

within 5 years after completion of the construction works. For that purpose, a Project Administration Office will be established in Agricultural Development Center (refer to Fig. 6.2.1), which will comprise the Supporting Services Division and the Operation and Maintenance Division. The former's main task during the construction stage is to promote the organization of water user associations in each irrigation district.

#### 6.2.2 Operation of the Irrigation System

Water user associations (WUA) will formulate a Water User Associations Union (WUAU) and will have an office in the Agricultural Development Center. The WUAU will be operated by the representatives of each WUA. In due consideration of the fact that the farmers in the Project Area have had no experience in the management of a large scale of irrigation system like those proposed in this Project, it is required that operation and maintenance activities of the Project facilities should be carried out by the Project Administration Office at the initial stage of the Project. It is proposed that such operation will be conducted for about 5 years after completion of the construction works and then the transfer of the facilities to the WUA will be carried out.

The facilities will be operated and maintained by the respective WUA of the eight subproject areas. At the first step, the irrigator groups at terminal farm lots will be organized, and then the groups of the secondary and main canals will be organized, and finally a WUA will be formed at each sub-project area.

The organization of a WUA will be stipulated in the bylaws of each WUA at the time of its establishment. As mentioned in the preceding sections, at the initial stage of the Project, the Project Administration Office will be responsible for operation and maintenance of the Project facilities and each WUA will be responsible for operation and maintenance of the facilities at secondary canals and subsequent facilities including gate operation.

TABLE 6.1.1 IMPLEMENTATION SCHEDULE

	YEAR						
	1	2	3	4	5	6	7
1. DETAILED DESIGN	[Horizontal bar from Year 1 to Year 2]						
2. CONSTRUCTION WORK							
1) IRRIGATION SYSTEM							
a. Grande de Otoro River (left bank)		[Horizontal bar from Year 2 to Year 4]					
b. Yucanguare River (Right Bank)			[Horizontal bar from Year 3 to Year 4]				
c. Yucanguare River (Left Bank)						[Horizontal bar from Year 6 to Year 7]	
d. Naranjo River				[Horizontal bar from Year 4 to Year 5]			
e. Mixcure River						[Horizontal bar from Year 6 to Year 7]	
f. Grande de Otoro River (Right Bank)				[Horizontal bar from Year 4 to Year 5]			
g. Cumes River					[Horizontal bar from Year 5 to Year 6]		
h. Aro River							[Horizontal bar from Year 7 to Year 7]
2) RURAL DEVELOPMENT							
a. Development Center		[Horizontal bar from Year 2 to Year 3]					
b. Farmers Organization Office			[Horizontal bar from Year 3 to Year 7]				
c. Road Improvement		[Horizontal bar from Year 2 to Year 3]					
3. EQUIPMENT			[Horizontal bar from Year 3 to Year 7]				

TABLE 6.1.2 PRIORITY CRITERIA FOR IMPLEMENTATION OF SUB-PROJECT

CRITERIA	PRIORITY	①	②	③	④	⑤	⑥	⑦	⑧
EIRR	ABOVE 10% 5%-10% BELOW 5%	⊙	○	⊙	⊙	⊙	⊙	⊙	○
BENEFICIARY HOUSEHOLD (per 100 ha)	ABOVE 20 5-20 families BELOW 5	○	○	⊙	△	○	○	△	⊙
IRRIGATION AREA	ABOVE 300ha 100-300ha BELOW 100ha	⊙	○	⊙	○	⊙	⊙	⊙	△
CROPPING INTENSITY	ABOVE 200% 150-200% BELOW 150%	⊙	⊙	⊙	⊙	○	△	○	⊙
FACILITATION OF CONSTRUCTION	EASY NORMAL DIFFICULT	○	○	○	△	○	△	△	△
ACCESSIBILITY	GOOD NORMAL POOR	○	○	⊙	○	○	○	⊙	△
TOTAL POINTS RANKING	(⊙:3,○:2,△:1)	15 -	13 -	17 1	12 4	14 2	12 5	13 3	11 6

- |                                       |                  |
|---------------------------------------|------------------|
| ①: GRANDE DE OTORO RIVER (LEFT BANK)  | ⑤: NARANJO RIVER |
| ②: GRANDE DE OTORO RIVER (RIGHT BANK) | ⑥: MIXCURE RIVER |
| ③: YUCANGUARE RIVER (RIGHT BANK)      | ⑦: CUMES RIVER   |
| ④: YUCANGUARE RIVER (LEFT BANK)       | ⑧: ARO RIVER     |

- NOTE: 1) Although the Yucanguare River (left bank) and Mixcure River have the same point in the above calculation, the former is given high priority, due to its higher value of EIRR.
- 2) As mentioned in this report, the Grande de Otoro irrigation sub-project should be given priority in the development. Therefore, left bank and right bank of the Grande de Otoro River have to be given higher priority than the Yucanguare River (left bank) and Mixcure River Irrigation sub-project.

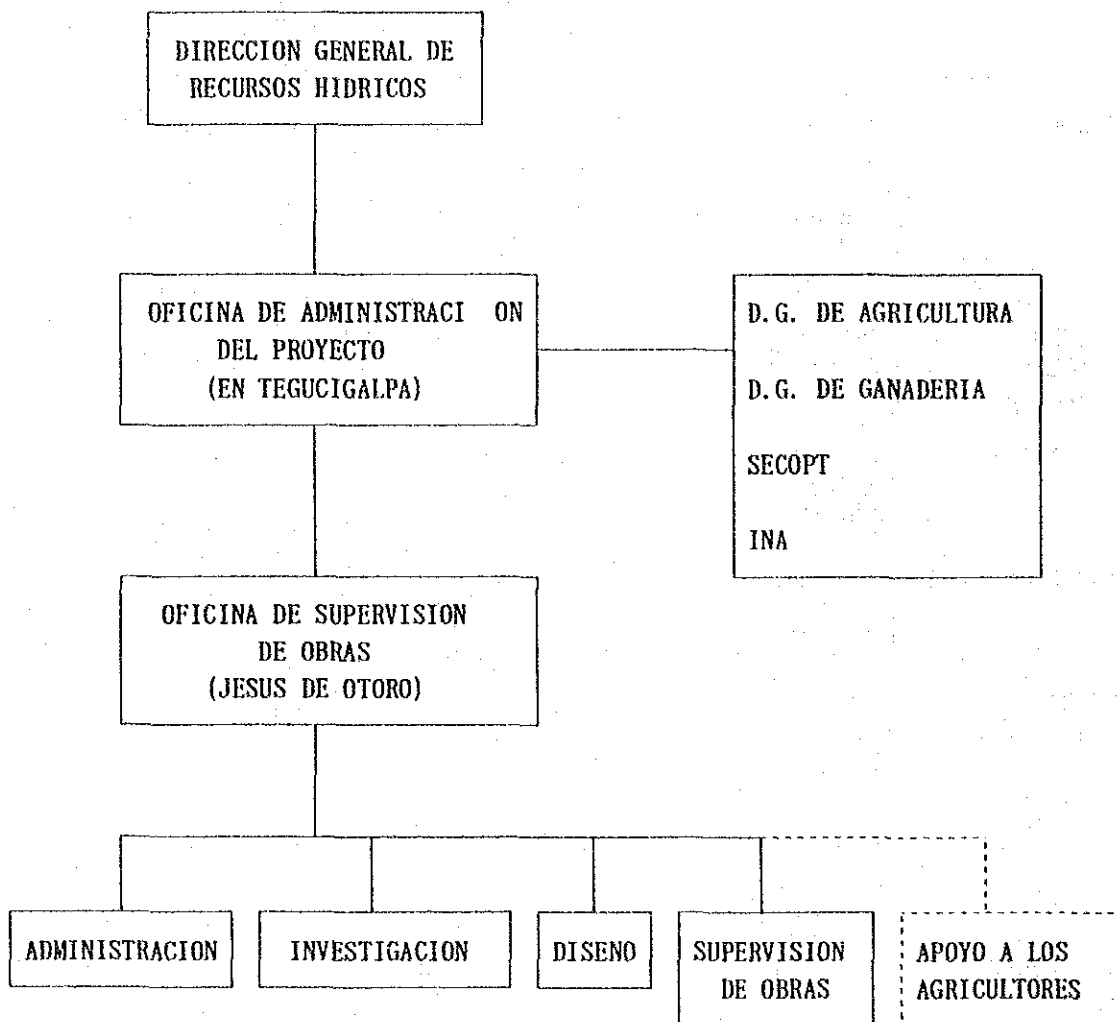


Fig. 6.1.1 PROPOSED ORGANIZATION CHART FOR PROJECT

EXSECUTION STAGE

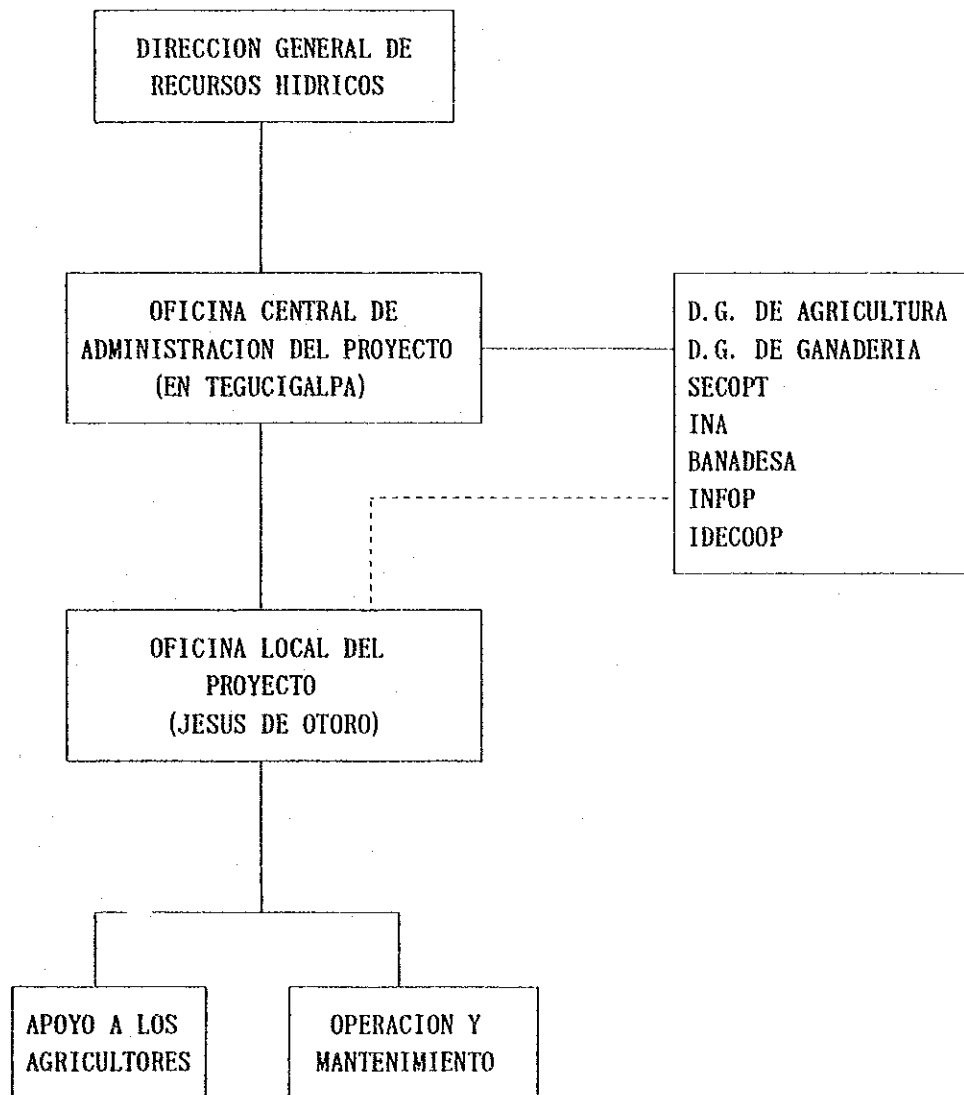


Fig. 6.2.1 PROPOSED ORGANIZATION CHART FOR PROYECTO

AFTER CONSTRUCTION STAGE



**CHAPTER VII**  
**ESTIMATION OF PROJECT COSTS**





## CHAPTER VII ESTIMATION OF PROJECT COSTS

### 7.1 General

The Project costs have been estimated on the basis of the following assumptions:

- a. Official exchange rate as of September 1993 has been applied, i.e. US\$1.00 = Lps 6.80 = Yen 106.00
- b. The proposed works will be executed by the contractor(s) to be selected under the international competitive bidding. The cost of the construction machinery and equipment is based on the rental cost of the same.
- c. The taxes upon the construction materials and equipment to be imported from abroad are not included.
- d. Unit cost of each work is based on the market prices prevailing in Honduras.
- e. Physical contingency of 5% is included.

### 7.2 Construction Cost

The total cost of the Project consists of the following items.

1. Land acquisition
2. Construction cost
3. Procurement of operation and maintenance equipment
4. Engineering services
5. Administration
6. Physical contingency
7. Price contingency

The total Project costs thus estimated amount to Lps 249 million, of which Lps 131 million are foreign currency portion and Lps 118 million are local currency portion.

Unit: Thousand Lempiras

	Foreign Currency Portion	Local Currency Portion	Total
A Land acquisition	0	4,446	4,446
B Construction cost	99,990	81,746	181,736
C Procurement O/M equipment	1,899	0	1,899
D Engineering services	7,537	5,915	13,452
E Administration	754	592	1,345
F Physical contingency	5,509	4,635	10,144
G Price contingency	15,080	21,188	36,268
<b>Total</b>	<b>130,769</b>	<b>118,521</b>	<b>249,290</b>

### 7.3 Operation and Maintenance Costs

The operation and maintenance costs have been estimated at Lps 2 million. including personnel expenses in the Project administration Office, maintenance and repair materials, and labor costs as shown in Table 7.3.1.

### 7.4 Replacement Costs

The deterioration of the Project facilities during the course of the years will have unfavorable effects on the productivity of the agricultural products. Therefore it is necessary to replace such materials as steel gates at the proper interval in order to maintain its proper function. The durable years and replacement costs of each equipment and materials are presented in Table 7.4.1.

### 7.5 Disbursement Schedule

Based on the implementation schedule as mentioned in the preceding section, the disbursement schedule of the Project has been prepared as shown in Table 7.5.1.

TABLE 7.3.1 OPERATION AND MAINTENANSE COST (ANUAL)

(UNIT :thousand lempiras)

ITEMS	COST	REMARKS
1. SALARIES AND WAGES	1,273	Ref. to following table
2. OFFICE EXPENSES	152	-ditto-
3. MENTENANSE AND REPAIRING COST	478	-ditto-
4. CONTINGENCY	95	5% (from 1 to 3)
<b>TOTAL</b>	<b>1,998</b>	

ANUAL OPERATION AND MAINTENANCE COST

(UNIT :thousand lempiras)

ITEMS	FOREIGN	LOCAL	SUB-TOTAL
ADMINISTRATION OFFICE	293	78	371
GRANDE DE OTORO RIVER (LEFT BANK)	205	134	339
GRANDE DE OTORO RIVER (RIGHT BANK)	138	76	214
YUCANGUARE RIVER (RIGHT BANK)	113	32	145
YUCANGUARE RIVER (LEFT BANK)	121	22	143
NARANJO RIVER	131	25	156
MIXCURE RIVER	149	52	201
CUMES RIVER	144	53	197
ARO RIVER	113	24	137
CONTINGENCY	70	25	95
<b>TOTAL</b>	<b>1,477</b>	<b>521</b>	<b>1,998</b>

TABLE 7.4.1 REPLACEMENT COST

ITEMS	LIFE TERM (YEARS)	COST (thousand lempiras)		
		FOREIGN	LOCAL	TOTAL
<b>1. IRR. &amp; DRAINAGE FACILITIES</b>				
a. Gates	30	10,926	60	10,986
b. Valves, etc.	15	571	82	653
Sub-total		11,497	142	11,639
<b>2. EQUIPMENT</b>				
a. Agricultural Extention	10	1,085	0	1,085
b. Operation & Maintenance	10	814	0	814
Sub-total		1,899	0	1,899
<b>TOTAL</b>		<b>13,396</b>	<b>142</b>	<b>13,538</b>

TABLE 7.5.1 DISBURSEMENT SCHEDULE

	TOTAL		FIRST YEAR		SECOND YEAR		THIRD YEAR		FOURTH YEAR		FIFTH YEAR		SIXTH YEAR		SEVENTH YEAR	
	FOREIGN	LOCAL SUB-TOTAL	FOREIGN	LOCAL	FOREIGN	LOCAL	FOREIGN	LOCAL	FOREIGN	LOCAL	FOREIGN	LOCAL	FOREIGN	LOCAL	FOREIGN	LOCAL
A. LAND ACQUISITION	0	4,446	0	1,175	0	684	0	1,008	0	1,017	0	337	0	225	0	0
B. CONSTRUCTION																
a. Irrigation & Drainage																
G. de Otoro (Left Bank)	32,843	29,645	0	0	16,422	14,823	16,422	14,822	0	0	0	0	0	0	0	0
G. de Otoro (Right Bank)	14,935	11,059	0	0	0	0	0	0	4,979	3,686	9,957	7,373	0	0	0	0
Yucanguare (Left Bank)	9,651	7,780	0	0	6,434	5,187	6,434	5,187	3,217	2,593	0	0	0	0	0	0
Yucanguare (Right Bank)	7,155	4,581	0	0	0	0	0	0	0	0	0	0	7,155	4,581	0	0
Naranjo	8,079	5,288	0	0	0	0	0	0	8,079	5,288	0	0	0	0	0	0
Mixonre	10,390	7,464	0	0	0	0	0	0	0	0	0	0	3,463	2,488	5,927	4,976
Cumes	8,655	6,235	0	0	0	0	0	0	0	0	4,323	3,118	4,323	3,118	0	0
Aro	4,571	3,904	0	0	0	0	0	0	0	0	0	0	0	0	4,571	3,904
b. Rural Development																
Rural Development Center	676	1,390	0	0	225	463	451	927	0	0	0	0	0	0	0	0
Farmers Organization Office	289	2,749	0	0	0	0	58	550	58	550	58	550	58	550	58	550
Road Improvement	2,745	1,651	0	0	1,373	826	1,373	825	0	0	0	0	0	0	0	0
(Sub-Total:B)	89,990	81,746	0	0	18,019	16,111	24,736	22,311	16,332	12,117	14,343	11,040	15,004	10,736	11,555	9,430
C. O/M EQUIPMENT	1,899	0	0	0	0	0	1,646	0	92	0	23	0	69	0	69	0
(Sub-Total:A+B+C)	101,889	86,192	0	1,175	18,019	16,795	26,382	23,319	16,424	13,134	14,366	11,377	15,073	10,961	11,624	9,430
D. ENGINEERING FEE	7,537	5,915	1,884	1,479	1,884	1,479	754	592	754	592	754	592	754	592	754	592
E. LOCAL ADMINISTRATION COST	754	582	108	85	108	85	108	85	108	85	108	85	108	85	108	85
(Sub-Total:D+E)	8,291	6,507	1,992	1,563	1,992	1,563	861	676	861	676	861	676	861	676	861	676
F. FISCAL CONTINGENCY	5,509	4,635	100	137	1,001	918	1,362	1,200	864	691	761	603	797	582	624	505
(Sub-Total:A+B+C+D+E+F)	115,689	97,334	2,092	2,875	21,012	19,277	28,506	25,195	18,150	14,501	15,938	12,656	16,731	12,219	13,110	10,611
G. PRICE CONTINGENCY	15,080	21,188	63	144	1,280	1,976	2,653	3,971	2,278	3,125	2,547	3,497	3,247	4,156	3,014	4,320
TOTAL	130,769	118,522	249,291	2,154	3,019	22,291	21,252	31,259	28,166	20,428	17,626	18,535	16,152	19,977	16,375	14,931



**CHAPTER VIII**  
**PROJECT EVALUATION**





## CHAPTER VIII PROJECT EVALUATION

### 8.1 Economic Analysis

#### 8.1.1 Basic Assumptions

The economic analysis has been undertaken on the basis of the following assumptions:

- 1) The official exchange rate as of September 1993 has been applied: US\$1.00 = Lps 6.80 = Yen 106.00
- 2) Project life has been assumed as 30 years.
- 3) Only direct tangible benefits has been quantified for the calculation of the EIRR.
- 4) Opportunity cost of capital (or discount rate) has been set at 10 %.
- 5) Conversion factor of 0.5 has been applied for unskilled labor cost.
- 6) It is assumed that the target of the proposed agricultural production would be achieved 3 years after completion of the project facilities.
- 7) Interest and price escalation are not considered in the calculation.

#### 8.1.2 Economic Project Costs

Economic Project costs comprise the following:

- (1) Investment costs for the Project
  - 1) land acquisition
  - 2) construction works
  - 3) operation and maintenance equipment
  - 4) engineering services
  - 5) administration
  - 6) physical contingency
- (2) O/M and Replacement Costs
- (3) Agricultural production costs (to be deducted from the benefits)

The economic project costs mentioned above do not include such transfer payment as duties, taxes, and interest. Standard conversion factor (SCF) has been applied to the financial project costs to obtain the economic project costs. SCF has been calculated on the basis of trade statistics in Honduras (refer to ANNEX J).

The economic project costs thus estimated amount to Lps 206.7 million as presented in Table 8.1.1. The annual disbursement schedule of the same is presented in Table 8.1.2.

### 8.1.3 Economic Benefits

The direct project benefits will arise as a result of increased production of farm products that would be derived from improved irrigation system and agricultural supporting services. Annual benefits are calculated as the difference between net incremental income under the "future without project condition" and "future with project condition". Valuation of economic benefits is based on the economic prices. (See details in ANNEX J).

### 8.1.4 Result of Economic Analysis

Economic analysis has been conducted on the basis of annual costs and benefits stream as estimated in the preceding sections. The result of economic analysis of the proposed Project in terms of Economic Internal Rate of Return (EIRR), Net Present Value (NPV) and Benefit Cost Ratio (B/C) is presented below. (Refer to Table 8.1.3).

EIRR: 10.5 %  
NPV: Lps 6.7 million  
B/C: 1.05

It is concluded from the above result that the proposed Project is economically feasible as the EIRR exceeds 10 %, NPV indicates the positive value, and B/C is more than 1.0.

### 8.1.5 Sensitivity Analysis

In order to evaluate the economic indicators of the proposed Project under the possible changes of the Project conditions in the future, the sensitivity analysis has been conducted under the conditions of: (a) cost increase by 10 %; (b) benefits decrease by 10 %; and (c) combination of (a) and (b). (Refer to ANNEX J). The results of the tests are summarized below:

<u>Assumptions</u>	<u>EIRR (%)</u>
a) Cost increase by 10 %	9.4
b) Benefits decrease by 10 %	9.3
c) Combination of the above two cases	8.2

As indicated above, the impact to the Project under the benefits decrease by 10 % is slightly heavier than that under the costs increase by 10 %.

### 8.1.6 Economic Analysis of Each Sub-project

The economic analysis of the Project in general has been conducted as mentioned in the preceding section. As the proposed Project is composed of 8 sub-projects, economic analysis of these sub-projects has also been conducted in order to evaluate the priority ranking of each sub-project in the execution of the same. The result of the analysis is shown below. (See details in

Sub-Project Area	EIRR (%)
Grande de Otoro Left Bank	13.2
Grande de Otoro Right Bank	7.7
Yucanguare Right Bank	19.0
Yucanguare left Bank	17.1
Naranjo	11.2
Mixcure	11.9
Cumes	16.4
Aro	7.2

Although there exist two sub-projects with EIRR of less than 10% when EIRR is calculated for each sub-project, the Project is considered to be viable if all the eight sub-projects are combined and evaluated as a whole. The economic analysis of each sub-project has been conducted in this section only for the purpose of determining priority ranking for the implementation of each sub-project.

## 8.2 Financial Analysis

### 8.2.1 Financial Project Costs

Financial Project costs signify the Project costs estimated on the basis of the market prices; comprising the costs for land acquisition; construction works; O/M equipment; engineering services; and administration. Base costs of the Project at the price level of September 1993 amount to Lps 202.88 million, and the total Project costs including physical and price contingency amount to Lps 249.29 million (refer to Table 8.2.1).

### 8.2.2 Finance Plan and Repayment of the Fund

Of the total Project costs, foreign currency portion accounts for Lps 130.77 million and local currency portion accounts for Lps 118.52 million. The finance plan is estimated on the assumptions that foreign currency portion of the Project costs will be financed by bilateral aid and/or international lending institutions, and the local currency portion of the same will be financed by the Honduran government budget. The foreign loan is assumed to be provided on the conditions of a repayment period of 30 years including 10-year grace period with interest rate of 2.5 % per annum. It is also assumed that the local currency portion of the project costs will be financed by the budget allocation of the government without any interest and repayment

of the principal.

Based on the above mentioned finance plan, a cash flow statement including the foreign fund requirement, government budget, interest payment, and repayment of the loan has been prepared as shown in Table 8.2.2.

### 8.2.3 Farm Household Income Analysis

The farmers in the Project Area are the main beneficiaries of the Project. Farm household income analysis has been conducted to evaluate the impact of the Project on the farm household income. The farmers in the Project Areas has been classified into small, medium and large scale farmers on the basis of the findings of the Farm Economy Survey which was conducted during Phase-1 Field Survey of the Study. Household income of these 3 representative farms has been analyzed and compared. (See details in ANNEX E and ANNEX J).

The net annual income of a small scale farmer is estimated to increase from Lps 1,730 at present to Lps 27,910 under future with Project condition; the same of a medium scale farmer is estimated to increase from Lps 8,840 at present to Lps 122,383; and the same of a large scale farmer is estimated to increase from Lps 170,966 at present to Lps 2,038,884 under future with Project condition. It should be noted that crop income from vegetables (e.g. tomato) cultivation accounts for more than half the net annual income under future with project condition. Therefore, the net annual income in the future will largely depend on the success of vegetables cultivation.

### 8.2.4 Cost Recovery of Irrigation O/M

It has been generally understood that operation and maintenance (O/M) of main canals fall on the responsibility of the government (Directorate General of Water Resources) and that of secondary canals fall on the responsibility of beneficiaries. However, the new policy of the government decided that O/M of main canals should be under responsibility of the beneficiaries.

Annual operation and maintenance costs of the Project are estimated at Lps 2 million which is equivalent to Lps 740 per ha. This amount corresponds to 0.4 % (in the case of large scale farmers) to 2.6 % (in the case of small scale farmers) of the net annual income under the future with project condition. Therefore, the amount of annual operation and maintenance costs falls in the

rage of capacity to pay of the farmers.

### 8.3 Socioeconomic Evaluation

#### 8.3.1 Contribution to National Economy

The proposed Project would help achieve several of the national development objectives such as: (a) promotion of agricultural infrastructure development; (b) increased production of basic grains; (c) increased production of non-traditional agricultural products (e.g. tomato) and its export; (d) improvement in agricultural technology; and (e) promotion of regional development.

At full development stage of the Project, annual production of agricultural products will be 14,071 mt of unhulled rice, 4,226 mt of maize, 361 mt of frijoles 24,186 mt of vegetables (e.g. tomato), valued at Lps 46.6 million at the 1993 price level (refer to Table 8.3.1). About half of the tomatoes will be exported to Guatemala, El Salvadore and other countries.

#### 8.3.2 Contribution to Regional Economy

The Project is expected to give various kinds of benefits not only for the farmers in the Project Area but also for other people in and around the Study Area. Expected beneficiaries would include construction firms, rice millers, maize flour mills, storage and transport enterprises, traders of agricultural inputs, traders of agricultural machinery and ordinary labors.

During the construction stage of the Project facilities, employment opprtunities for the construction workers would be increased and ordinary labors in and around the Project Area would be benefitted. After completion of the Project facilities, on farm employment opportunities would largely be increased. In addition, commercial activities in the Study Area would extensively activated as a result of increased demand of agricultural inputs, promotion of agricultural machinery, increased volume of commercialized farm products, and increased capacity of agricultural processing facilities.

#### 8.3.3 Improvement of Farm Income and Living Conditions

The proposed Project would substantially contribute to raising production level of farm products in the Project Area through the

introduction of improved irrigation system and agricultural supporting services. As a result, the net annual income of a small scale farmer is estimated to increase from Lps 1,730 at present to Lps 27,910 under future with Project condition; the same of a medium scale farmer is estimated to increase from Lps 8,840 at present to Lps 122,383; and the same of a large scale farmer is estimated to increase from Lps 170,966 at present to Lps 2,038,884 under future with Project condition. With the increased farm income, improved quality of life of the people in the project Area would be attained. Homes can be enlarged and improved. More and better food will be available. Health and sanitation conditions will be improved. Labor saving agricultural machinery and equipment will increase greatly.

Table 8.1.1

## ECONOMIC PROJECT COSTS

Unit: Million Lempiras

Item	Financial Cost	Conversion Factors	Economic Cost
1. Land Acquisition	4.45	0.00	0.00
2. Direct Construction Costs	190.52	0.95	180.99
3. O&M Equipment	1.90	0.95	1.80
4. Engineering Services	13.46	0.95	12.78
5. Administration	1.35	0.95	1.28
6. Base Cost (1-5)	211.67		196.86
9. Physical Contingency 1/	10.58		9.84
Total Project Cost 2/	222.26		206.71

Note: 1/ Physical contingency of 5 % against total base cost  
 2/ Value added tax is not included

Table 8.1.2

ANNUAL DISBURSEMENT SCHEDULE  
(ECONOMIC PROJECT COSTS)

Unit: Million Lempiras

Item	PY1	PY2	PY3	PY4	PY5	PY6	PY7
1. Land Acquisition	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2. Direct Construction Costs							
Grande de Otoro Left Bank	0	29.68	29.68	0.00	0.00	0.00	0.00
Grande de Otoro Right Bank	0	0.00	0.00	8.23	16.46	0.00	0.00
Yucanguare Right Bank	0	0.00	11.04	5.52	0.00	0.00	0.00
Yucanguare Left Bank	0	0.00	0.00	0.00	0.00	11.15	0.00
Naranjo	0	0.00	0.00	12.70	0.00	0.00	0.00
Mixcure	0	0.00	0.00	0.00	0.00	5.65	11.31
Cumes	0	0.00	0.00	0.00	7.07	7.07	0.00
Aro	0	0.00	0.00	0.00	0.00	0.00	8.05
Agr. Dev. Center	0	0.65	1.31	0.00	0.00	0.00	0.00
Farmers Manage. Office	0	0.00	0.58	0.58	0.58	0.58	0.58
Road Improvement	0	2.08	2.09	0.00	0.00	0.00	0.00
Sub-total	0	32.41	44.70	27.03	24.11	24.45	19.94
3. O&M Equipment	0	0.00	1.56	0.09	0.02	0.07	0.07
4. Engineering Services	3.19	3.19	1.28	1.28	1.28	1.28	1.28
5. Administration	0.18	0.18	0.18	0.18	0.19	0.18	0.18
Base Cost (1-5)	3.38	35.79	47.72	28.58	25.60	25.98	21.47
6. Physical Contingency	0.17	1.79	2.39	1.43	1.28	1.30	1.07
Total	3.55	37.58	50.11	30.00	26.88	27.28	22.54

Note: 1/ Foreign currency at 3 % per annum and local currency at 5 % per annum based on the expected consumer price indexes by IMF.



Table 8.1.3

## ECONOMIC ANALYSIS (OVERALL PROJECT)

Unit: Million Lps

Proj. Year	Incremental Net Benefit								Net Benef. Total	Incremental Costs			Net Cash Flow	Disc. Factor at 10%
	GOL	GOR	YUR	YUL	NAR	MIX	CUM	ARO		Investm. Cost	O & M Cost	Total Cost		
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	3.55	0.00	3.55	-3.55	0.909
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	37.58	0.03	37.61	-37.61	0.826
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	50.11	0.31	50.42	-50.42	0.751
4	4.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.08	30.00	0.69	30.69	-26.61	0.683
5	8.2	0.0	1.7	0.0	0.7	0.0	0.0	0.0	10.57	26.88	0.92	27.80	-17.23	0.621
6	10.2	1.1	3.4	0.0	1.4	0.0	0.0	0.0	16.11	27.28	1.13	28.41	-12.30	0.564
7	10.2	2.2	4.3	0.9	1.8	0.0	1.2	0.0	20.54	22.54	1.33	23.87	-3.33	0.513
8	10.2	2.7	4.3	1.8	1.8	1.0	2.4	0.3	24.57	0.00	1.50	1.50	23.07	0.467
9	10.2	2.7	4.3	2.3	1.8	2.1	3.0	0.6	27.00	0.00	1.50	1.50	25.50	0.424
10	10.2	2.7	4.3	2.3	1.8	2.6	3.0	0.8	27.68	0.00	1.50	1.50	26.18	0.386
11	10.2	2.7	4.3	2.3	1.8	2.6	3.0	0.8	27.68	0.00	3.92	3.92	23.76	0.350
12	10.2	2.7	4.3	2.3	1.8	2.6	3.0	0.8	27.68	0.00	1.50	1.50	26.18	0.319
13	10.2	2.7	4.3	2.3	1.8	2.6	3.0	0.8	27.68	0.00	1.50	1.50	26.18	0.290
14	10.2	2.7	4.3	2.3	1.8	2.6	3.0	0.8	27.68	0.00	1.50	1.50	26.18	0.263
15	10.2	2.7	4.3	2.3	1.8	2.6	3.0	0.8	27.68	0.00	1.50	1.50	26.18	0.239
16	10.2	2.7	4.3	2.3	1.8	2.6	3.0	0.8	27.68	0.00	1.50	1.50	26.18	0.218
17	10.2	2.7	4.3	2.3	1.8	2.6	3.0	0.8	27.68	0.00	1.50	1.50	26.18	0.198
18	10.2	2.7	4.3	2.3	1.8	2.6	3.0	0.8	27.68	0.00	1.50	1.50	26.18	0.180
19	10.2	2.7	4.3	2.3	1.8	2.6	3.0	0.8	27.68	0.00	1.50	1.50	26.18	0.164
20	10.2	2.7	4.3	2.3	1.8	2.6	3.0	0.8	27.68	0.00	1.50	1.50	26.18	0.149
21	10.2	2.7	4.3	2.3	1.8	2.6	3.0	0.8	27.68	0.00	3.92	3.92	23.76	0.135
22	10.2	2.7	4.3	2.3	1.8	2.6	3.0	0.8	27.68	0.00	1.50	1.50	26.18	0.123
23	10.2	2.7	4.3	2.3	1.8	2.6	3.0	0.8	27.68	0.00	1.50	1.50	26.18	0.112
24	10.2	2.7	4.3	2.3	1.8	2.6	3.0	0.8	27.68	0.00	1.50	1.50	26.18	0.102
25	10.2	2.7	4.3	2.3	1.8	2.6	3.0	0.8	27.68	0.00	1.50	1.50	26.18	0.092
26	10.2	2.7	4.3	2.3	1.8	2.6	3.0	0.8	27.68	0.00	1.50	1.50	26.18	0.084
27	10.2	2.7	4.3	2.3	1.8	2.6	3.0	0.8	27.68	0.00	1.50	1.50	26.18	0.076
28	10.2	2.7	4.3	2.3	1.8	2.6	3.0	0.8	27.68	0.00	1.50	1.50	26.18	0.069
29	10.2	2.7	4.3	2.3	1.8	2.6	3.0	0.8	27.68	0.00	1.50	1.50	26.18	0.063
30	10.2	2.7	4.3	2.3	1.8	2.6	3.0	0.8	27.68	0.00	1.50	1.50	26.18	0.057
									684.2	197.94	43.84	241.78	0.105	

EIRR: 10.5 %  
 NPV: Lp 6.7 million  
 B/C: 1.05

Note: GOL = Grande de Otoro Left Bank      NAR = Naranjo  
 GOR = Grande de Otoro Right Bank      MIX = Mixcure  
 YUR = Yucanguare Right Bank      CUM = Cumes  
 YUL = Yucanguare Left Bank      ARO = Aro

Replacement costs (Lps 2.4 million) are included in PY11 and PY21.

Table 8.2.1

## FINANCIAL PROJECT COSTS

Unit: Million Lempiras

Item	Total Financial Costs		
	FC	LC	Total
1. Land Acquisition	0.00	4.45	4.45
2. Direct Construction Costs			
Grande de Otoro Left Bank	32.84	29.65	62.49
Grande de Otoro Right Bank	14.94	11.06	26.00
Yucanguare Right Bank	9.65	7.78	17.43
Yucanguare Left Bank	7.16	4.58	11.74
Naranjo	8.08	5.29	13.37
Mixcure	10.39	7.46	17.85
Cumes	8.66	6.24	14.89
Aro	4.57	3.90	8.48
Agri. Dev. Center	0.68	1.39	2.07
Farmer Manage. Office	0.29	2.75	3.04
Road Improvement	2.75	1.65	4.40
Sub-total	99.99	81.75	181.74
3. O&M Equipment	1.90	0.00	1.90
4. Engineering Services	7.54	5.92	13.45
5. Administration	0.75	0.59	1.35
Base Cost (1-5)	110.18	92.70	202.89
6. Physical Contingency	5.51	4.64	10.14
Sub-total	115.69	97.34	213.02
7. Price Contingency 1/	15.08	21.19	36.27
Total	130.77	118.52	249.29

Source: See details in ANNEX-J.

Table 8.2.2 Financial Statement

Unit: Million Lempiras

Ano Proy.	Cash Outflow				Cash Inflow				Total Inflow
	Project Cost	O&M Cost	Loan Interest	Repay- ment	Total Outflow	Foreign Loan	Government Budget	Government Subsidy	
1	5.2	0.0	0.1	0	5.2	2.2	3.0	0.1	5.2
2	43.5	0.1	0.6	0	44.2	22.3	21.3	0.7	44.2
3	60.4	0.5	1.4	0	62.3	31.3	29.2	1.9	62.3
4	38.1	1.1	1.9	0	41.0	20.4	17.6	3.0	41.0
5	34.7	1.5	2.4	0	38.5	18.5	16.2	3.8	38.5
6	36.4	1.8	2.9	0	41.0	20.0	16.4	4.7	41.0
7	31.1	2.2	3.3	0	36.5	16.1	14.9	5.5	36.5
8	0	2.5	3.3	0	5.8	0	0	5.8	5.8
9	0	2.5	3.3	0	5.8	0	0	5.8	5.8
10	0	2.5	3.3	0	5.8	0	0	5.8	5.8
11	0	2.5	3.1	6.5	12.1	0	0	12.1	12.1
12	0	2.5	2.9	6.5	12.0	0	0	12.0	12.0
13	0	2.5	2.8	6.5	11.8	0	0	11.8	11.8
14	0	2.5	2.6	6.5	11.6	0	0	11.6	11.6
15	0	2.5	2.5	6.5	11.5	0	0	11.5	11.5
16	0	2.5	2.3	6.5	11.3	0	0	11.3	11.3
17	0	2.5	2.1	6.5	11.2	0	0	11.2	11.2
18	0	2.5	2.0	6.5	11.0	0	0	11.0	11.0
19	0	2.5	1.8	6.5	10.8	0	0	10.8	10.8
20	0	2.5	1.6	6.5	10.7	0	0	10.7	10.7
21	0	2.5	1.5	6.5	10.5	0	0	10.5	10.5
22	0	2.5	1.3	6.5	10.3	0	0	10.3	10.3
23	0	2.5	1.1	6.5	10.2	0	0	10.2	10.2
24	0	2.5	1.0	6.5	10.0	0	0	10.0	10.0
25	0	2.5	0.8	6.5	9.8	0	0	9.8	9.8
26	0	2.5	0.7	6.5	9.7	0	0	9.7	9.7
27	0	2.5	0.5	6.5	9.5	0	0	9.5	9.5
28	0	2.5	0.3	6.5	9.4	0	0	9.4	9.4
29	0	2.5	0.2	6.5	9.2	0	0	9.2	9.2
30	0	2.5	0.0	6.5	9.0	0	0	9.0	9.0
<b>Total</b>	<b>249.3</b>	<b>64.4</b>	<b>53.3</b>	<b>130.8</b>	<b>497.8</b>	<b>130.8</b>	<b>118.5</b>	<b>248.5</b>	<b>497.8</b>

Table 8.3.1

## TOTAL AGRICULTURAL PRODUCTION AND VALUE

	Production under each Sub-Project Area								Total pro- duction	Value (Million lps.)
	GOL	GOR	YUR	YUL	NAR	MIX	CUM	ARO		
-----										
Situacion 'sin Proyecto'										
-----										
Arroz de riego, e. ll.	455	175	676	378	364	315	343	46	2,751	2.83
Arroz de riego, e. seca	232	92	348	196	188	164	176	0	1,396	1.44
Arroz de non-riego	52	106	0	0	0	0	0	0	158	0.16
Arroz total	739	373	1024	574	552	479	519	46	4,305	4.43
Maiz de riego, e. lluv.	178	0	33	4	0	73	229	13	530	0.47
Maiz de riego, e. seca	15	5	23	13	0	0	10	0	65	0.06
Maiz, non-riego	0	52	0	10	0	0	0	0	62	0.05
Maiz total	193	57	56	27	0	73	239	13	657	0.58
Frijoles, e. lluvia	40	0	7	1	0	16	51	3	117	0.15
Frijoles, e. seca	1	0	2	1	0	0	1	0	5	0.01
Frijoles, non-riego	0	16	0	16	0	16	16	16	78	0.10
Frijoles total	41	16	9	17	0	31	68	18	199	0.26
Pasto (riego)	39	0	15	8	89	11	52	0	214	2.35
Pasto (natural)	53	52	61	2	0	0	20	29	216	2.37
Pasto total	92	52	76	10	89	11	72	29	429	4.72
Sub-total										9.99
-----										
Situacion 'con Proyecto'										
-----										
Arroz, e. de lluvia	2280	681	1104	516	900	1290	966	216	7,953	8.19
Arroz, e. seca	2128	636	1029	482	437	336	868	203	6,118	6.30
Arroz total	4408	1317	2133	998	1337	1626	1834	419	14,071	14.49
Maiz, e. de lluvia	1216	363	588	275	480	688	500	116	4,226	3.72
Maiz, e. seca	0	0	0	0	0	0	0	0	0	0.00
Maiz total	1216	363	588	275	480	688	500	116	4,226	3.72
Frijoles, e. de lluvia	0	34	0	26	23	0	0	0	83	0.11
Frijoles, e. seca	114	0	56	0	0	18	47	44	278	0.36
Frijoles total	114	34	56	26	23	18	47	44	361	0.47
Hortalizas (Tomato)	8722	2605	4217	1974	1790	1377	2668	832	24,186	22.01
Pastura	95	196	46	22	29	54	90	9	540	5.94
Sub-total										46.63

**ENVIRONMENTAL IMPACT ASSESSMENT**      **CHAPTER IX**



## CHAPTER IX ENVIRONMENTAL IMPACT ASSESSMENT

### 9.1 Outline

The General Law of the Environment passed in the Congress of Honduras on May 27, 1993 and which became effective on July 20, 1993. We carried out the environmental impact assessment in accordance with the provisions of Article 34 of the Law.

As a result, we judged that this Irrigation Agriculture Development Project has no negative impact on the environment and the natural resources of the basin of Jesus De Otoro, through careful implementation of the Project.

However, it is necessary to control the spread of Malaria with sustainability and action of the residents themselves, in order to prevent labor shortages caused by an attack of Malaria. In addition, it is necessary to guide residents in environmental awareness such as the prevention of water pollution. Moreover, it is necessary to arouse residents attentions to the control of soil erosion and conservation of vegetation in the surrounding mountain districts of the Project area.

### 9.2 Background of Implementation of EIA

#### 9.2.1 Enactment of the General Law of the Environment and Environmental Administration

The general Law of the Environment passed in the Congress of Honduras on May 27, 1993 and which became effective on July 20, 1993. The Law applies to all environmental problems such as natural, cultural resources and urban & rural space etc.

The Ministry of Environment was established under the provision of Articles 10, 11 & 12 of the General Law of the Environment (see Fig.2.2.1 in ANNEX K). The responsibilities of the Ministry are: to execute the environmental legislation of Honduras; to formulate and to coordinate the national policies on the environment; to watch for the accomplishment of these policies; to coordinate the public and private institutions about environmental matters.

Environmental administration is executed by central governmental organizations in each concerning domain and all municipal offices under coordination of the Ministry of Environment.

#### 9.2.2 Implementation of the Environmental Impact Assessment

We carried out the environmental impact assessment in accordance with the provisions of Article 34 of the Law, which stipulate that every hydroelectrical project, irrigation project or any other project destined to use surface or under ground waters

within national territory, will be preceded obligatorially a plan of hydrological ordering and an environmental impact assesment(EIA).

### 9.3 Actual Environmental Situation of the Project Area

#### 9.3.1 Social Environment

##### (1) Inhabitants

The total population of Jesus De Otoro City is about 14,000 according to the 1988 census. About 70 % of the inhabitants of Jesus De Otoro City live in the rural district. There are no residences of aborigines or minorities in the Otoro Basin.

##### (2) Institutions and Customs

There are 40 diversion works on the Grande De Otoro River and its 9 tributaries in the Otoro Basin. All these diversion works are small scale and belong to individuals or farmers' groups, with vested habitual water uses.

A water control organization was organized in 1991, when a serious drought occurred, to solve serious water use troubles. This organization laid down the rules and carried out the coordination of water use.

Although fishing is carried out in the Grande De Otoro River and its tributaries, there is not any fishery right, and there is not navigable. Furthermore there is no negative custom for development or religious taboo.

##### (3) Endemic and Epidemic

The Otoro Basin is the highest malarial area in the Third Area of the Second Sanitary Region. The main reason for the high occurrence of malaria is that there are many natural pools, swamps and puddles in the basin. The malarious patient rate (ratio of the number of patients for the population) is clearly higher in the basin where the altitude is lower than 700 m (see Fig.9.3.1).

On the other hand, the number of malarious patients in 1988 and 1989 is remarkably few according to Table 1.6.2 of ANNEX G. Because a malaria control operation was carried out actively with aid materials from foreign countries, including Japan, the number of patients was very few. However, because the aid materials were exhausted after that, the malaria control operation became inactive and the number of patients increased again.

There is no recognition of the existence of serious diseases such as the chagas disease.

##### (4) Agrochemicals

The number of insecticides, fungicides and herbicides actually used in Otoro basin is 17 items, 7 items and 7 items respectively



(see Tables 3.4.1 and 3.4.2 in ANNEX D). All sold agrochemicals were not contrary to the Pesticide Regulations. However, it should be noted that Aldrin, a prohibited pesticide, was found to be used by some farmers.

#### (5) Treatment of Waste and Excrement

The farmhouse has not generally had a lavatory, and excrement is left in field to decompose naturally. Recently, the Catholic Relief Service (CRS), a NGO in the USA, initiated an aid project to construct water works and flush lavatories with a percolation pit for drained water in farmhouses. In addition, two other NGOs will initiate the Letrina Construction Project. Letrina is a kind of simple lavatory consisting of an unlined pit and wooden frame. With due regard to the above mentioned situations, environmental problems caused by excrements in rural areas is solving.

As the farmhouse has not had drainage facilities for living water, the drained water was left to flow naturally. As mentioned above, the activity of the CRS comprises the treatment of drained water by a percolate pit. Therefore, water pollution of rivers will be protected.

#### (6) Monuments, Cultural Patrimony etc.

The anthropological, archeological, historical, artistic, cultural and ethnic patrimony are not recognized in the Otoro basin and its surroundings.

### 9.3.2 Natural Environment

#### (1) Precious Wild Life and the Ecological District

The habitat of wild fauna and flora which falls under the "Convention on International Trade in Endangered Species of Wild Fauna and Flora" (CITES), the wetlands which are designated in accordance with the "Convention on Wetlands of International Importance Especially as Waterfowl Habitat" (Ramsar Convention), the natural heritages which are designated in accordance with the "Convention concerning the Protection of the World Cultural and Natural Heritage", and other national parks etc. are not recognized in the Otoro basin and its surroundings.

#### (2) Soil Erosion

As the configuration of the Otoro basin is of gentle rise and fall with 2-5 % slope, there is little possibility of soil erosion if farmers pay some attention to correct farming methods.

#### (3) Vegetation and Soil Erosion in Surrounding Mountain District

The surrounding mountain district is covered by thin woods of pine (Pinus oocarpa) and some broadleaf trees. The growth of trees is poor because the topsoil horizon is very thin and in most parts is occupied by rocks. The pine is cut down for building materials and the broadleaf trees are cut down for firewood. As

the cutting volume is greater than the annual growth volume, the woods are decreasing year by year. The decrease of these woods has the possibility of being a check factor for the Irrigation Development Project because these woods have an important roll as a headwater conservation forest for the Grande De Otoro River and its tributaries.

The terrain of the mountain district is steep and consists of easily eroded soils. These features exist on the right bank of the Grande De Otoro River. Therefore, consideration of soil conservation should be made. However, as many farmers actually cut down trees and cultivate maize here, soil erosion is accelerated. We estimated the annual runoff of soil at 6 points in the sloping maize fields, applying the Universal Soil Loss Equation (USLE). The findings showed that the annual runoff of soil per hectare was estimated at 134-324 tons, with a mean of 205 tons (Table 3.2.1 in ANNEX K).

#### (4) Water Quality

Water sampling for the dry season was carried out in the Grande De Otoro River and its 5 tributaries in November of 1992. As the result their analysis, the water quality was recognized to be rather good for irrigation water (see Fig.9.3.2 and Table 9.3.1).

Furthermore, a complementary survey with a portable water quality tester was carried out at 3 points along the Grande De Otoro River in August of 1993. It was confirmed that the water quality of a point under La Gloria Bridge, on the upper stream, has no problems for use as irrigation water. However, the water quality of a point on the middle reaches, which is located 11 km downstream of La Gloria Bridge and is also located 100 m downstream of the confluence point with the Quebrada Caracas, and the water quality of a third point, which is located 5 km downstream from the confluence point, above mentioned, have a small problem with a COD value in the range 15-30 mg/l, after torrential rains.

### 9.4 Environmental Impact of the Project

#### 9.4.1 Social Environment

##### (1) Life of Inhabitants

This development project has no negative environmental impact to the life of the inhabitants, the institutions and customs.

##### (2) Public Health; Irrigation Development and Malaria

There are found some examples that an initiation of irrigation agriculture caused the increase of occurrence of malaria. However, the prevention of water stagnation by cleaning of canals, especially the weeding of side walls, and the prevention of the formation of puddles from surplus irrigation water are effective means of malarial vector(mosquito) control in irrigation

agriculture areas. It is expected that the number of malarious patient will not increase because this Project will be implemented with consideration for malaria control.

In this region, malaria does not cause much sickness in adults; 16-20 days a year on average. However, there is the possibility that sickness, which means the impossibility of labor, concentrates upon the farmer's busy season because the sickness breaks out when there is a decline in physical strength caused by overwork. According to the plan, this project will increase the demand for labor because of the increase in the cropping area, and the labor shortage will be covered by farm mechanization. However, a labor loss of 16-20 days caused by malarial sickness is a serious problem which can not be disregarded. Therefore, labor losses should be minimized as much as possible.

In agricultural development project, it is desired that the malaria control works are carried out with a sustainable method and with the inhabitants participation. In addition to the periodical group work of farmers, cleaning of canals and filling up of puddles, use of foam balls of wigglericide (pesticide for mosquito larva) which are thrown by hand without any tool, and the use of a mosquito net which is made from materials mixed with mosquitocide, are the most effective and suitable means for malarial vector (mosquito) control in the Development Project.

For example, foam balls containing 5% pyriproxyfen are very efficacious in controlling mosquito larvae; twenty balls can control mosquito larvae in 1 hectare paddyfield. No specialist or apparatus is needed for throwing the balls. Their effectiveness continues for about 3 months.

In phase 2 of the study, we distributed mosquito nets made of thread mixed with permethrin to five farmhouses and tested their defensive effect to mosquito attack. We confirmed its highly defensive effect against mosquito attack. We were keenly asked from neighboring inhabitants to distribute the mosquito nets to all the inhabitants.

It is strongly recommended that the malaria control work, consist of a sustainable method and the inhabitants participation should be included in the Irrigation Agricultural Development Project in order to ensure required manpower.

### (3) Agrochemicals

The use of agrochemicals will have no impact on the environment in the Development Project because the Project has the following policies; usage dosage of insecticide and fungicide should be minimized by the recommendation of crop varieties with insect and disease resistance, by the instruction of farming methods to minimize the insect population density, by the instruction of timely spraying of agrochemicals with the appropriate dosage and by instruction on how to protect natural enemies; furthermore, the use of dangerous agrochemicals on man, animals and fish, because of their high toxicity and high residual toxicity, should be prohibited and safe agrochemicals should be recommended in

their place.

Although some harmful chemicals to man such as parathion are not contrary to the Pesticide Regulation, it should be instructed to do not use these dangerous agrochemicals. Furthermore, it should be instructed that washings of empty bottles of agrochemicals, which has high toxicity on fish, do not flow in the rivers.

#### 9.4.2 Natural Environment

##### (1) Ecosystem

As the main work of the Development Project is for the improvement of the existing irrigation farmlands, any additional impact on the natural ecosystem will be very small so there will not be an invasion and propagation of noxious weeds or insects.

##### (2) Soil

As the cropping plan and soil treatment are carefully designed in consideration of the soil characteristics and other environmental conditions, problems such as soil erosion, soil salinization, fall in soil fertility and soil contamination will be prevented. However, an attention should be drawn to the control of soil erosion in the surrounding mountain district of the Project Area as mentioned in 9.3.2.(3). (Refer to 4.2.6 of ANNEX K)

##### (3) Hydrology

The irrigation and drainage works included in this Development Project are as follows; construction of small scale diversion works on the upper stream of the Grande De Otoro River; consolidation of existing small scale irrigation systems and river conservation as the occasion demands. Therefore severe problems, such as a change in the flow conditions and the water level of surface water, a change in the flow conditions and the water level of ground water, flooding, sedimentation of the soil and the lowering of the riverbed will not occur.

##### (4) Water Quality

According to the result of a survey almost farmers apply fertilizer with enough amount which is close level to the standard application amount in Japan (see Table 9.4.1). Therefore, the total applied amount of fertilizers at the implementation stage of the Development Project will increase by only a very small amount compared to the present situation. In addition, the total nitrogen amount originating from domestic animal excrement is less than 1% of the total amount originating from the fertilizer applied for rice, maize and frijoles (see Table 9.4.2). Therefore, the Development Project will not cause hardly any increase in the nitrogen content of the river.

The General Law of the Environment prohibits the throwing of the remains of animals and other contaminants into continental

waters. As there is a lot of surplus land in the Project Area the treatment of these contaminants is solved by burying them.

In addition, it is necessary to instruct the residents increasing their awareness of water pollution.

Table 9.3.1 WATER QUALITY OF GRANDE DE OTORO RIVER AND ITS TRIBUTARIES (NOV.18, 1992)

Name of river	pH	BOD	COD	DO	DS	T-N	T-P	CE	Col
Rio Grande de Otoro									
Upper stream (1)	6.2	2.7	2.0	8.4	25	1.12	0.36	50	900
Under stream (3)	6.3	2.0	3.0	8.2	28	1.12	0.40	50	500
Rio Cumes (4)	6.1	1.8	1.0	8.6	10	1.12	0.10	30	450
Qda. Santa Cruz (5)	6.1	2.0	2.5	8.5	20	2.52	0.27	40	950
Rio mixcure (6)	6.6	2.3	2.0	7.5	105	1.40	0.14	300	1600
Rio Naranjo (7)	6.0	1.5	3.0	7.9	18	1.12	0.45	30	950
Rio Yucanguare (8)	6.4	2.5	3.0	7.4	20	1.12	0.38	40	350

BOD : Biochemical oxygen demand, mg/l  
 COD : Chemical oxygen demand, mg/l  
 DO : Dissolved oxygen, mg/l  
 DS : Dissolved solido, mg/l  
 T-N : Total nitrogen, mg/l  
 T-P : Total phosphoric acid, mg/l  
 CE : Electric conductivity, mS/cm  
 Col : Coliform organisms number, MPN/100ml (MPN; most probable number)

(1)-(8): Number of water sampling point in Fig.9.3.2

Table 9.4.1 APPLICATION AMOUNT OF FERTILIZER  
PER HECTARE IN JESUS DE OTORO BASIN

Crops	N	P	K
Rice	135 kg	65 kg	24 kg
Maize	76	37	13
Frijol	23	23	7

Table 9.4.2 TOTAL APPLICATION AMOUNT OF FERTILIZER  
IN JESUS DE OTORO BASIN

	N kg	P kg	K kg	Prop. fer.
Rice	482,408	233,484	85,629	100 %
Maize	228,883	113,299	39,643	91
Frijol	36,976	36,745	10,751	85
Animal	3,875	2,489	3,620	
Total	752,142	386,017	139,643	

Animal: Animal domestic

Prop. fer.: propotion of farms which applied  
fertilizers

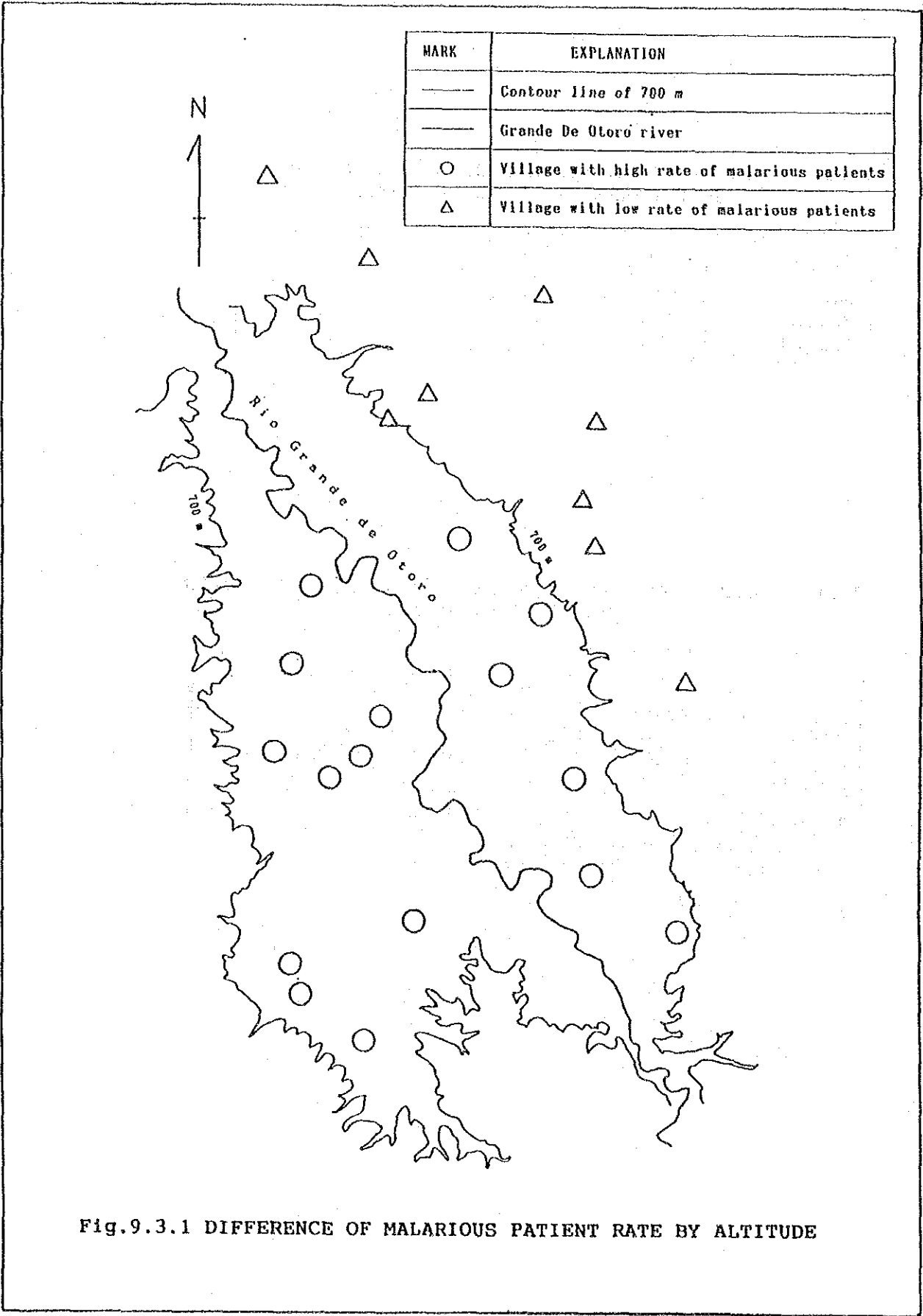
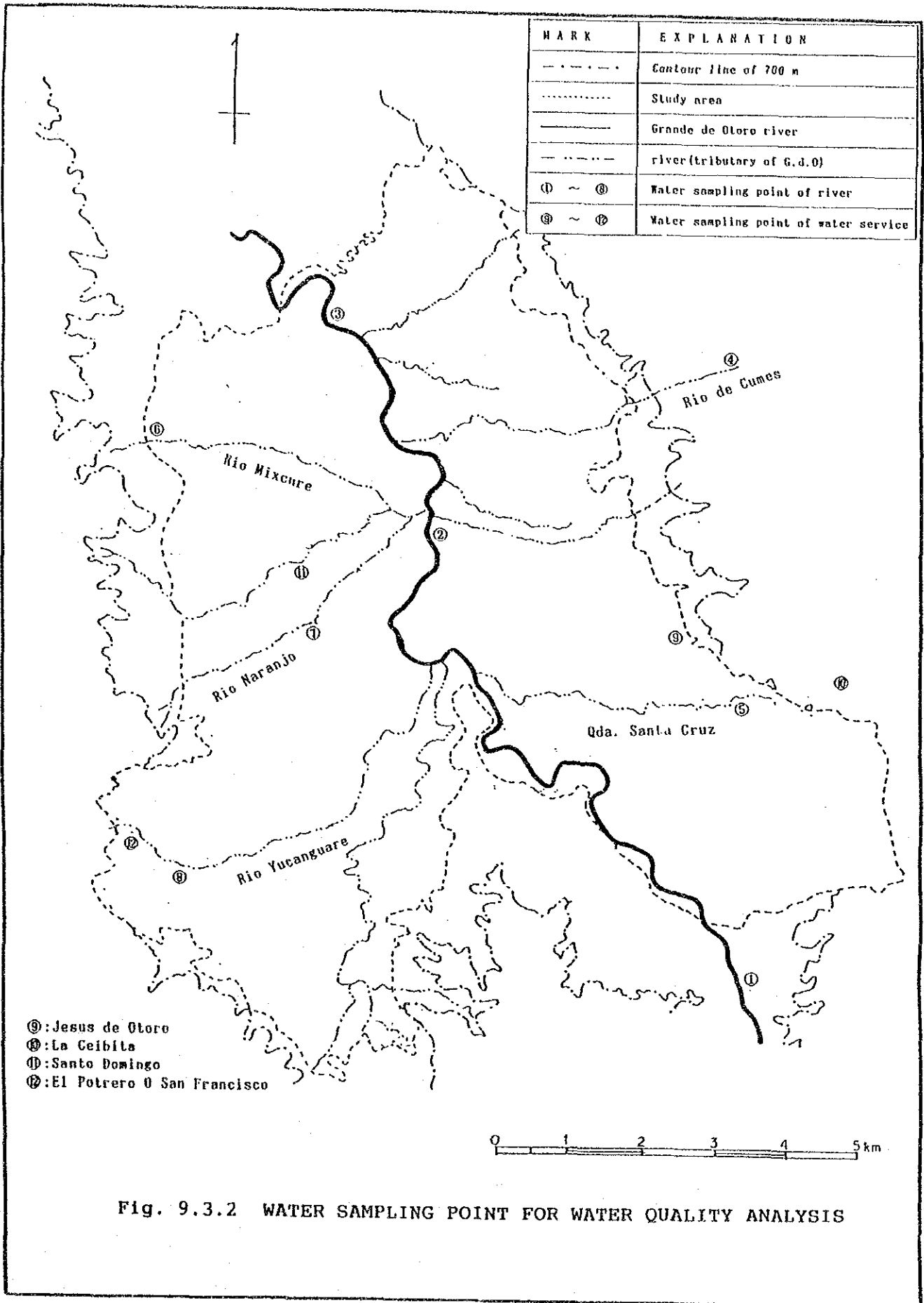


Fig.9.3.1 DIFFERENCE OF MALARIOUS PATIENT RATE BY ALTITUDE







**CHAPTER X**  
**CONCLUSION AND RECOMMENDATION**



## CHAPTER X CONCLUSION AND RECOMMENDATION

Some irrigation systems have low economic internal rate of return because canal construction is considerably costly due to the complicated topographical conditions benefit does not meet to the construction cost due to much acreage of existing irrigated area. However, objectives of this Project are to establish the project area as an important base of national food supplying base, to improve the earning differentials between rural and urban areas by introducing cash crops, and to create employment opportunities. In order to achieve these objectives, it is necessary to develop whole the Valley with one project.

From a viewpoint of this, it is cleared that the Project is technically sound and economically viable. Further, it is in response to the Governmental policies and contributes much to the national economy. In environmental aspect, it does not harm to the environment, an adequate operation and maintenance of the Project will improve environmental conditions.

Accordingly, the Project should be implemented as quickly as possible from the effective project so that the development potentials would be exploited.

The following recommendations are, therefore, made to the Government of Honduras.

(1) An arrangement should be made for obtaining a loan or grant aid from international organizations or possible donor countries.

(2) It is necessary to prepare establishment of executing organization.

(3) The operation and maintenance of the Project will be carried out by farmers, but the Governmental technical guidance is necessary for at least 5 years for farmers to conduct it. Such organization should be prepared soon.

(4) The agricultural development center which is a base of activities of farmer's organization, roads which are important for farming activities, and assembly halls which strongly effect to the farmer's organizations and farmers' living conditions should be constructed until the irrigation systems concerned will be constructed.

(5) For quick achievement of project objectives, agricultural extension activities and its organizations should be strengthened.

(6) In order to activate the farmer's organizations and agricultural activities, it is desirable that special measures shall be taken regarding the governmental assistance, credit and taxes to newly established farmer's organizations.

(7) In order to raise the farmer's living level, it is recommendable to improve the health and education system.

(8) The use of agricultural chemicals is in a license system. It is recommendable to review the suitability to use one which has much toxicant elements, which includes much residual toxicity, and which kills natural enemies.

## APPENDICES





APPENDIX-1

List of the Study Team Members

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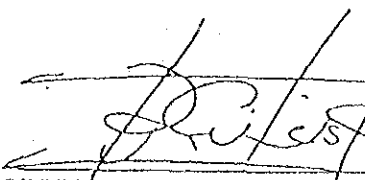
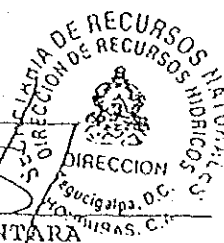
Name	Expertise
1. Narumi YAMADA	Team Leader
2. Toshinori KAWAMURA	Hydrology and Meteorology
3. Hiroeki FUJIHASHI	Geology and Soil Mechanics
4. Yutaka WATANABE	Soils
5. Vicente MOCHIZUKI	Land Use/Rural Infrastructur
6. Harunobu INOUE	Agriculture
7. Shinichi MATSUNAGA	Irrigation and Drainage
8. Shoji MASUMURA	Agroeconomy/Farmer Organization
9. Eiji TAKEMORI	Facility Design
10. Yoshihiko NISHIKAWA	To-survey Supervisor
11. Yasutaka UCHIYAMA	Environment
12. Masaru OBARA	Project Evaluation

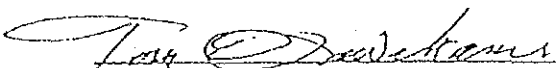
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SCOPE OF WORK FOR  
THE FEASIBILITY STUDY ON  
THE IRRIGATED AGRICULTURAL DEVELOPMENT PROJECT  
IN JESUS DE OTORO VALLEY, INTIBUCA DEPARTMENT  
IN THE REPUBLIC OF HONDURAS

AGREED UPON  
BETWEEN  
MINISTRY OF NATURAL RESOURCES  
AND  
JAPAN INTERNATIONAL COOPERATION AGENCY

TEGUCIGALPA, MARCH 19, 1992

  
  
ORLANDO AVILES ALCANTARA  
DIRECTOR GENERAL  
DIRECTORATE GENERAL OF WATER  
RESOURCES  
IN REPRESENTATION OF THE MINISTER  
OF NATURAL RESOURCES

  
TORU KAWAKAMI  
LEADER  
PREPARATORY STUDY TEAM,  
JAPAN INTERNATIONAL  
COOPERATION AGENCY

## I INTRODUCTION

In response to the request of the Government of the Republic of Honduras (hereinafter referred to as "the Government of Honduras"), the Government of Japan has decided to conduct the Feasibility Study on the Irrigated Agricultural Development Project in Jesús de Otoro Valley in Intibucá Department (hereinafter referred to as "the Study"), in accordance with the relevant laws and regulations in force in Japan.

Accordingly, the Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of technical cooperation programmes of the Government of Japan, will undertake the Study in close cooperation with the authorities concerned of the Government of Honduras.

The present document sets forth the scope of work with regard to the Study.

## II OBJECTIVE OF THE STUDY

The objectives of study are,

1. To conduct feasibility study in order to formulate the irrigated agricultural development plan, which may include livestock, in Jesús de Otoro Valley, Intibucá Department.
2. To carry out technology transfer to the Honduras counterpart personnel concerned in the course of the Study.

## III OUTLINE OF THE STUDY

### 1. Study Area

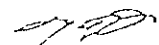
The Study covers Jesús de Otoro Valley (approximately 7,500 ha) in Intibucá Department.

### 2. Scope of the Study

The Study consists of the following two phases, and work plans in each phase are as follows.

#### 2-1 Works in phase I

- (1) Collection of data and information on,
  - (a) Topography,
  - (b) Meteorology,
  - (c) Hydrology,
  - (d) Geology,
  - (e) Soil and Land use
  - (f) Land holding and Tenure conditions,
  - (g) Live-stock,
  - (h) Irrigation and drainage system



- (i) Farming method and Agricultural production,
- (j) Agro-economy and Marketing
- (k) Farmers' organization and Supporting services
- (l) Rural infrastructure
- (m) Construction materials and their cost, and
- (n) Others

- (2) Field survey on the item mentioned in (1)
- (3) Topographic mapping including aerial photo-taking, ground survey, and mapping.
- (4) Formulation of basic plan for the Study

#### 2-2 Work in phase II

- (1) Supplementary survey on the items mentioned in 2-1, (1)
- (2) Formulation of the irrigated agricultural development plan consisting of:
  - (a) Irrigation and drainage development plan,
  - (b) Land use, cropping pattern and farming method, (including pasture)
  - (c) Farm roads
  - (d) Water management,
  - (e) Agricultural organization and supporting services development plan, and
  - (f) Others
- (3) Implementation schedule of the Project
- (4) Operation and maintenance plan
- (5) Estimation of the project cost and benefits
- (6) Project evaluation (including environmental aspects)
- (7) Recommendations

#### IV STUDY SCHEDULE

The study will be carried out in accordance with the attached tentative work schedule.

#### V REPORTS

JICA shall prepare and submit the following reports to the Government of Honduras.

- (1) Inception Report



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Twenty (20) copies in Spanish at the commencement of Phase I study.

(2) Progress Report I

Twenty (20) copies in Spanish at the end of works in Honduras of Phase I Study.

(3) Interim Report II

Twenty (20) copies in Spanish at the commencement of Phase II study.

(4) Progress Report II

Twenty (20) copies in Spanish at the end of works in Honduras of Phase II study.

(5) Draft Final Report

Twenty (20) copies in Spanish at the end of works in Japan of Phase II study. The Government of Honduras provides JICA with its comments on the Draft Final Report within one (1) month after the receipt of the Draft Final Report.

(6) Final Report

Fifty (50) copies in Spanish and English (only Main Report) within two (2) months after the receipt of the comments on the Draft Final Report. In case any doubt arises in interpretation, English text shall prevail.

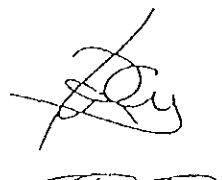
VI UNDERTAKING OF THE GOVERNMENT HONDURAS

1. To facilitate smooth conduct of the Study, the Government of Honduras shall take necessary measures:

(1) To permit the members of the Japanese study team to enter, leave and sojourn in Honduras for the duration of their assignment therein, and exempt them for foreign registration requirements and consular fees.

(2) To exempt the members of the Japanese study team from taxes, duties, and other charges on equipment, machinery and other materials brought into Honduras for the conduct of the Study.

(4) To exempt the members of the Japanese study team from income tax and charges of any kind imposed on or in connection with any emoluments or allowances paid to the members of the Japanese study team for their services in connection with the



implementation of the Study.

- (5) To provide necessary facilities to the Japanese study team for remittance as well as utilization of the funds introduced into Honduras from Japan in connection with the implementation of the Study.
  - (6) To secure permission for entry into private properties or restricted areas for the conduct of the Study.
  - (7) To secure permission for the Japanese study team to take all data and documents (including aerial-photographs and maps) related to the Study out of Honduras to Japan.
  - (8) To provide medical services as needed. The expenses will be chargeable on the members of the Japanese study team.
2. The Government of Honduras shall bear claims, if any arises against the members of the Japanese study team resulting from, occurring in the course of, or otherwise connected with the discharge of their duties in the implementation of the Study, except when such claims arise from gross negligence or willful misconduct on the part of the members of the Japanese study team.
  3. La Secretaria de Recursos Naturales (hereinafter referred to as "LA SECRETARIA") through the Directorate General of Water Resources (hereinafter referred to as "DGRH") shall act as counterpart agency to the Japanese study team and also as coordinating body in relation to other governmental and non-governmental organizations concerned for the smooth implementation of the Study.
  4. "LA SECRETARIA" shall, at its own expense, provide the Japanese study team with the following in cooperation with other organization concerned;
    - (1) Available data and information related to the Study,
    - (2) Counterpart personnel
    - (3) Suitable office space with necessary equipment in Tegucigalpa and in Comayagua,
    - (4) One vehicle with driver,
    - (5) Credentials or identification cards



VII UNDERTAKING OF JICA

For the implementation of the study, JICA shall take the following measures;

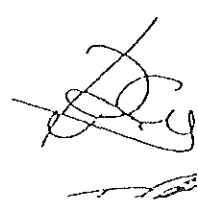
1. To dispatch, at its own expense, study teams to Honduras
2. To pursue technology transfer to the Honduras counterpart personnel in the course of the Study.

VIII CONSULTATION

JICA and "DGRH" will consult with each other in respect of any matter that may arise from or in connection with the Study.

IX TRANSLATION

The Scope of Work is made both in English and in Spanish. In case any discrepancy of translation arises between the two languages, the English version shall prevail.

A handwritten signature in black ink, located in the bottom right corner of the page. The signature is stylized and appears to consist of several overlapping loops and lines, possibly representing the initials of the signatory.

TENTATIVE SCHEDULE

Year/Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
works in open															
works in embankment															
reports	△ Ic/R	△ P/R(1)						△ IL/R		△ P/R(2)		△ OF/R			
Installation	Phase I			Phase II											

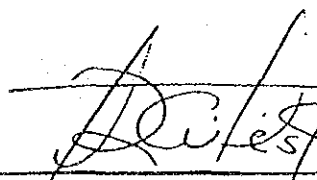

Ic/R : Inception Report      P/R : Progress Report      IL/R : Interim Report      OF/R : Draft Final Report  
 O : Comments on OF/R by the Honduras side      ( ) : Field Work      ( ) : Home Office Work



ALCANCE DEL TRABAJO  
PARA  
EL ESTUDIO DE FACTIBILIDAD  
SOBRE  
EL PROYECTO DE DESARROLLO AGRICOLA BAJO RIEGO  
EN EL VALLE DE JESUS DE OTORO, DEPARTAMENTO DE INTIBUCA,  
REPUBLICA DE HONDURAS

ACORDADO  
ENTRE  
LA SECRETARIA DE RECURSOS NATURALES  
Y  
LA AGENCIA DE COOPERACION INTERNACIONAL DEL JAPON

TEGUCIGALPA, 19 DE MARZO DE 1992

  
  
ORLANDO AVILES ALCANTARA  
DIRECTOR GENERAL  
DIRECCION GENERAL DE  
RECURSOS HIDRICOS  
EN REPRESENTACION DEL  
MINISTERIO DE RECURSOS NATURALES

  
TORU KAWAKAMI  
JEFE DEL EQUIPO PARA EL  
ESTUDIO PREPARATORIO  
AGENCIA DE COOPERACION  
INTERNACIONAL DEL JAPON

## I. INTRODUCCION

En respuesta a la solicitud del Gobierno de la República de Honduras (de aquí en adelante denominado "el Gobierno de Honduras"), el Gobierno del Japón ha decidido realizar el Estudio de Factibilidad sobre el Proyecto de Desarrollo Agrícola Bajo Riego en el Valle de Jesús de Otoro, Departamento de Intibucá (de aquí en adelante denominado "El Estudio"), de acuerdo a las leyes y reglamentos relacionados, vigentes en Japón.

La Agencia de Cooperación Internacional del Japón (de aquí en adelante denominada "JICA"), agencia oficial responsable para la ejecución de programas de cooperación técnica del Gobierno del Japón, emprenderá el Estudio con la estrecha cooperación de las autoridades del Gobierno de Honduras.

El presente documento establece el Alcance del Trabajo para el Estudio.

## II. OBJETIVOS DEL ESTUDIO

Los objetivos del estudio son los siguientes:

1. Ejecutar el Estudio de Factibilidad para elaborar un plan de desarrollo agrícola con riego, el cual podrá incluir la ganadería, en el Valle de Jesús de Otoro en el Departamento de Intibucá.
2. Llevar a cabo transferencia de tecnología al personal relacionado del Gobierno de Honduras, durante la ejecución del Estudio.

## III. PERFIL DEL ESTUDIO

### 1. Area del Estudio

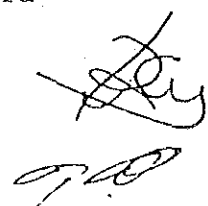
El Estudio abarca el Valle de Jesús de Otoro (aproximadamente 7,500 ha) en el Departamento de Intibucá.

### 2. Alcance del Estudio

El Estudio consiste en dos fases y cada fase abarca las siguientes actividades:

#### 2-1 Actividades en fase I

- (1) Recopilación de datos e información sobre:
  - (a) Topografía
  - (b) Meteorología
  - (c) Hidrología
  - (d) Geología
  - (e) Suelos y uso de la tierra
  - (f) Condiciones de tenencia de la tierra



- (g) Ganadería
- (h) Sistemas de riego y drenaje
- (i) Métodos de cultivo y producción agrícola
- (j) Agroeconomía y mercadeo
- (k) Organización de agricultores y servicios de apoyo
- (l) Infraestructura rural
- (m) Materiales de construcción y su costo
- (n) Otros

(2) Estudio de campo sobre lo mencionado en (1).

(3) Levantamiento topográfico incluyendo la toma de fotografías aéreas, estudios en terreno y mapeo.

(4) Formulación del plan básico para el Estudio

#### 2-2 Actividades en la fase II

(1) Estudios suplementarios sobre lo mencionado en 2-1 (1).

(2) Formulación del plan de desarrollo agrícola en riego, que consistirá en los siguientes puntos:

- (a) Plan de desarrollo de irrigación y drenaje
- (b) Uso de la tierra, patrón de cultivo y métodos de cultivo incluyen pastos.
- (c) Caminos rurales
- (d) Manejo del agua
- (e) Plan de desarrollo para la organización agrícola y servicios de apoyo
- (f) Otros

(3) Cronograma de ejecución del Proyecto

(4) Plan de operación y mantenimiento

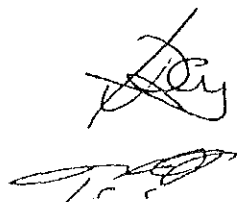
(5) Estimación del costo del Proyecto y sus beneficios

(6) Evaluación del Proyecto (incluyendo aspectos ambientales).

(7) Recomendaciones

#### IV. CRONOGRAMA DEL ESTUDIO

El estudio será llevado a cabo de acuerdo al cronograma tentativo adjunto a la presente.



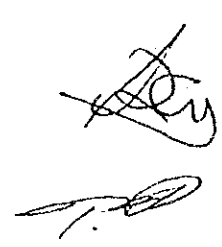
V. INFORMES

JICA elaborará y presentará al Gobierno de Honduras los siguientes informes:

- (1) Informe Inicial  
Veinte (20) copias en español, al inicio de la fase I
- (2) Informe de Avance I  
Veinte (20) copias en español al final de las actividades de la Fase I, en Honduras
- (3) Informe Intermedio  
Veinte (20) copias en español al inicio de la Fase II
- (4) Informe de Avance II  
Veinte (20) copias en español al final de las actividades de la Fase II en Honduras.
- (5) Borrador del Informe Final  
Veinte (20) copias en español al final de las actividades de la Fase II, en Japón. El Gobierno de Honduras hará del conocimiento de JICA sus comentarios, después un mes de haber recibido el Borrador del Informe Final.
- (6) Informe Final  
Cincuenta (50) copias en español e inglés (solo del Informe Principal) dentro de dos (2) meses, a partir del recibo de los comentarios sobre el Borrador del Informe Final. En caso que surgiera alguna duda en la interpretación, la versión en inglés prevalecerá.

VI. COMPROMISOS DEL GOBIERNO DE HONDURAS

1. Para facilitar la realización del Estudio, el Gobierno de Honduras tomará las siguientes medidas necesarias:
  - (1) Garantizar la seguridad del grupo de estudio Japonés.
  - (2) Permitir a los miembros del grupo entrar, salir y permanecer en Honduras durante el tiempo asignado a este trabajo y eximirlos de los requisitos de registro de extranjeros y tarifas consulares.
  - (3) Eximir de impuestos a los miembros del grupo de estudio, de derechos arancelarios y otros cargos sobre equipo, maquinarias y otros materiales traídos a Honduras para la ejecución del Estudio.
  - (4) Eximir del impuesto sobre renta y otros gravámenes de cualquier tipo sobre o en conexión con los emolumentos o viáticos pagados a los miembros del

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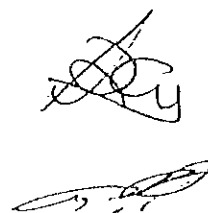
grupo de estudio, por servicios relacionados con la ejecución del Estudio.

- (5) Facilitar al grupo de estudio la remisión y uso de los fondos introducidos en Honduras del Japón en relación con la ejecución del Estudio.
  - (6) Garantizar el permiso de ingreso a propiedades privadas o áreas restringidas para la ejecución del Estudio.
  - (7) Garantizar al grupo de estudio el permiso de llevar de Honduras al Japón, los datos y documentos (incluyendo fotografías aéreas y mapas) relacionados con el Estudio.
  - (8) Proporcionar los servicios médicos, cuando sean necesarios, cuyos gastos serán pagados por los miembros del grupo de estudio.
2. El Gobierno de Honduras se hará cargo de los reclamos, si se presenta alguno, contra los miembros del grupo, que pudieran surgir de, ocurrir en el transcurso de, o durante la ejecución del Estudio, excepto cuando tales reclamos se originen por grave negligencia o mala conducta intencional de los miembros del grupo.
3. La Secretaría de Recursos Naturales (de aquí en adelante denominada "La Secretaría"), la Dirección General de Recursos Hídricos (de aquí en adelante denominado "DGRH"), actuará como agencia de contraparte del grupo de estudio y también como coordinador de las relaciones con otras organizaciones gubernamentales y no-gubernamentales para facilitar la ejecución del Estudio.
- (4) La Secretaría proporcionará, a su propio costo, en cooperación con las organizaciones pertinentes, lo siguiente:
- (1) Datos e información disponibles relacionados con el Estudio,
  - (2) Personal de contraparte,
  - (3) Oficinas adecuadas con el mobiliario necesario, en Tegucigalpa y en Comayagua.
  - (4) Un vehículo con motorista y
  - (5) Credenciales o tarjetas de identificación.

#### VII. COMPROMISOS DE JICA

JICA para la ejecución del Estudio, tomará las siguientes medidas:

- (1) Enviar a Honduras al grupo de estudio, a su propio costo,
- (2) Procurar la transferencia de tecnología al personal hondureño de contraparte, durante la ejecución del Estudio.

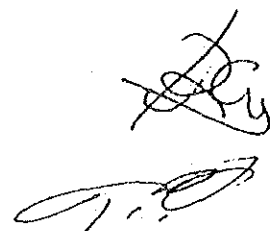


VIII. CONSULTAS MUTUAS

JICA y la D.G.R.H. se consultarán mutuamente con respecto a cualquier asunto que pudiere surgir de, o en conexión con el estudio.

IX. TRADUCCION

El alcance del trabajo se ha preparado en inglés y español. En caso que surgiera alguna discrepancia en la interpretación de los idiomas, la versión en inglés prevalecerá.

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TENTATIVE SCHEDULE

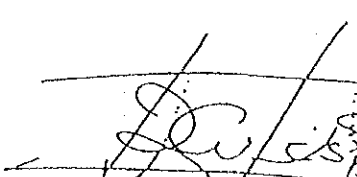
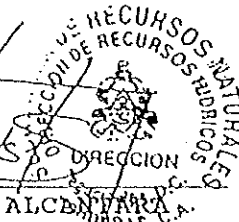
Item/Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Works in Japan					□											
Works in Honduras		□														
Reports	△ Ic/R		△ P/R(1)					△ Ic/R			△ P/R(2)		△ DF/R		△ E/R	
Explanation			Phase I			Phase I					Phase II					

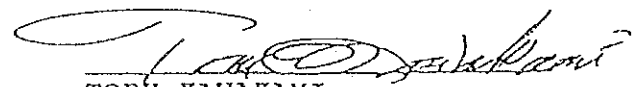
(Remarks) Ic/R : Inception Report    P/R : Progress Report    Ic/R : Interim Report    DF/R : Draft Final Report    E/R : Final Report  
 □ : Comments on DF/R by the Honduras side    □ : Field Work    □ : Home Office Work

MINUTES OF MEETING  
ON  
THE SCOPE OF WORK  
FOR  
THE FEASIBILITY STUDY  
ON  
THE IRRIGATED AGRICULTURAL DEVELOPMENT PROJECT  
IN JESUS DE OTORO VALLEY, INTIBUCA DEPARTMENT  
IN THE REPUBLIC OF HONDURAS

AGREED UPON  
BETWEEN  
GENERAL DIRECTORATE OF WATER RESOURCES  
AND  
JAPAN INTERNATIONAL COOPERATION AGENCY

TEGUCIGALPA, MARCH 19, 1992

  
  
ORLANDO AVILES ALCON  
DIRECTOR GENERAL  
DIRECTORATE GENERAL OF  
WATER RESOURCES  
MINISTRY OF NATURAL RESOURCES

  
TORU KAWAKAMI  
LEADER  
PREPARATORY STUDY TEAM  
JAPAN INTERNATIONAL  
COOPERATION AGENCY

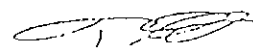


The Preparatory Study Team for the "Feasibility Study on the Irrigated Agricultural Development Project in Jesús de Otoro Valley in Intibucá Department, Republic of Honduras" had a series of discussions related to the Study, with officials from the General Directorate of Water Resources (DGRH), from March 13, 1992 to March 19, 1992. This document is a summarized conclusion of the discussions mentioned above:

1. DGRH promised that counterpart personnel will be provided, at its own expense, to the Study Team.
2. DGRH promised to provide the suitable offices, in Tegucigalpa and Comayagua, with necessary office equipment such as desks, chairs, cabinets and telephone(s).
3. DGRH requested JICA Preparatory Study Team to provide, at its own expense, vehicles for the Study, due to budget limitations.

Related to the drivers, DGRH will provide one driver to the Japanese study team; also DGRH expressed the desire of obtaining the necessary daily allowances for the driver as well as fuel expenses, from the Japanese study team.

4. DGRH requested JICA training in Japan for the Governmental personnel concerned with the Study.
5. DGRH requested that the Study shall be carried out as soon as possible.
6. DGRH requested JICA to provide, in connection with the implementation of the Study, the following equipment:
  - (1) Automatic water level recorder
  - (2) Staff gauge
  - (3) Current meter
  - (4) Copy machine
7. The Team promised to convey the requests (from 3 to 6) to the Government of Japan.



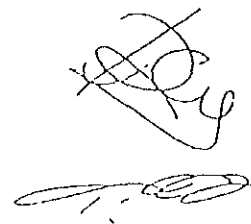
MEETING'S PARTICIPANT LIST

<u>HONDURAS SIDE</u> <u>NAME</u>	<u>POSITION</u>	<u>ASSIGNMENT</u>
Orlando Avilés Aláantara	Director General	Director General
Leslie Burgos de Flores	Chief of Irrigation Studies and Promotion Department	Coordinator
Lily Palma	Planner	Agronomy and Irrigation
Olga Estrada	Planner	Agroeconomy
Eduardo Alvarez	Planner	Agroeconomy
Gladis Rojas	Chief of Hydrology Section	Hydrology and Climatology

<u>JAPANESE SIDE</u> <u>NAME</u>	<u>POSITION</u>	<u>ASSIGNMENT</u>
Toru Kawakami	Director, Technical Affairs Div., Agriculture, Forestry and Fisheries Planning and Survey Dept. JICA	Leader
Takashi Tosaka	Deputy Director, Administration Div., Agricultural Structure Improvement Bureau, MAFF	Rural Planning

Handwritten signature and initials, possibly 'T. Kawakami' and 'T. Tosaka', located at the bottom right of the page.

Shoji Tani	Chief of Second Section Disaster Prevention and Restoration Div., Agricultural Structure Improvement Bureau, MAFF	Irrigation and Drainage
Hiroshi Tuthiya	Senior Officer, Agricultural Production Bureau Crop Production Dept., Tokai Regional Agricultural Adminis- tration Office, MAFF	Agriculture
Shizuo Hiroshige	Staff, Technical Affairs Div., Agricul- ture, Forestry and Fisheries Planning and Survey Dept., JICA	Coordinator
Yoshimi Sugano	International Coopera- tion Service Center	Interpreter





A handwritten signature, possibly 'Shoji Tani', is written in the bottom right corner of the page. Below the signature is a large, stylized scribble or flourish.

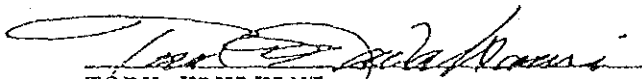
MINUTA DE DISCUSION  
SOBRE EL ALCANCE DEL TRABAJO  
PARA EL ESTUDIO DE FACTIBILIDAD  
DEL PROYECTO DE DESARROLLO AGRICOLA BAJO RIEGO  
DEL VALLE DE JESUS DE OTORO, DEPARTAMENTO DE INTIBUCA,  
REPUBLICA DE HONDURAS

ACORDADO ENTRE

LA DIRECCION GENERAL DE RECURSOS HIDRICOS  
Y  
LA AGENCIA DE COOPERACION INTERNACIONAL DE JAPON

TEGUCIGALPA, 19 DE MARZO DE 1992

  
  
ORLANDO AVILES ALCANTARA  
DIRECTOR GENERAL  
DIRECCION GENERAL DE RECURSOS  
HIDRICOS  
MINISTERIO DE RECURSOS  
NATURALES

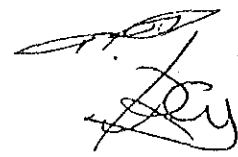
  
TORU KAWAKAMI  
LIDER  
GRUPO DE ESTUDIO PREPARATORIO  
AGENCIA DE COOPERACION  
INTERNACIONAL DE JAPON

El Grupo de Estudio Preparatorio, para el "Estudio de Factibilidad del Proyecto Desarrollo Agrícola Bajo Riego del Valle de Jesús de Otoro, Departamento de Intibucá", República de Honduras, sostuvo una serie de discusiones relacionada al Estudio conjuntamente con funcionarios de la Dirección General de Recursos Hídricos (DGRH), del 13 al 19 de marzo de 1992. Este documento corresponde al resumen de las conclusiones resultantes de las discusiones mencionadas anteriormente:

1. La DGRH convino en asignar el personal de contraparte necesario, a su propio costo, al grupo de Estudio.
2. La DGRH prometió proporcionar oficinas adecuadas, en Tegucigalpa y en Comayagua, con el mobiliario necesario, tal como escritorios, sillas, libreros y teléfono.
3. La DGRH solicitó al grupo de Estudio Preparatorio de JICA, que proporcionara a su propio costo, vehículos para la ejecución del Estudio, debido a limitaciones presupuestarias.

En relación a los conductores, la DGRH asignará uno al Grupo de Estudio Japonés; asimismo la DGRH expresó la necesidad de obtener los viáticos para el conductor así como los gastos relacionados al consumo del combustible, de parte del Grupo de Estudio Japonés.

4. La DGRH solicitó a JICA entrenamiento en Japón para los funcionarios asignados a la ejecución del Estudio.
5. La DGRH solicitó la ejecución del Estudio a la brevedad posible.
6. La DGRH solicitó a JICA proveer, en relación con la ejecución del Estudio, el siguiente equipo:
  1. Lector automático del nivel del agua
  2. Limnómetro
  3. Molinete
  4. Fotocopiadora
7. El Grupo de Estudio Preparatorio de JICA prometió hacer del conocimiento del Gobierno de Japón, las solicitudes planteadas (incisos 3 al 6).



LISTA DE PARTICIPANTES A LAS REUNIONES

<u>GRUPO HONDUREÑO</u> <u>NOMBRE</u>	<u>CARGO</u>	<u>FUNCION</u>
Orlando Avilés Alcántara	Director General	Director General
Leslie Burgos de Flores	Jefe Depto. Estudio y Fomento de Riego	Coordinador
Lily Palma	Planificador	Agronomía y Riego
Olga Estrada	Planificador	Economía
Eduardo Alvarez	Planificador	Economía
Gladis Rojas	Jefe Sección de Hidrología	Hidrología y Climatología
<u>GRUPO JAPONES</u> <u>NOMBRE</u>	<u>CARGO</u>	<u>FUNCION</u>
Toru Kawakami	Director División de Asuntos Técnicos-Departamento de Planificación e Investigación Agrícola, Forestal y Pesca JICA	Líder
Takashi Tosaka	Sub-Director División de Admon. Buró de Mejoramiento de Infraestructura Agrícola Ministerio de Agricul- tura, Bosques y Pesca	Planificación Rural

Shoji Tani	Jefe de la Segunda Sección de la División de Prevención de desas- tres y restauraciones Buró de Mejoramiento de Infraestructura Agrícola Ministerio de Agricul- tura, Bosque y Pesca	Riego y Drenaje
Hiroshi Tuthiya	Oficial Principal Buró de Producción Agrícola Oficina de Admon. Agrícola Regional Tokai Ministerio de Agricul- tura, Bosque y Pesca	Agricultura
Shizuo Hiroshige	Funcionario de la División de Asuntos Técnicos Departamento de Plani- ficación e Investiga- ción Agrícola, Bosque y Pesca JICA	Coordinador
Yoshimi Sugano	Centro de Servicios de Cooperación Inter- nacional	Intérprete







JICA