.005</u>	<u>49.044</u>	<u>41.484</u>
<u>Patrimonio Pasivo</u>					
<u>Patrimonio</u>					
Disponible	20.492	27.803	19.584	18.798	15.262
Restringido	69.163	35.763	8.170	804	3.263
Aumento (Disminución) Patrimonio	<u>25.018</u>	<u>8.710</u>	<u>0</u>	<u>0</u>	<u>0</u>
Por diferencia cambiaria	114.673	72.276	28.754	19.702	18.525
<u>Pasivo a largo plazo</u>	21.259	31.253	38.860	27.536	21.470
<u>Pasivo Corriente</u>					
Vencimiento corriente deuda a largo plazo	511	1.273	701	666	277
Proveedores y contratistas	1.508	3.763	884	746	628
Intereses y comisiones por pagar	76	190	440	148	128
Retenciones y gastos acumulados por pagar	<u>283</u>	<u>705</u>	<u>367</u>	<u>244</u>	<u>456</u>
	<u>2.378</u>	<u>5.931</u>	<u>2.391</u>	<u>1.804</u>	<u>1.489</u>
	<u>138.310</u>	<u>110.460</u>	<u>70.005</u>	<u>49.044</u>	<u>41.484</u>

CEDEGE

PRESTAMOS RECIBIDOS

<u>Institución Financiera</u>	<u>Monto Original</u>	<u>Objeto</u>
BID (16/CD-EC)	CD \$ 2,808,000	Estudios de factibilidad proyecto Daule-Peripa y Asistencia Técnica.
BID (377/SF-EC)	US\$ 20,800,000	Proyecto de Riego Babahoyo
FONAPRE (12-127-01-007-PE)	Sucres 40,000,000	Estudios Complementarios de Factibilidad y Diseños Definitivos Daule-Peripa
FONAPRE (P-047)	Sucres 75,000,000	Contrato de Consultoría y contratación de exper- tos individuales para proyecto Daule-Peripa
FONAPRE (056)	Sucres 35,096,022	II Fase estudios de la Cuenca del Río Guayas.
FONAPRE (Préstamos Ampliatorios)	Sucres 42,375,292	II Fase estudios de la Cuenca del Río Guayas.
FONAPRE	Sucres 20,310,000	Compra equipo de Compu- tación.
FONAPRE (No.089)	Sucres 100,000,00	Estudios de Consultoría para diseños definitivos Central Hidroeléctrica Daule-Peripa.
BEDE	Sucres 158,000,000	Proyecto Babahoyo (Sucres 130,000,000) Proy.Trasvase Daule Sta. Elena (Sucres 28,000,000)
Bco. Exterior de España	Sucres 3,165,391 US\$ 1,562,050	Diseños de construcción del Acueducto St. Elena.
BID (610/SF-EC 58/IC-EC 32/VF-EC)	US\$ 165,000,000	Construcción I Fase Proy. Daule-Peripa.
BID (ATN/SF-1810-EC)		

CEDEGE

Presupuestos de la Entidad
(En miles de US\$)

PROGRAMAS , ACTIVIDADES Y PROYECTOS	1 9 8 3			1 9 8 4		
	Corrientes	Capital	Total	Corrientes	Capital	Total
UNIDADES CENTRALES	<u>839</u>	<u>22</u>	<u>861</u>	<u>1,064</u>	<u>23</u>	<u>1,087</u>
ESTUDIOS DE PROYECTOS	<u>1,046</u>	<u>788</u>	<u>1,834</u>	<u>586</u>	<u>668</u>	<u>1,254</u>
Estudios Básicos	336	56	392	314	51	365
Hidrología y Recursos Hidráulicos (Proyecto Baja Cuenca)	205	730	935	155	616	771
Plan Regional para la Cuenca del Guayas y Península de Santa Elena	505	2	507	117	—	117
EJECUCION DE PROYECTOS	<u>2,216</u>	<u>39,789</u>	<u>42,005</u>	<u>2,137</u>	<u>54,363</u>	<u>56,500</u>
Proyecto de Riego Babahoyo	<u>1,103</u>	<u>3,971</u>	<u>5,074</u>	<u>1,037</u>	<u>4,054</u>	<u>5,091</u>
Administración del Proyecto	857	94	951	824	101	925
Construcción del Proyecto de Riego Babahoyo	246	3,877	4,123	213	3,953	4,166
Proyecto Daule - Peripa	713	33,630	34,343	768	48,604	49,372
Trasvase de Aguas del Río Daule a la Península de Santa Elena	400	2,188	2,588	332	1,705	2,037
<u>TOTAL DE LA CEDEGE</u>	<u>4,101</u>	<u>40,599</u>	<u>44,700</u>	<u>3,787</u>	<u>55,054</u>	<u>58,841</u>

PROYECCION BASE
CEDEGE
ESTADO DE RESULTADOS

PAGE

	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02
INGRESOS																			
INGRS.PRESUP.	2160	2160	2160	2160	2160	2160	2160	2160	2160	2160	2160	2160	2160	2160	2160	2160	2160	2160	2160
OTROS BABAH	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
OTROS DAULE	0	0	0	0	0	1500	2940	4190	4380	29100	29300	29300	29300	29300	29300	29300	29300	29300	29300
TOTAL INGRESOS	2360	2360	2360	2360	2360	3860	5300	6550	6740	31460	31660	31660	31660	31660	31660	31660	31660	31660	31660
EGRESOS																			
IN.CENTRAL	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
R./MANT.BABAH	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100
R./MANT.DAULE	0	0	0	0	0	1740	3180	4430	4820	6340	6540	6540	6900	6900	6900	6900	6900	6900	6900
ERES DEUDA EX	0	0	0	0	0	24364	22996	20747	34814	47957	45409	43206	40270	37335	34400	31465	28530	25595	22660
PRECIACION	0	0	0	0	0	10000	10000	10000	13979	17989	17989	17989	17989	17989	17989	17989	17989	17989	17989
TOTAL EGRESIS	2100	2100	2100	2100	2100	38204	38276	37277	55713	74386	72038	69835	67259	64324	61389	58454	55519	52584	49649
LIDAD9PER.NET	260	260	260	260	260	-34344	-32976	-30727	-48973	-42926	-40378	-38175	-35599	-32664	-29729	-26794	-23859	-20924	-17989

PROYECCION BASE
CEDEGE
ORIGEN Y APLICACION DE FONDOS

PAGE

	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03
E FONDOS																				
R)NETA	260	260	260	260	260	-34344	-32976	-30727	-48973	-42926	-40378	-38175	-35599	-32664	-29729	-26794	-23859	-20924	-17989	-15054
ACION	0	0	0	0	0	10000	10000	10000	13979	17989	17989	17989	17989	17989	17989	17989	17989	17989	17989	17989
DEAL	4166	533	12570	11230	9601	10660	15264	16503	9306	0	0	0	0	0	0	0	0	0	0	0
ERNO	9724	14586	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ERNO	0	50740	76330	93758	54208	34677	66838	76649	45717	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UENTES	14150	66119	89160	105248	64069	20993	59126	72425	20029	-24937	-22389	-20186	-17610	-14675	-11740	-8805	-5870	-2935	0	2935
ON FONDOS																				
Y.BABAHAY	4166	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Y.BAULE	9724	65920	88900	104997	61103	45337	84650	93152	55023	0	0	0	0	0	0	0	0	0	0	0
ION EQUIP	0	0	0	0	0	0	0	0	0	0	70	0	0	170	1920	0	1170	70	5310	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UNVER.	13890	65920	88900	104997	61103	45337	84650	93152	55023	0	70	0	0	170	1920	0	1170	70	5310	0
ACION DEU	0	0	0	4167	8333	8333	20333	20333	26719	23867	28293	28293	28293	28293	28293	28293	28293	28293	28293	28293
PLICACION	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PLICACION	13890	65920	88900	109164	69436	53670	104983	113485	81742	23867	28363	28293	28293	28463	30213	28293	29463	28363	33603	28293
T(DEF)ANU	260	199	260	-3916	-5367	-32677	-45857	-41060	-61713	-48804	-50752	-48479	-45903	-43138	-41953	-37098	-35333	-31298	-33603	-25358
IT(DEF)AC	260	459	719	-3197	-8564	-41241	-87098	-128158	-189871	-238675	-289427	-337906	-383809	-426947	-468900	-505998	-541331	-572629	-606232	-631590

EQUADOR- PROYECTO DAULE-PERIPA -PRIMERA ETAPA
ANÁLISIS FINANCIERO DE LA UTILIDAD POR HECTÁREA/AÑO EN ARROZ (En US\$) 1/
(No incluye tarifas por riego y drenaje, ni otras cargas tributarias)

Descripción	Unidad	Cantidad	Costo Unitario	Total
A. COSTOS DE PRODUCCIÓN POR COSECHA 2/				
1. Preparación tierra	Hora/Tractor	12	10	120
2. Semilla	Kg	50	2	100
3. Transplante	Jornal	30	4	120
4. Fertilizantes	Kg	300	0,5	150
5. Aplicación fertilizantes	Jornal	10	4	40
6. Productos fitosanitarios	Kg	4	15	60
7. Tratamientos fitosanitarios	Jornal	5	4	20
8. Manejo del agua	Jornal	5	4	20
9. Deshierbe	Jornal	10	4	40
10. Cosecha	Hora/máquina	3	40	120
11. Transporte	Tonelada	6,5	10	65
12. Gastos financieros 3/	Global	-	-	102
<u>Total costos</u>	-	-	-	957
B. INGRESOS BRUTOS POR COSECHA				
Producción de arroz en cáscara 4/	TM	6,35	200	1,365
C. UTILIDAD FINANCIERA POR COSECHA				
	-	-	-	408
D. UTILIDAD FINANCIERA POR AÑO 5/				
	-	-	-	772

NOTAS: 1/ Situación promedio con proyecto en pleno desarrollo. Representa cerca del 77% del área beneficiada en 1.993

2/ Según el nivel tecnológico, algunos de los rubros pueden utilizar mayor uso de mano de obra o uso de maquinaria, siendo el impacto en el costo de menor importancia financiera.

3/ Se ha supuesto una financiación del 90% de los costos, a una tasa de interés del 20% anual, durante 8 meses.

4/ Rendimientos de verano alcanzan a 6,5 TM/Ha. En invierno la producción es de 6,2 TM/Ha.

5/ Se ha estimado un índice de uso de la tierra de 1,87 para el proyecto.

CRONOGRAMA ACUMULADO DE INCORPORACION (33.000 HAS.)

DCA

Precios Económicos a Nivel de
Puerta Granja 1/

		US\$ por Tonelada Métrica
Arroz <u>2/</u>	CIF	220
	FOB	205
Maíz		150
Soya		290
Sorgo		145
Frijol		500
Algodón		600
Tomate		90
Higuerilla		175

- 1/ Basado en proyecciones del IBRD Commodity Studies and Projections Division.
2/ Precio CIF aplicado a la proporción que sustituye importaciones; precio FOB al excedente para exportación; coeficiente de molino = 0.65.

Precio Económico del Arroz (US\$ de 1984/TM) 1/

	C I F		F O B	
	<u>1990</u>	<u>1995</u>	<u>1990</u>	<u>1995</u>
Precio Básico 2/ (FOB Bangkok)	350	340	350	340
+ Flete & Seguros CIF: Bangkok a Guayaquil FOB: (Guayaquil-País Importador)	35	35	25	25
+ Trasbordo y Manejo Pto. Guayaquil CIF (+); FOB (-)	10	10	10	10
- Transporte y Manejo entre Zona de Proyecto y Centro de Consumo (CIF) o Puerto (FOB)	15	15	10	10
- Costos Pilado	65	65	65	65
+ Valor Sub-Productos	35	35	35	35
- Transporte de Granja a Piladora	10	10	10	10
Precio Económico por TM Arroz Pilado	340	330	315	305
Precio Económico por TM de Arroz Paddy (Arroz Pilado x 0.65)	221	215	205	198

1/ Precio Económico de Arroz Paddy a nivel de puerta granja
(Precio Arroz Pilado x 0.65, coeficiente de molino.)

2/ Proyección del IBRD, Commodity Price Forecasts, July 1984, para arroz 5%
quebrado BOF Bangkok.

Apéndice VI-5

Balance de Producción vs. Consumo del Arroz
(1000's Toneladas Métricas de Arroz Pilado)

Año	P R O D U C C I O N D E A R R O Z P I L A D O				Consumo Nacional	Excedente (o Déficit)
	Proyecto Daule Peripa	Proyecto Babahoyo	Resto del Ecuador	Total Producción		
1987	40.5	30.0	200.0	270.5	303.0	- 32.5
1988	68.0	40.0	200.0	308.0	312.0	- 4.0
1989	75.5	45.0	200.0	320.5	325.0	- 4.5
1990	157.0	50.0	200.0	407.0	338.0	+ 69.0
1991	203.0	50.0	200.0	453.0	350.0	+103.0
1992	270.0	50.0	200.0	520.0	362.0	+158.0
1993	284.0	50.0	200.0	534.0	375.0	+159.0
1994	305.0	50.0	200.0	555.0	388.0	+167.0
1995	321.0	50.0	200.0	571.0	402.0	+169.0
1996	326.0	50.0	200.0	576.0	416.0	+160.0
1997	328.0	50.0	200.0	578.0	431.0	+147.0
1998	329.0	50.0	200.0	579.0	446.0	+133.0
1999	330.0	50.0	200.0	580.0	462.0	+118.0
2000	330.0	50.0	200.0	580.0	478.0	+102.0
2001	330.0	50.0	200.0	580.0	495.0	+ 85.0
2002	330.0	50.0	200.0	580.0	512.0	+ 68.0
2003	330.0	50.0	200.0	580.0	530.0	+ 50.0
2004	330.0	50.0	200.0	580.0	550.0	+ 30.0
2005	330.0	50.0	200.0	580.0	569.0	+ 11.0
2006	330.0	50.0	200.0	580.0	589.0	- 9.0
2007	330.0	50.0	200.0	580.0	610.0	- 30.0
2008	330.0	50.0	200.0	580.0	630.0	- 5.0
2009	330.0	50.0	200.0	580.0	650.0	- 70.0
2010	330.0	50.0	200.0	580.0	675.0	- 95.0

Apéndice VI-6

CONSUMO DEL ARROZ

Ano	Poblacion ('000)	Y Indice Ingreso Per Capita (i=2%)	LN(Yn/Yo) LN(Y)	Elasticidad E	Consumo p/Capita(Kg)	Consumo T.M
0 1985	9379	1.000	0.0000	0.28	30.000	281370
1 1986	9673	1.010	0.0100	0.28	30.084	290998
2 1987	9976	1.020	0.0199	0.28	30.167	300948
3 1988	10228	1.030	0.0299	0.28	30.251	309405
4 1989	10612	1.041	0.0398	0.28	30.334	321908
5 1990	10949	1.051	0.0498	0.28	30.418	333046
6 1991	11280	1.062	0.0597	0.28	30.501	344057
7 1992	11620	1.072	0.0697	0.28	30.585	355399
8 1993	11971	1.083	0.0796	0.28	30.669	367135
9 1994	12333	1.094	0.0896	0.28	30.752	379267
10 1995	12704	1.105	0.0995	0.28	30.836	391738
11 1996	13085	1.116	0.1095	0.28	30.919	404584
12 1997	13478	1.127	0.1194	0.28	31.003	417848
13 1998	13882	1.138	0.1294	0.28	31.087	431544
14 1999	14298	1.149	0.1393	0.28	31.170	445685
15 2000	14727	1.161	0.1493	0.28	31.254	460287
16 2001	15169	1.173	0.1592	0.28	31.337	475363
17 2002	15624	1.184	0.1692	0.28	31.421	490930
18 2003	16093	1.196	0.1791	0.28	31.504	507003
19 2004	16576	1.208	0.1891	0.28	31.588	523599
20 2005	17073	1.220	0.1990	0.28	31.672	540734
21 2006	17585	1.232	0.2090	0.28	31.755	558426
22 2007	18113	1.245	0.2189	0.28	31.839	576692
23 2008	18656	1.257	0.2289	0.28	31.922	595552
24 2009	19216	1.270	0.2388	0.28	32.006	615025
25 2010	19792	1.282	0.2488	0.28	32.090	635130

$$C_t = C_o (E LN (Y_n/Y_o) + 1)$$

W1075s
ECUADOR

CUADRO I
Componente de Energía Eléctrica
Flujos de Beneficios Netos (US\$ miles 1984)

<u>Año</u>	<u>Caso</u>			<u>Base</u>		
	<u>Demanda</u>	<u>Media</u>		<u>Demanda</u>	<u>Alta</u>	
	<u>Valor</u>			<u>Valor</u>		
	<u>Energía no</u>	<u>Dif. costos</u>	<u>TOTAL</u>	<u>Energía no</u>	<u>Dif. costos</u>	<u>TOTAL</u>
	<u>suplida SDP*</u>	<u>energía suplida</u>		<u>suplida SDP</u>	<u>energía suplida</u>	
1987						
1988						-5915,4
1989			- 5915,4			-35495,2
1990			-35495,2			-41411,5
1991		17070,0	-24341		-8307,0	-43802,0
1992		6953,0	-28542,2		30285,0	30285,0
1993		8553,0	8553,0		24018,0	24018,0
1994		21818,0	21818,0	1965,0	33300,0	35265,0
1995	2385,0	31659,0	34044,0	2468,0	35912,0	38380,0
1996	2083,0	31772,0	35855,0	2462,5	39064,5	41527,0
1997	2000,0	16906,0	20906,0	2462,5	38971,5	41434,0
1998	3910,0	6106,0	10016,0	2462,5	23637,5	26100,0
1999	0,0	1422,0	1422,0	0,0	3141,0	3141,0
2000	1700,0	11462,0	13162,0	840,0	12225,4	13065,4
2001						
		13162,0	13162,0		13065,4	13065,4
2036						

VP (84)

11980,0

24200,0

* sin Daule Peripa

JKDPCB2

ECUADOR, DAULE PERIPA, BENEFICIOS Y COSTOS
 US\$ millones (1984)

BENEFICIOS

	R I E G O			ELECTRICIDAD		AGUA	CONTROL
	B17	B33	B50	Demanda Alta	Demanda Media	POTABLE	INUNDACIONES
1980							
1981							
1982							
1983							
1984							
1985							
1986							
1987	4.47		4.47				0.45
1988	8.93		8.93	-5.92		0.87	0.45
1989	11.81		11.81	-35.50	-5.92	-4.66	0.45
1990	15.39	9.92	25.31	-41.41	-35.50	2.35	0.45
1991	16.77	22.11	38.88	-43.80	-24.34	-12.11	0.45
1992	18.94	25.78	44.72	30.29	-28.54	-4.85	0.45
1993	19.57	27.93	47.50	24.02	8.35	22.41	0.45
1994	19.58	31.28	50.86	35.27	21.82	22.58	0.45
1995	19.83	34.57	54.40	38.38	34.04	4.24	0.45
1996	20.00	36.45	56.45	41.53	35.86	2.16	0.45
1997	20.21	36.79	57.00	41.34	20.91	2.26	0.45
1998	20.23	37.67	57.90	26.10	10.02	2.16	0.45
1999	20.23	38.27	58.50	3.14	1.42	0.12	0.45
2000	20.23	38.37	58.60	13.07	13.16	0.12	0.45
2001	20.23	38.97	59.20	13.07	13.16	0.12	0.45
2002	20.23	39.97	59.70	13.07	13.16	0.12	0.45
2003	20.23	39.47	60.20	13.07	13.16	0.12	0.45
2004	20.23	40.47	60.70	13.07	13.16	0.26	0.45
2005	20.23	41.02	61.25	13.07	13.16	0.26	0.45
2006	20.23	41.02	61.25	13.07	13.16	0.26	0.45
2007	20.23	41.02	61.25	13.07	13.16	0.26	0.45
2008	20.23	41.02	61.25	13.07	13.16	0.26	0.45
2009	20.23	41.02	61.25	13.07	13.16	0.26	0.45
2010	20.23	41.02	61.25	13.07	13.16	0.26	0.45
2011	20.23	41.02	61.25	13.07	13.16	0.26	0.45
2012	20.23	41.02	61.25	13.07	13.16	0.26	0.45
2013	20.23	41.02	61.25	13.07	13.16	0.26	0.45
2014	20.23	41.02	61.25	13.07	13.16	0.26	0.45
2015	20.23	41.02	61.25	13.07	13.16	0.26	0.45
2016	20.23	41.02	61.25	13.07	13.16	0.26	0.45
2017	20.23	41.02	61.25	13.07	13.16	0.26	0.45
2018	20.23	41.02	61.25	13.07	13.16	0.26	0.45
2019	20.23	41.02	61.25	13.07	13.16	0.26	0.45
2020	20.23	41.02	61.25	13.07	13.16	0.26	0.45
2021	20.23	41.02	61.25	13.07	13.16	0.26	0.45
2022	20.23	41.02	61.25	13.07	13.16	0.26	0.45
2023	20.23	41.02	61.25	13.07	13.16	0.26	0.45
2024	20.23	41.02	61.25	13.07	13.16	0.26	0.45
2025	20.23	41.02	61.25	13.07	13.16	0.26	0.45
2026	20.23	41.02	61.25	13.07	13.16	0.26	0.45
2027	20.23	41.02	61.25	13.07	13.16	0.26	0.45
2028	20.23	41.02	61.25	13.07	13.16	0.26	0.45
2029	20.23	41.02	61.25	13.07	13.16	0.26	0.45
2030	20.23	41.02	61.25	13.07	13.16	0.26	0.45
2031	20.23	41.02	61.25	13.07	13.16	0.26	0.45
2032	20.23	41.02	61.25	13.07	13.16	0.26	0.45
2033	20.23	41.02	61.25	13.07	13.16	0.26	0.45
2034	20.23	41.02	61.25	13.07	13.16	0.26	0.45
2035	20.23	41.02	61.25	13.07	13.16	0.26	0.45
2036	20.23	41.02	61.25	13.07	13.16	0.26	0.45

VPN: 105.586 148.412 253.992 24.233 11.980 10.096 2.979

IRF: 0.1726 0.1529

C O S T O S

	O & M			INVERSION			SIN PROYECTO	
	Presa	17000	50000	Presa	17000	33000	17000	50000
1980				1.85				
1981				5.30				
1982				29.32				
1983				22.91	0.48			
1984				37.41	4.94			
1985				36.76	13.31			
1986				45.07	19.25			
1987	0.00	0.79	0.79	39.49	17.82	12.42	4.50	4.50
1988	0.24	1.30	1.30	1.98	7.08	20.58	6.00	6.00
1989	0.24	1.50	1.50			25.91	6.10	6.10
1990	0.24	1.59	4.60			25.91	6.20	8.60
1991	0.24	1.68	4.30			18.65	6.30	8.80
1992	0.44	1.73	4.40				6.40	9.00
1993	0.44	1.90	4.60				6.50	9.20
1994	0.44	1.97	4.90				6.60	9.40
1995	0.44	1.90	4.83				6.70	9.60
1996	0.44	1.90	5.19				6.80	9.80
1997	0.44	1.90	5.37				6.90	9.90
1998	1.33	2.83	6.12				7.00	10.00
1999	0.44	1.90	5.19				7.00	10.00
2000	0.44	1.90	6.37				7.00	10.00
2001	0.44	1.97	5.26				7.00	10.00
2002	0.44	7.21	10.47				7.00	10.00
2003	0.44	1.90	5.19				7.00	10.00
2004	0.44	1.90	5.13				7.00	10.00
2005	0.44	1.90	23.90				7.00	10.00
2006	0.44	1.90	5.19				7.00	10.00
2007	0.44	5.55	8.81				7.00	10.00
2008	1.33	2.90	6.19				7.00	10.00
2009	0.44	1.90	5.19				7.00	10.00
2010	0.44	1.90	8.61				7.00	10.00
2011	0.44	1.90	5.36				7.00	10.00
2012	0.44	1.90	5.19				7.00	10.00
2013	0.44	1.90	5.19				7.00	10.00
2014	0.44	1.90	5.19				7.00	10.00
2015	0.44	1.97	5.26				7.00	10.00
2016	0.44	1.90	5.19				7.00	10.00
2017	0.44	7.21	10.47				7.00	10.00
2018	1.33	2.83	6.29				7.00	10.00
2019	0.44	1.90	5.19				7.00	10.00
2020	0.44	1.90	25.06				7.00	10.00
2021	0.44	1.90	5.19				7.00	10.00
2022	0.44	1.97	5.26				7.00	10.00
2023	0.44	1.90	5.19				7.00	10.00
2024	0.44	1.90	5.19				7.00	10.00
2025	0.44	1.90	5.26				7.00	10.00
2026	0.44	1.90	5.19				7.00	10.00
2027	0.44	5.55	8.81				7.00	10.00
2028	1.33	2.83	6.12				7.00	10.00
2029	0.44	1.97	5.26				7.00	10.00
2030	0.44	1.90	8.61				7.00	10.00
2031	0.44	1.90	5.19				7.00	10.00
2032	0.44	7.21	10.67				7.00	10.00
2033	0.44	1.90	5.19				7.00	10.00
2034	0.44	1.90	5.19				7.00	10.00
2035	0.44	1.90	5.19				7.00	10.00
2036	0.44	1.90	5.19				7.00	10.00

VPN: 2.433 12.310 29.164 208.323 49.891 58.184 41.983 55.206

IRR:

NAME OF PROJECT = DAULE-PERIPA JK-DPFIN X/29/84

Apêndice VI-9

Pág. 1 de 2

RATE OF RETURN =

8.8

DO YOU WISH COMPLETE SENSITIVITY ANALYSIS ? YES

% CHANGE SALES R OF R (NO CHANGE IN COSTS AND INVST)

-25	6.8
-20	7.2
-15	7.6
-10	8.0
-5	8.4
0	8.8
5	9.1
10	9.4
15	9.8
20	10.0
25	10.4

% CHANGE COSTS R OF R (NO CHANGE IN SALES AND INVST)

-25	9.0
-20	8.9
-15	8.9
-10	8.8
-5	8.8
0	8.8
5	8.7
10	8.7
15	8.6
20	8.6
25	8.5

% CHANGE INVST R OF R (NO CHANGE IN SALES AND COSTS)

-25	10.6
-20	10.2
-15	9.8
-10	9.4
-5	9.0
0	8.8
5	8.5
10	8.2
15	7.9
20	7.7
25	7.5

NAME OF PROJECT = DAULE-PERIPA JK-DPS X/29/84

RATE OF RETURN = 11.7

DO YOU WISH COMPLETE SENSITIVITY ANALYSIS ? YES

<u>% CHANGE SALES</u>	<u>R OF R</u>	<u>(NO CHANGE IN COSTS AND INVST)</u>
-25	9.2	
-20	9.8	
-15	10.3	
-10	10.8	
-5	11.2	
0	11.7	
5	12.1	
10	12.6	
15	12.9	
20	13.4	
25	13.7	

<u>% CHANGE COSTS</u>	<u>R OF R</u>	<u>(NO CHANGE IN SALES AND INVST)</u>
-25	12.0	
-20	11.9	
-15	11.9	
-10	11.8	
-5	11.8	
0	11.7	
5	11.6	
10	11.6	
15	11.5	
20	11.4	
25	11.4	

<u>% CHANGE INVST</u>	<u>R OF R</u>	<u>(NO CHANGE IN SALES AND COSTS)</u>
-25	14.0	
-20	13.5	
-15	13.0	
-10	12.5	
-5	12.1	
0	11.7	
5	11.3	
10	11.0	
15	10.6	
20	10.3	
25	10.0	

Mercado para los Productos Agrícolas

De acuerdo al análisis, basado en el plan de cultivos elaborado por CEDEGE, el arroz representa más del 90% de la producción agrícola del proyecto, tanto en volumen como en términos del valor. Por lo tanto se considera necesario enfatizar el proceso de comercialización, como parte integral del análisis del proyecto, pero aún mas importante como actividad clave continua para CEDEGE, y las agencias coparticipantes en el Proyecto, principalmente el MAG.

En particular, se enfatiza la necesidad que CEDEGE efectúe un estudio sobre la situación del arroz en el Ecuador, las tendencias del consumo nacional y las perspectivas de exportación del excedente anticipado. Hasta la fecha se ha observado cierta tendencia de enfocar el arroz básicamente como un producto de sustitución de importaciones, en parte por una posible sobre-estimación del futuro consumo doméstico. En vista del gran potencial del Proyecto Daule-Peripa de producir excedentes importantes, se considera necesario prever los pasos necesarios para asegurar su comercialización.

Para reforzar la conclusión anterior, se cita la proyección del consumo del arroz presentado en ____ y del balance entre el consumo y la producción anticipada durante cada año de la vida del proyecto. De acuerdo a dicho ejercicio, el Ecuador podría producir excedentes significativos alrededor del año 1990, hasta el año 2005, después del cual la supuesta demanda superaría la producción en las superficies proyectadas. Se señala como el período de mayor exportación el de 1992-1996, cuando el excedente varía entre 158.000 y 169.000 TM anuales.

El análisis de mercado tomó como punto de partida este último volumen y considerando que los costos de producción son similares a otros países de la región enfocó como principal ventaja comparativa del Ecuador su ubicación geográfica en la Costa del Pacífico, aprovechando la cercanía al puerto de Guayaquil de la zona arroceras del Proyecto, así como del resto de la gran región arroceras de la costa.

Por lo tanto se examinó la situación respectiva de cada país de Centro y Sud América ubicado en la Costa del Pacífico, para evaluar las posibilidades futuras de importar arroz del Ecuador, o en el caso de Colombia de competir en la exportación. Los resultados de este ejercicio indicaron que Centroamérica podría considerarse como una región auto-abastecedora, por posibilidades de exportación.

Perú representa el principal, y quizás el único futuro comprador de la región con una demanda significativa y continua. Los demás países o tienen demanda limitada por sus hábitos de consumo o son básicamente auto-suficientes, con necesidades esporádicas de importaciones para satisfacer déficits eventuales. En cambio, el Perú ha registrado últimamente importaciones por encima de los 100.000 TM (1981 y 1983, la mayoría de los EEUU) a pesar de sus propios niveles de productividad relativamente altos, mayores a 4.2 TM/ha (arroz paddy).

Una proyección basada en el actual nivel de consumo per cápita de 31.4kg, con un ligero aumento de la producción (actual hasta 500.000 TM de arroz pilado) indicaría un déficit de 157.000 TM en 1991, aumentando hasta 300.000 TM en el año 2000, periodo dentro del cual Ecuador tendría que colocar entre 100.000 y 169.000 TM al año. Por lo tanto se concluye que Perú podría absorber todos los excedentes de arroz proyectados para dicho periodo, siempre que no cambiaran fundamentalmente sus propias condiciones de producción.

De lo anterior, se concluye que el mercado del arroz exportable del Ecuador no se debe considerar garantizado de ninguna forma, aunque existen buenas perspectivas dada la continuación de tendencias actuales de consumo, suponiendo relaciones comerciales normales con los países vecinos de la región. Para asegurar el pleno aprovechamiento de estas posibilidades, se recomienda la puesta en marcha, dentro de CEDEGE, de una entidad con las funciones de estudio **y establecimiento de los canales de comercialización necesarios.**

Los demás productos no presentan problemas de comercialización puesto que representan incrementos menores a la producción actual. En el caso del maíz, el producto más voluminoso después del arroz, con 21.400 TM anuales esperadas al consolidarse la producción, representa menos del 10% del nivel actual superior a 220.000 TM. Los demás productos representan proporciones mucho menores. Por otro lado ya existen los canales de comercialización adecuados para todos los productos.

Colombia representa el único país exportador de la región del Pacífico, y la fuente principal del mismo Ecuador para cubrir sus propios déficits en los últimos años; exportó 40.000 TM al Ecuador en 1980, 5.000 TM en 1981 y hasta 15.000 TM en 1983.

Aunque su propio consumo es alto (39.5 kg/cápita) la productividad también lo es, de alrededor de 5.0 TM/ha. La política actual es de fomentar las exportaciones. Por lo tanto, hay que suponer que Colombia mantendría su posición como exportador, y como mínimo se mantendría el auto-abastecimiento.

Chile consume poco arroz, alrededor de 100.000 TM (menos de 9.0 kg/capita), del cual casi se auto-abastece, con importaciones menores; de 10.000 a 30.000 TM en los últimos 3 años.

Bolivia. Su nivel de consumo es relativamente bajo, en 12.5 kg/capita, y tiene el potencial de auto-abastecimiento de sus regiones de claros y "yungas", aunque recurrió a importaciones de 30.000 TM en 1983.

Centro América. La región se considera auto-suficiente, con Costa Rica como principal fuente futura de excedentes para mantener dicha situación.

En el resto de la región, sólo Brasil teóricamente podría absorber excedentes de arroz del Ecuador, puesto que su alto nivel de consumo, tanto per cápita (47.0 kg) como absoluto, entre 50-60 millones de toneladas, podría fácilmente admitir variaciones esporádicas del orden de magnitud de los excedentes ecuatorianos (100-170.000 TM) de potenciales exportadores.

Por otro lado, Guyana debería continuar como abastecedor principal de arroz al Caribe, junto con Venezuela y los EEUU, cuyos mayores precios del producto lo sitúa en cierta desventaja en relación a la situación esperada para Ecuador con el Proyecto Daule-Peripa, cuya ubicación junto con sus costos marginales de producción, le permitiría competir en los mercados arriba señalados.

ECUADOR

Daule-Peripa (EC-0099)

Operación y Mantenimiento

I. Zona Riego 17.000 Has.

a) Personal

Administración
Mantenimiento

24 Personas
22 Operadores, mecánicos y choferes
7 Topógrafos, cuaderneros y dibujantes
3 Ingenieros

Operación Bombas

1 Jefe
17 Operadores bombas
17 Ayudantes
3 Mecánicos

Operación Riego y Drenaje

3 Ingenieros
14 Inspectores y Jefes Zona
48 Canaleros y operadores compuertas

Total = 45.840.720

US\$ Equivalente = $\frac{725.328}{17.000} = 42.67/\text{TM-año}$

b) Materiales

US\$3.300.000/año

2.000.000/año

Grava
Pinturas Mantenimiento
Cemento

300.000/año

Material oficina

1.000.000/año

Combustible y lubricante *
de maquinaria + vehículos

c) Energía

Riego
Drenaje

13.913.000 KW-H/año
2.500.000 KW-H/año

16.413.000 KW-H

d) Maquinaria

Mantenimiento de vías	270 Km
Mantenimiento canales drenaje	120 Km
Canales Riego	55 Km primarios
	108 Km secundarios
	61 Km terciarios

Mantenimiento de Vías

$$270 \text{ Km} \times 5.00 \text{ mts ancho} \times 0.25 = 337.500 \text{ M}^3$$

Equipo: 1 motoniveladora (conformando)

1 tractor D6 (explot. material)

1 cargadora 1 yd³ (cargando volquetas)

volquetas

1 rodillo vilero compact. (auto propulsadora)

Supuestos

1. Reparar la sub-base totalmente cada 10 año
 vol/año = 33.750 M³/año

2. La reposición de sub-base se hace en verano = 6 meses

3. La motoniveladora trabaja todo el año.

Horas disponibles para reposición de sub-base.

$$6 \text{ meses} \times 22 \text{ días hábiles} \times 10 \text{ horas} = 1.320 \text{ horas/año}$$

Horas necesarias

Tractor de 140 H.P.

$$\text{Vol/año} = 33.750 \text{ M}^3$$

$$\text{Rendimiento} = 50 \text{ M}^3/\text{H.}$$

$$\text{Horas necesarias} = 675 \text{ horas}$$

Cargador 1 yd³

$$\text{Vol/año} = 33.750 \times 1.15 = 388 \text{ Km}^3$$

$$\text{Rendimiento} = 60 \text{ M}^3/\text{H}$$

$$\text{Horas necesarias} = 647 \text{ horas}$$

Volquetas

$$\text{Velocidad cargada} = 30 \text{ Km/H}$$

$$\text{Velocidad vacía} = 45 \text{ Km/H}$$

$$\text{T Cargada} = 1 \text{ hora}$$

$$\text{T vacía} = 0.67 \text{ horas}$$

$$\text{Rendimiento} = 8 \text{ M}^3 \text{ suetos}$$

$$\text{Rendimiento real} = \frac{8}{0.67 + 1.0} = 5 \text{ m}^3/\text{hora}$$

$$60 \text{ M}^3/5 = 12 \text{ volquetas}$$

Rodillo

Velocidad = 4 Km/H
 Ancho = 2.40 X 0.6 = 1.44
 Número pasadas = 4.0

$$\frac{4000}{4} \times \frac{1.44}{1} \times 0.25 = 360 \text{ M}^3/\text{H}$$

$$\text{Horas Necesarias} = \frac{33.750}{480} = 94 \text{ horas}$$

$$\text{Motoniveladora} = \frac{33.750}{60 \text{ M}^3/\text{Horas}} = 562 \text{ Horas}$$

Mantenimiento rutinario en 6 meses

1 moto 6 meses x 22 días x 3 = 396
 1 rodillo 6 meses x 22 días x 3 = 396

Horas totales/año:

Moto 396 + 562 = 958 horas/año
 Cargador 0 + 647 = 647 horas/año
 Tractor 0 + 675 = 675 horas/año
 Rodillo 396 + 94 = 490 horas/año
 Volquetas $\frac{33.750 \text{ M}^3}{5 \text{ M}^3/\text{H}}$ = 6750 horas

Horas disponibles

Reposición Sub-Base = 1.320 horas
 Mantenimiento rutinario = $\frac{396 \text{ horas}}{1.716 \text{ horas}}$

Máquinas necesarias

Moto niveladora $\frac{958 + 396}{1716} = 0.8$
 Cargador = $\frac{647}{1.320} = 0.5$
 Tractor = $\frac{675}{1.320} = 0.51$
 Rodillo = $\frac{396 + 94}{1.716} = 0.30$
 Volquetas = $\frac{6.750}{1.320} = 5.0$

Estaciones de Bombeo

Riego	San Jacinto 1:	336 KW
	San Jacinto 2:	<u>260 KW</u>
		596 KW
	Hiqueran 1	577 KW
	Hiqueran 2	<u>116 KW</u>
		693 KW
	El Mate 1	91 KW
	El Mate 2	87 KW
	El Mate 3	140 KW
	El Mate 4	<u>159 KW</u>
		577 KW
Drenaje	América y Lomas	<u>2.941 KW</u>
		4.807 KW
	San Jacinto	295 KW
	Hiquerán	576 KW
	Mate 1	240 KW
	Mate 2	62 KW
	América 1	451 KW
	América 2	62 KW
	América 3	73 KW
	Tomas	<u>83 KW</u>
		1.842 KW
Total = 66.49 KW		
Total = con Factor Potencia = 7.822		
Cargo Fijo		$78.22 \times \frac{5}{57.45} = 12$
		5.392.730 s/año
US\$ Equivalente		<u>85.328/año</u>
Consumo Total		16.413.000 KW-H/año
Tarifa		2.54 s/KW-H
		41.689.020 s/año
US\$ Equivalente		659.636/año
Total/año		744.964 US\$/año
		43.82 US\$/Ha-año

RESUMEN DE TARIFAS DE EQUIPO

D6D Valor US\$ 183.000 (7.000 depreciación)

Tarifa horaria = US\$ 54.72/hora

<u>%</u>		<u>S</u>	<u>US\$</u>
* 43%	Depreciación	0	26.10
29%	Repuestos	0	15.66
14%	Rodantes y aceras	0	7.61
6%	Combustible	2.66	0
		0.80	0
* 8%	Operador	4.55	0
<u>100%</u>		<u>8.01</u>	<u>46.71</u>
		(15%)	(85%)

Cargador Valor US\$ 144.000

Tarifa horaria = US\$ 47.52/hora

	<u>S</u>	<u>US\$</u>
Depreciación	0	20.43
Repuestos	0	13.78
Llantas y aceros	0	6.65
Combustibles y	2.85	0
Lubricantes		
Operador	3.80	0
	<u>6.65</u>	<u>40.87</u>
	(15%)	(85%)

Motoniveladora
y Retroexcav. US\$ 132.000

Tarifa horaria = US\$ 43.50/hora

	<u>S</u>	<u>US\$</u>
Depreciación	0	18.73
Repuestos	0	12.63
Llantas y aceros	0	6.10
Combustibles y	2.61	0
Lubricantes		
Operador	3.48	0
	<u>6.09</u>	<u>37.47</u>
	(15%)	(85%)

Costos horarios (tarifas)

D6 - 183.000

$$183.000 \times 0.00033 = 54.72/\text{hora}$$

$$\underline{183.000} = 26.10 \text{ depreciaciones}$$

$$\text{Dif.} = 28.62$$

$$\begin{array}{r} \text{Operador} = -3.00 \times \frac{2.000}{1.320} = -4.55 \\ \hline 24.07 \end{array}$$

$$* \text{ Repuestos} = 18.30 \times 0.6 = 15.66$$

$$\text{Dif.} = 20.89$$

$$\begin{array}{r} \text{Combustible} = \frac{21}{63.20} \times 8 = 2.66 \\ \hline \end{array}$$

$$\text{Dif.} = 8.41$$

$$\text{Lubricantes} = 0.3 \times 2.66 = 0.80$$

$$\text{Dif. } 7.61 = \text{Rodamiento y herramienta}$$

Horas necesarias/año

Draga = 1.667 Horas/año
Retro = 600 Horas/año
Tractor = 80M³/Hora

Horas Tractor = 1.000 horas/año

RESUMEN DE HORAS MAQUINAS - AÑO

	<u>Volq.</u>	<u>D6D</u>	<u>Retro</u>	<u>Caref.</u>	<u>Rodillo</u>	<u>D.L.</u>	<u>Moto</u>
	6750	1675	600	647	490	1667	958
H. Disp	1716	1716	1716	-	-	-	-
N° máq.	4.0	1.0	0.4	0.4	0.3	1.0	0.6
N° Ajust	4.0	1.0	1.0	1.0	1.0	1.0	1.0

COSTOS OPERACION POR AÑO

	<u>Red Llantas Aceros</u>	<u>Combustibles y Lubricantes</u>	<u>Repuestos</u>
Volq.	22.748	9.787	47.182
D6D	12.746	5.795	26.230
Retro	3.660	1.566	7.578
Carg.	4.302	1.844	8.916
Dragline	4.217	6.235	30.156
Rodillo Vib.	3.126	1.338	6.473
Moto	5.843	2.500	12.099
Tanque	1.470	632	3.048
	<u>58.112</u>	<u>29.697</u>	<u>141.682</u>

V/R de la Maquinaria

	<u>US\$</u>
4 volquetes 8M ³	292.000
1 D6D 140 H.P.	183.000
1 Retro (1 yd ³)	140.000
1 Rodillo Vibratorio Auto Prop	138.000
1 Moto rígida (120 E)	132.000
Tanque	65.000
Remolque	84.000
	<u>1.034.000</u>
7 camionetas 2.5 ton	84.000
	<u>1.118.000</u>

<u>Dragalíneas 1 yd³</u>		US\$189.000
Tarifa horaria	=	US\$ 62.37/hora
		<u>S</u> <u>US\$</u>
Depreciación	0	26.82
Repuestos	0	18.09
Rodamiento y Aceros	0	2.53
Combustibles y Lubricantes	3.74	0
Operador	<u>5.00</u>	<u>0</u>
	8.74	54.26
	(13%)	(87%)

<u>Rodillo</u>		US\$ 138.000
Tarifa horaria	=	US\$ 45.54/hora
		<u>S</u> <u>US\$</u>
* Depreciación	0	19.58
* Repuestos	0	13.21
Rodamiento y Aceros	0	6.38
Combustibles y Lubricantes	2.73	0
* Operador	<u>3.64</u>	<u>0</u>
	6.37	39.17

<u>Volquetes 8M³</u>		US\$ 73.000
Tarifa horaria	=	US\$ 24.09/hora
		<u>S</u> <u>US\$</u>
Depreciación	0	10.36
Repuestos	0	6.99
Llantas y Aceros	0	3.37
Combustibles y Lubricantes	1.45	0
Operador	<u>1.93</u>	<u>0</u>
	3.38	20.78
	(14%)	(86%)

Remolque US\$ 84.000

Tarifa horaria = US\$ 27.72/hora

	<u>S</u>	<u>US\$</u>
Depreciación	0	11.92
Repuestos	0	8.04
Llantas y Aceros	0	3.88
Combustibles y Lubricantes	1.63	0
Operador	2.17	0
	<u>3.80</u>	<u>23.92</u>
	(14%)	(86%)

Carro Tanque US\$ 65.000

Tarifa horaria = US\$ 21.45/hora

	<u>S</u>	<u>US\$</u>
Depreciación	0	9.22
Repuestos	0	6.22
Llantas y Aceras	0	3.00
Combustibles y Lubricantes	1.29	0
Operador	1.72	0
	<u>3.01</u>	<u>18.44</u>
	(14%)	(86%)

Mantenimiento Canales Drenaje

Dragalínea (Excor)
 Tractor (Regadío)
 Retroexc. (Canales pequeños)

HACER DIBUJO 10 Mts/perímetro mojado

$$\text{Volumen} = 10 \times 0.20 \times 120.000 = 240.000 \text{ M}^3$$

Se reperfila la totalidad cada 3 años

$$\text{Vol/año} = 80.000 \text{ M}^3$$

80.000 M³ 50.000 con draga
 30.000 con retro.

Rendimiento Draga = 30 M³/Hora

Rendimiento Retro. = 50 M³/Hora

COSTOS DE OPERACION, MANTENIMIENTO Y ADMINISTRACION

	<u>S</u>	+	<u>US\$</u>
<u>Operación</u>			
Salarios	528.000		0
<u>Mantenimiento</u>			
Salarios	100.540		0
<u>Administración</u>			
Salarios	96.060		0
<u>Mantenimiento</u>			
Materiales	30.000		0
Material Oficina	10.000		0
<u>Operación</u>			
Energía	744.964		0
<u>Mantenimiento</u>			
Repuestos maquinaria	0		141.682
Llantas Rodam. aceras y acero	0		58.112
Combustible y Lubric.	29.697		0
Combustible, Lubric. y	14.000		0
Mantenimiento Vehículos			
	<u>1.553.261</u>		<u>199.712</u>

$$\text{Promedio X Ha-año} = \frac{1.752.973}{17.000} = \text{US\$ } 103.12/\text{Ha-año } \underline{1/}$$

- 1/ No incluye reposición de maquinaria de mantenimiento, equipos de bombeo, de riego y drenaje, vehículos, equipos electromecánicos. En el cuadro general de flujo de costos de administración, operación y mantenimiento, sí se incluyen todas las reposiciones de maquinarias, vehículos y equipo.

ECUADOR - PROYECTO DAULE PERIPA (EC-0099)

OPERACION MANTENIMIENTO Y ADMINISTRACION PARA 17.000 Ha

S U E L D O S

<u>PERSONAL REQUERIDO</u>	<u>CANTIDAD</u>	<u>MENSUAL</u>	<u>BENEFICIOS SOCIALES</u>	<u>O T R O S</u>	<u>TOTAL MENSUAL</u>	<u>TOTAL ANUAL</u>	<u>TOTAL GENERAL</u>
Jefe del Distrito	1	30.000	13.500	15.000	58.500	702.000	702.000
<u>I. Operación</u>							
Jefe de Operación	1	27.400	12.330	15.000	54.730	656.760	656.760
<u>I.1 Riego y Drenaje</u>							
Jefe Riego y Drenaje	1	25.000	11.250	13.000	49.250	591.000	591.000
Jefe de Sector	2	23.000	10.350	12.000	45.350	544.200	1.088.400
Jefe de Zonas (Bach.Agric.)	6	12.700	5.715	-	18.415	220.980	1.325.880
Inspectores	8	11.000	5.390	-	16.390	196.680	1.593.440
Canaleros	38	8.000	5.440	-	13.440	161.280	6.128.640
Operad.Compuertas Princ.	10	10.000	5.600	-	15.600	187.200	1.872.000
<u>I.2 Operación Bombas</u>							
Jefe de Bombeo	1	23.000	10.350	8.000	41.350	496.200	496.200
Operad.Bombas Riego	9	11.000	5.390	-	16.390	196.680	5.310.360
Operad.Bombas Drenaje	8	11.000	5.390	-	16.390	196.680	4.720.320
Ayudantes de Operación	17	8.000	5.440	-	13.440	161.280	8.225.280
Mecánicos	1	11.500	5.635	-	17.135	205.620	411.240
Ayudante Mecánicos	2	8.000	5.440	-	13.440	161.280	322.560
<u>II. Mantenimiento</u>							
Jefe de Mantenimiento	1	23.000	10.350	12.000	45.350	544.200	544.200
Ing. Civil Obra	1	21.000	9.450	-	30.450	365.400	365.400
Topógrafos	1	12.700	5.715	-	18.415	220.980	220.980
Cadeneros	5	8.000	5.440	-	13.440	161.280	806.400
Dibujantes	1	11.000	5.390	-	16.390	196.680	196.680
Operador de Tractor	1	13.350	6.010	-	19.360	232.320	232.320
Operador de Cargadora	1	11.700	5.730	-	17.430	209.160	209.160
Operador Motonivelador	1	13.350	6.010	-	19.360	232.320	232.320
Operador Rodillo 10T	2	11.700	5.730	-	17.430	209.160	418.320
Operador Retroexcavadora	1	13.350	6.010	-	19.360	232.320	232.320
Operador Dragalina	1	13.350	6.010	-	19.360	232.320	232.320
Chofer Remolque	1	10.830	5.310	-	16.140	193.680	193.680

S U E L D O S

<u>PERSONAL REQUERIDO</u>	<u>CANTIDAD</u>	<u>BENEFICIOS</u>			<u>TOTAL MENSUAL</u>	<u>TOTAL ANUAL</u>	<u>TOTAL GENERAL</u>
		<u>MENSUAL</u>	<u>SOCIALES</u>	<u>O T R O S</u>			
Chofer Volqueta	2	9.540	5.540	-	15.080	180.960	361.920
Chofer Tanquero	1	9.540	5.540	-	15.080	180.960	180.960
Chofer 3 Ton.	7	8.370	5.190	-	13.560	162.720	1.139.040
Mecánico	1	11.500	5.635	-	17.135	205.620	205.620
Ayudante	3	8.000	5.440	-	13.440	161.280	483.840

III. Administración

Jefe Administrativo	1	23.000	10.350	12.000	45.350	544.200	544.200
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III.1 Contabilidad

Contador General	1	23.000	10.350	4.000	37.350	448.200	448.200
Contadores Ayudantes	2	12.700	5.715	-	18.415	220.980	441.960
Pagador	1	13.500	6.075	-	19.575	234.900	234.900
Ayudante Contador	2	10.600	5.200	-	15.800	189.600	379.200
Ayudante Pagador	2	12.000	5.760	-	17.760	213.120	426.240

III.2 Almacén-Bodega

Jefe de Compras	1	17.400	7.830	-	25.230	302.760	302.760
Ayudante	1	15.900	7.155	-	23.055	276.660	276.660
Guarda Almacén	1	12.700	5.715	-	18.415	220.980	220.980
Ayudante	2	10.800	5.300	-	16.100	193.200	386.400

III.3 Secretarias Servicio

Secretaria Jefe	1	11.300	5.535	-	16.835	202.020	202.020
Secretarias	3	10.000	6.000	-	16.000	192.000	576.000
Mensajeros y Conserjes	3	8.000	5.440	-	13.440	161.280	483.840

III.4 Personal

Jefe de Personal	1	25.000	11.250	6.000	42.250	507.000	507.000
Analista de Personal	2	21.000	9.450	-	30.450	365.400	730.800

TOTAL MANO DE OBRA NO CALIFICADA

10'483 (23%)

Ecuador - Proyecto Daule Peripa (EC-0099)

MAQUINARIA PARA OPERACION Y MANTENIMIENTO - 33.000 Ha. ^{1/}

<u>V/R de la Maquinaria</u>	<u>US\$</u>
8 Volquetes 8 m ³	584.000
1 D6D 140 H.P.	183.000
1 Retro (1 yd ³)	140.000
1 Rodillo Vibratorio Auto Prop.	138.000
1 Moto Rígida (120 E)	132.000
Tanque	65.000
Remolque	<u>84.000</u>
	1.326.000
14 camionetas 2.5 ton.	<u>168.000</u>
TOTAL:	<u>1.494.000</u>

1/ El costo de esta maquinaria no hace parte de este financiamiento.

COSTOS DE ADMINISTRACION, OPERACION Y MANTENIMIENTO

	<u>1988</u> <u>0</u>	<u>1</u>	<u>1990</u> <u>2</u>	<u>3</u>	<u>1992</u> <u>4</u>	<u>5</u>	<u>1994</u> <u>6</u>	<u>7</u>	<u>1996</u> <u>8</u>	<u>9</u>	<u>1998</u> <u>10</u>	<u>11</u>	<u>2000</u> <u>12</u>	<u>13</u>	<u>2002</u> <u>14</u>	<u>15</u>
. Mant. Z.R.	1.17										0.93					
bas R. y D.	5.90														5.31	
. Eléct.	4.30															
ículos	0.08						0.07							0.07		
Op. y Mant.		1.50	1.60	1.68	1.74	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90
17.000 Ha.	11.45	1.50	1.60	1.18	1.74	1.90	1.97	1.90	1.90	1.90	2.83	1.90	1.90	1.97	7.21	1.90
q.Mant. Presa	1.24										0.99					
Op. y Mant.		0.24	0.24	0.24	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44
Presa	1.24	0.24	0.24	0.24	0.44	0.44	0.44	0.44	0.44	0.44	1.33	0.44	0.44	0.44	0.44	0.44
. (Alt. I)																
. Mant. Z.R.			1.46										1.17			
bas R. y D.																
. Elect.																
ículos			0.17							0.17						
Op. y Mant.			1.34	2.51	2.64	2.70	2.90	2.90	3.26	3.26	3.26	3.26	3.26	3.26	3.26	3.26
33.000 Ha.			2.97	2.51	2.64	2.70	2.90	2.90	3.26	3.43	3.26	3.26	4.43	3.26	3.26	3.26
UN. OP. Y MANT.	12.69		4.81	3.93	4.82	5.04	5.31	5.24	5.60	5.77	7.42	5.60	6.77	5.67	10.91	5.60
Calif.17.000 Ha.		0.06	0.13	0.13	0.14	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
Calif.33.000 Ha.						0.07	0.10	0.12	0.16	0.22	0.22	0.22	0.22	0.22	0.22	0.22
les 17.000 Ha.		0.01	0.01	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03					
les 33.000 Ha.						0.03	0.03	0.04	0.05	0.06	0.07	0.07	0.07	0.07	0.07	

[illegible]

[illegible]