SUPPORTING REPORT [I]

AGRICULTURAL INFRASTRUCTURE

ANNEX I: AGRICULTURAL INFRASTRUCTURE

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I.1 Agricultural Infrastructure

(1) Irrigation

1) General

The population of El Salvador grows by about 100,000 persons annually according to the data of Banco Central de Reserva. Expansion of irrigated agricultural lands is an important national policy of El Salvador because it is a well-known fact that food demand increases with the population. Therefore, securing food is a matter of highest priority. According to the Master Plan for the water resource development, "Plan Maestro de Desarrollo y Aprovechamiento de los Recursos Hídricos", prepared in the 1980s, 274,000 ha of irrigable land exists nationwide.

Region	CLASS					Total
	I	II	III	IV	V	(ha)
A	295.0	10551.0	34362.0	15182.0	7189.0	67579.0
B		2453.0	2496.0	3856.0	2035.0	10840.0
C	753.0	2425.0	4600.0	2133.0	2341.0	12252.0
D	755.0	4195.0	7186.0	11374.0	5358.0	28113.0
E		2207.0	2121.0	1643.0	734.0	6705.0
F	3100.0	12907.0	21328.0	12623.0	4100.0	54058.0
G	5020.0	10250.0	851.0	3540.0	2650.0	29970.0
H	1264.0	10503.0	12719.0	8696.0	8390.0	40308.0
I		852.0	3603.0	2351.0	2280.0	9086.0
J			3793.0	2518.0	6294.0	12605.0
Total	11187.0	56343.0	100718.0	63916.0	41371.0	273535.0

Source: Documents Básicos "Plan Maestro de Desarrollo y Aprovechamiento de los Recursos Hídricos" (PLAMDARH)

The irrigated agricultural land totals about 35,000 ha, of which 23,000 ha are privately owned and 12,000 ha are government-owned. The irrigated agricultural land is distributed as follows: 44 % in the basin of Sensunapan River, the Banderas River and the San Pedro River, 21 % in the basin of Lempa River and its tributaries, and 15 % in the basin of the Comalapa River and the Jiboa River. The gravity irrigation method and the sprinkler irrigation method are commonly used.

Region	Superficie Regada (ha)	Tipo de Riego %		Water Recursos de Agua	
		Gravedad	Aspersion	Superfieal	Subterranea
A	7100.0				
B	500.0			100.0	
C	780.0		100.0		
D	15069.0				
E	895.0			46.0	54.0
F	3800.0	57.0	43.0		
G	2100.0	64.0	36.0	90.0	10.0
H	3627.0	55.0	45.0		
I	400.0			30.0	70.0
J	100.0				
Total	34371.0				

Source: Documents Básicos PLAMDARH

2) Water Rights

The irrigation and drainage law (Reglamento General de la Ley de Riego y Avenamiento) concerning river water-use is set by the General Department of Renewable Natural Resources of the Ministry of Agriculture and Livestock (Ministerio de Agricultura y Ganadería, Dirección General de Recursos Naturales Renov. -MAG-), and enforced on November 11, 1970. The law stipulates that it is possible to use for irrigation 80 % of the minimum river flow in the dry season (CAPITULO, II Art. 11). However, only 70 % of the water volume can be used for irrigation because it is also used by the inhabitants for domestic purposes or the animals for drinking: intake is carried out at a water intake point downstream.

3) Present Condition of Agricultural Infrastructure

In the Study area, cultivation is basically dependent on rain for irrigation. There are a lot of crops (maize, sorghum, beans), specially grain and rice, cultivated in the study area. Sugarcane, sesame products and several vegetables (tomato, green pepper, chayote, squash, etc.) are cultivated in some areas because they are well paying cash crops. Sugarcane is cultivated either in flat or mountainous lands, and, require less water than other crops. In the Study area, few water is used for agriculture and farmers sell their products to the sugar mills. As explained in the Inception Report, the Study Area has been divided into five blocks:

Block A (the Ilopango Lake catchment area)
Block B (the upper reaches of the Jiboa River basin)
Block C (the middle reaches of the Jiboa River basin)
Block D (the lower reaches of the Jiboa River basin)
Block E (the Sepaquiapa River basin)

a) Block A

Coffee fields exist between 700 m and 900 m above sea level along the southern edge of the Ilopango Lake. In the vicinity of the eastern part of Candelaria, there are fields either cultivated with coffee or banana. These are rainfed crops since irrigation and drainage facilities do not exist in this Block.

b) Block B

A set of five hard PVC pipes is installed in the Jiboa river (1 and 2 inches in diameter), and "Wiskiru" and "Chile" are produced under the sprinkling irrigation system in the downstream area, which is about 30 m lower in elevation than the water intake points. Maize and frijol beans are cultivated in the rainy season without irrigation.

c) Block C

Sugarcane is chiefly cultivated in Verapaz and Guadalupe, both located at the foot of the San Vicente mountain on the left bank of the Jiboa River. Main crops in the mountain area are coffee, pineapple and sugarcane. Spring water is used to irrigate small fields on the plane along the Jiboa River planted with frijol beans during the dry season. The potential area for irrigation in Verapaz, Guadalupe and the Borbollon River valley is presumed to be about 400 h. Some 20-30 Mz were irrigated before the 1970s. However, after ANDA developed wells for water supply in the upper reaches of the Borbollon River basin, the discharge of the Borbollon River was drastically reduced and agriculture in this block became of the rainfed type. On the hillside of the San Vicente mountain, rainfed cultivation of maize and sugarcane is practiced up to about 700-800 m above sea level.

d) Block D

This block covers the plane stretching from the Pan American Highway CA-2 to the Pacific Ocean in the Jiboa River downstream basin. At present, water from the Jiboa River is not used for irrigation due to the inflow of Ilopango Lake's water upstream. Agriculture in this area (Block D) is managed by cooperatives of 6 "Haciendas". Capital shortage prevents agricultural cooperatives from rehabilitating irrigation and water resource facilities. Consequently, agriculture became dependent on rain water. In the dry season, sugarcane, sesame, watermelon and maize are cultivated, while pasture is grown in the rainy season.

e) Block E

This block consists of the Sepaquiapa River basin: from the southern mountain rim of the Ilopango Lake to the confluence of the Sepaquiapa and Jiboa rivers. The condition of existing agricultural infrastructure in the upper reaches of the Sepaquipa River basin is similar to Block C. Cooperative Hacienda Astoria is located on the plane on the right bank of the Sepaquiapa River. This Cooperative has built a temporary earth dam in the river and an earth canal to irrigate about 130 ha of agricultural land during the dry season. The dam is about 1.5 m in height and about 4.0 m in bottom width, while the canal is about 1.5 m in depth and about 2.5 m in width.

Before the civil war in El Salvador, lots or parcels of land in the lower part of the Sepaquipa River (San Mauricio zone) were irrigated with river water using diesel pump mechanism. When the war began, the farmers stopped cultivating the land out of fear and migrated to other places. 12 years later, the same farmers came back. The water of the Sepaquiapa River, however, has became so contaminated with waste and manure from the farms established in 1991 at the left bank of the river.

(2) Drainage

1) General

There is no drainage project at present, but the "Comalapa Irrigation Project" incorporates a flood control and drainage plan. The lower parts of the Lempa River

basin and the Jiboa River basin are observed to be subject to inundation damage. The area susceptible to inundation damage is estimated to total around 5,000 ha.

2) Present Condition in the Study Area

Inundation is thought to have damaged about 3,500 ha of land in the lower part of the Jiboa River basin. The inundation period extends over three weeks or more, at a depth of 30 to 60 cm.

(5) Rural Roads

1) General

Rural roads are under the jurisdiction of the Road Bureau (DGC) of the Ministry of Public Works, and are classified below based on traffic volume.

CLASS	EFFECTIVE WIDTH (m)	PAVEMENT WIDTH (m)	PAVEMENT THICKNESS (m)
(1) SPECIAL ROAD	30.6	14.6	9.0
(2) FIRST CLASS	12.0	7.3	9.0
(3) SECOND CLASS	9.5	6.5	6.0
(4) Imp. THIRD CLASS	8.0	6.0	5.0
(5) THIRD CLASS	6.0	6.0	5.0
(6) RURAL A	5.0		
(7) RURAL B	5.0		

2) Existing Condition of the Roads in the Study Area

The Study Area is located southeast of the capital city, San Salvador, bordered to the north by the Pan American Highway (CA-1) which connects San Salvador, Cojutepeque and San Vicente to the east. National road (CA-2) is the main road in the southern part of the Study Area. Both roads are major arteries for the agricultural distribution system of El Salvador. The road network in the Study Area is good. However there are a lot of dirt roads and traffic is usually bad The existing condition of the road network in the Study Area is as follows:

CLASS	Condition L. MB (km)	Condition L. B (km)	Condition L. R (km)	Condition L. M (km)
(1) SPECIAL ROAD	33.0	15.0	15.2	0
(2) FIRST CLASS	0	40.0	36.9	2.1
(3) SECOND CLASS	0	10.0	20.6	45.7
(4) Imp> THIRD CLASS	0	0	0	0
(5) THIRD CLASS	0	26.5	4.9	78.5
(6) RURAL A	0	0	33.3	9.3
(7) RURAL B	0	6.5	13.0	128.5
TOTAL	33.0	98.0	123.9	264.1

MB: Very Good

B: Good

R: Fair

M: Bad

I.2 Irrigation Facilities Plan

(1) Irrigation Development Constraints

The following are enumerated as irrigation development constraints in the Study Area.

1) Natural Constraints

a) Irrigation in the Study Area would depend on river surface water and rainfall. 95 % of these water resources are concentrate in the rainy season. The average annual precipitation in the study area is 1850 mm. On the other hand, only a limited volume of water is available during the dry season because there is little rainfall during this time of the year.

b) The water of Ilopango Lake cannot be used because it is arsenic and contains boron, or because it is contaminated with industrial waste and sewage from city drains.

c) The land to be irrigated should be 100 m or less in elevation, that is, the low-lying plane to the south of the old national Road (CA-2).

2) Technical Constraints

a) Shortage of civil engineers or agricultural engineers experienced in the effective use of natural resources such as water and soil. Shortage makes the transfer of new irrigation technologies or cultivation technology to the farmers difficult.

b) Studies on irrigation development and new cultivation technologies stagnate because the functions of the Ministry of Agriculture and Livestock are under reform.

3) Legislative Constants

a) The irrigation and drainage law was promulgated in November 1970 and enforced in March 1973. Thereafter, irrigation development programs were terminated due to the implementation of agrarian reform which entailed the

distribution of agricultural lands.

4) Other Constraints

a) The importation of low-priced vegetables and fruits of good quality from neighboring countries obstructs agricultural development in the area.

b) Absence of a distribution system for domestic agricultural products, and of a farmers' organization to control the distribution of agricultural imports domestically.

(2) Drainage Development Constraints

The following are enumerated as drainage development constraints in the Study Area.

1) Natural Constraints

a) 90 % of the agricultural lands in lower Jiboa River basin are situated in areas with a slope gradient of less than 1 %, making natural drainage difficult in the rainy season.

b) A brook is the only means of drainage in this area.

c) The upstream basin topography is steep, and the flood traveling time is extremely short because the river is not that long.

2) Technical Constraints

a) Shortage of civil engineers or agricultural engineers experienced in the effective use of natural resources such as water and soil.

b) Studies on drainage development stagnate because the functions of the Ministry of Agriculture and Livestock are under reform.

3) Legislative Constraints

a) The irrigation and drainage law was promulgated in November 1970 and enforced in March 1973. Thereafter, irrigation development programs were

terminated due to the implementation of agrarian reform which entailed the distribution of agricultural lands.

(3) Rural Road Development Constraints

The following are enumerated as rural road development constraints in the Study Area.

1) Natural Constraints

a) Collapse of the slope or the road shoulder occurs due to torrential rains in the rainy season because a part of the rural road in the ravine section is made of earth.

b) The rural road in the ravine section is also used to drain rain water.

c) Because the drainage system in the lower Jiboa river basin has not yet been improved, the rural earth roads are always eroded in the rainy season due to inundation.

2) Technical Constraints

a) Rural roads A and B are under the jurisdiction of the Road Bureau of the Ministry of Public Works. The bureau has a shortage of civil engineers for rural road maintenance.

b) Studies on rural road development are unprogressive.

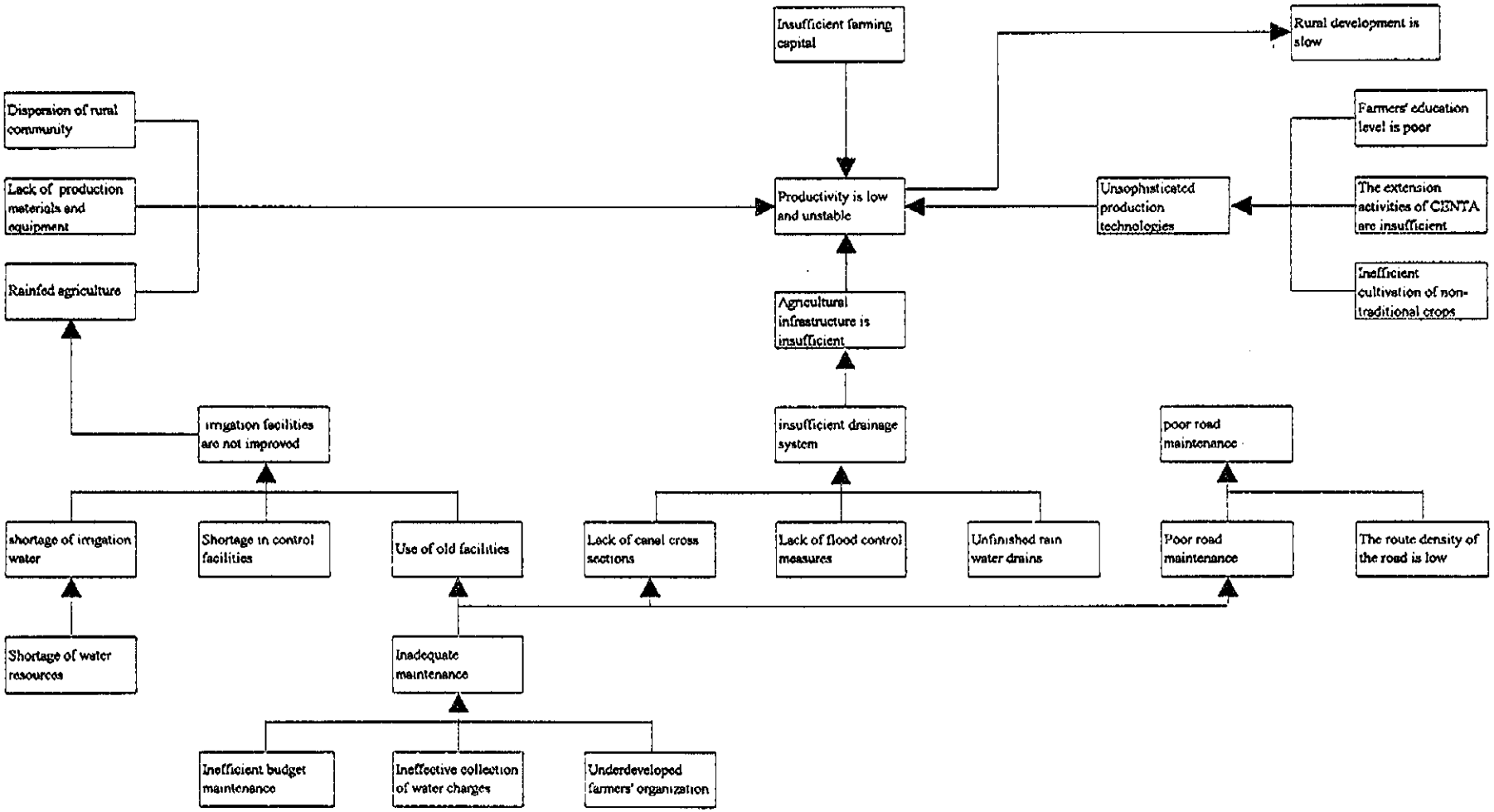
3) Legislative Constraints

a) The municipal mayor was supposed to request to the central government a budget for the repair and construction of rural roads.

Effective rainfall for Etcrop

Rainfall mm /month		12.5	25	37.5	50	62.5	75	87.5	100	113	125	138	150	163	175	188	200
	25	8	16	24													
	50	8	17	25	32	39	46										
	75	9	18	27	34	41	48	56	62	69							
	100	9	19	28	35	43	52	59	66	73	80	87	94	100			
Etcrop	125	10	20	30	37	46	54	62	70	76	85	92	98	107	116	120	
mm/M	150	10	21	31	39	49	57	66	74	81	89	97	104	112	119	127	133
	175	11	23	32	42	52	61	69	78	86	95	103	111	118	126	134	141
	200	11	24	33	44	54	64	73	82	91	100	109	117	125	134	142	150
	225	12	25	35	47	57	68	78	87	96	106	115	124	132	141	150	159
	250	13	25	38	50	61	72	84	92	102	112	121	132	140	150	158	167
•Effective water		20		25	37.5		50	62.5		75	100		125	150	175		200
•Revised Values		0.73		0.77	0.86		0.93	0.97		1.00	1.02		1.04	1.06	1.07		1.08

Problems in the Agricultural Development Plan (Agricultural Infrastructure Improvement Project)



B. Necessity of Agricultural Infrastructure Improvement
(Upper part of the Jiboa River basin)

(1) General

The Jiboa River flows into the Pacific Ocean from the northern part of the San Vicente Volcano, forming a steep valley. The river length is short at about 50 km and the catchment area is about 600 km². The upstream basin area topography is not flat and the inhabitants reside on a semicylindrical plateau or in the valley. Maize, beans or grain are the staple food and sugarcane, coffee, bananas and mandarin are also cultivated in the area. The forest area is deforested for the cultivation of maize and sugarcane on the steep slope. Moreover, because inhabitants in the ravine section keep felling trees for domestic fuel, the denuded areas are always eroded.

(2) Necessity of Development

Developments for the prevention of soil erosion and forest denudation caused by excessive cultivation and deforestation to improve land productivity, should cover the upstream region, the middle and lower Jiboa River basin areas. Although the area is adjacent to the metropolis, the standard of living is comparatively poor. Therefore, the development plan should incorporate rural infrastructure development to improve the standard of living of the residents in the basin. The installation of irrigation facilities is not recommendable because it is difficult to find areas suitable to irrigation, and because it is economically infeasible.

C. Necessity of Agricultural Infrastructure Improvement
(Lower Jiboa River basin)

The geological features of lower Jiboa River basin are as shown in Fig. ***. From the top, it is made up of the San Salvador Formation, the Cuscatlan Formation, and the Balsamo Formation. The San Salvador Formation is 100-200 m thick. It is an accumulation of debris from the San Salvador Volcano, and mainly consists of tuff. The specific gravity of each layer is ***, ***, ***, respectively.

According to the Feasibility Study Report on the Comalapa Irrigation Project (Estudio de Factibilidad Técnica y Economica del Proyecto de Riego Comalapa), the thalweg of Jiboa River made the river flow straight to the Pacific Ocean in 1949. From 1951, it passed the western part of El Estero Jaltepeque, which is a lagoon at

present, and flowed into a lot of brooks. The Jiboa River flowed into the Pacific Ocean only in the rainy season of 1954. The Jiboa River also passed through an old river course, from La Bocana del Amatal to the Pacific Ocean.

According to the above mentioned report, the flow of Jiboa River into the El Estero Jaltepeque lagoon is intercepted by the asphalt road connecting El Rosario and Marcelino on the Pacific Ocean coast sometime between the 1950's and 1960's. On the other hand, the length of Jiboa River should be extended and its right bank breadth widened to control flooding. The right bank area of lower Jiboa River basin always suffers from inundation damage because the mouth of the river is closed in the dry season. Scouring activities for the diversion of the thalweg from east to west in flood time has also resulted in depressions. The period of inundation continues for one month or more, depending on the scale of the flood, consequently inflicting heavy damage. Flooding would not occur, therefore, if a drainage channel is constructed or the existing channels are improved.

The Ministry of Public Works, through the General Department of Roads, is currently planning the construction of a road leading to San José de Luna from Hacienda Astoria, on the eastern side of the airport. This road will be constructed to protect the international airport from flooding. However it would be difficult to acquire the required capital because the construction work is extensive (inclusive of subgrade works). As for the design of this road, the subgrade should be 60 cm thick, the subgrade course 30 cm, and the asphalt pavement 20 cm thick. From a Rural Road A classification, this road shall be upgraded as a Third Class Road.

(2) Necessity of Development

To protect the international airport from the floods of Jiboa River and Sepaquiapa River, the development of lower Jiboa River basin is a priority. The southern part of the airport measures approximately 4500 ha and is owned by six cooperatives (cooperatives own 2500 ha of land in the study area). The potential of this area for agricultural development is considered high. Along with the adjoining Comalapa area, this area will become an agricultural production area if groundwater irrigation is introduced. The location of this area, which is 30 km from the metropolitan area, also meets the agricultural criteria. Agricultural productivity is low in this area, however, as the lands have been ruined by the flood of the Jiboa River.

D. Irrigation Plan

(1) Basic Policy

1) Traditional crops (basic grain) shall be cultivated mainly in the rainy season. Crop diversification shall be promoted and agricultural productivity shall be improved by cultivating non-traditional crops in the dry season.

2) The water quality of Ilopango Lake and Jiboa River are not sintable for irrigation.

3) Spray irrigation or drip irrigation will be promoted through the effective use of water resources and because of the highly permeable quality of the soil in the basin.

(2) Proposed Project Area

A big study was carried out to determine which areas have great agricultural development potential: these areas will be irrigated with groundwater. The selection was carried out using cadastral maps and the results of the interviews with farmers, the support of ANDA (National Resources Directorate), and data on related projects conducted in the past. The areas to be developed through the project are the following:

1) Areas in the northwestern part of San Vicente Volcano-Chichontepec 660 ha

a. Verapaz (490 ha)
b. Guadalupe (170 ha)

2) Areas in the central zone of the municipality of San Pedro Masahuat 655 ha

a. Canton El Carmen (360 ha)
b. Hacienda San Mauricio (125 ha)
c. Canton Tilapa (140 ha)

3) Areas in the southern zone of the municipality of San Pedro Masahuat 785 ha

a. Cooperative Astoria (130 ha)
b. Cooperative San José Luna (250 ha)
c. Cooperative El Achiotal (240 ha)

Table-5.2.6.1 Condition of Existing Wells

No.	Place	Municipality	Department	Well Depth (m)	Production (m^3)	Project Area (ha)	Quantity
1	Verapaz	Verapaz	San Vicente	150	360	490	14
2	Guadalupe	Guadalupe	San Vicente	150	360	170	6
3	El Carmen	San Pedro Masahuat	La Paz	100	370	360	12
4	San Mauricio	San Pedro Masahuat	La Paz	150	190	125	5
5	Tilapa	El Rosario	La Paz	100	370	140	4
6	Durce Nombre	San Pedro Masahuat	La Paz	100	370	30	1
7	Astoria	San Pedro Masahuat	La Paz	100	350	130	4
8	San Jose de Luna	San Pedro Masahuat	La Paz	100	350	250	7
9	El Achiotal	San Pedro Masahuat	La Paz	100	350	240	7
10	Sta. Emilia	San Pedro Masahuat	La Paz	100	350	70	2
11	Sta. Teresa Indigena de La Paz	San Pedro Masahuat	La Paz	100	350	25	1
12	El Triunfo de San Felipe	San Pedro Masahuat	La Paz	100	350	70	2
	TOTAL					2100	65

d. Cooperative Sta. Emilia (70ha)
e. Cooperative Sta. Teresa Indigena de la Paz (25 ha)
f. Cooperative El Triunfo de San Felipe (70 ha)

(3) Projected Required Groundwater Volume

According to the geological study on the zone and the perforation data of the wells for the production of drinking water made by ANDA in the San Vicente Volcano area (Chichontepec) and the Jiboa River basin, the number of the wells to be constructed, production water volume, and well depth were determined (see Table-**).

(4) Proposed Crops

The crops to be introduced in the three selected areas shall be determined according to the land use study results and meteorological conditions. The proposed crops are as follows:

1) Areas in the northwestern zone of San Vicente Volcano (Chichontepec)

a.	rainy season	Maize
		Sorghum
		Beans
b.	dry season	Green peppers
		Cucumber
		Tomato

2) Areas in the central zone of the municipality of San Pedro Masahuat

a.	rainy season	Maize
		Sorghum
		Beans
		Squash
b.	dry season	Green peppers
		Peppers
		Watermelon

Melon

3) Areas in the southern zone of the municipality of San Pedro Masahuat

a.	rainy season	Maize
		Sesame
		Sugar cane
b.	dry season	Watermelon
		Melon

(5) Irrigation system using groundwater

1) Irrigation system

The area subject to irrigation is determined based on the amount of groundwater to be pumped up. In addition, the selection of the irrigation area shall also be determined in terms of farm management and O/M, in consideration of the irrigation facilities to be installed and the construction cost of groundwater production facilities. Because the initial investment is high for groundwater irrigation, spray irrigation or drip irrigation is recommended instead. The groundwater irrigation system basically consists of deep tube wells and irrigation facilities.

1) Characteristics of the wells and pumping equipment

a. Deep tube wells:

The wells will be 12 inches in diameter with an 8 inch casing pipe.
Well perforation depth

- Northwestern zone of San Vicente (Chichontepec) 150 m
- Central zone of the municipality of San Pedro Masahuat 100-150 m
- Southern zone of the municipality of San Pedro Masahuat 100 m

b. Pump capacity

The capacity of the well pumps will be between 50 HP to 75 HP.

2) Electric installation

a. Power supply

For the operation of the well equipment, two ways have been considered: Use of electricity (three phases) or diesel generator. The use of the latter was deemed advantageous due to the following reasons:

a.1) Easy to operate and maintenance is cheaper.
a.2) The price of diesel is cheaper than electric charges.
a.3) The installation of a generator is cheaper than electrification.

2) Cropping Pattern

Groundwater makes irrigation possible all year round. Since the construction cost of irrigation facilities is high, cash crop cultivation is recommended. The cultivation of staple food, e.g., maize, and pasture is recommended in the rainy season. The land occupation period of the main crops is as follows:

watermelon:	3 months	melon:	3 months
sesame:	3 months	eggplant:	3 months
cucumber:	3 months	maize:	4 months

a) Three crops are assumed per cropping year. Allowing 10 days for plowing and soil disinfection, the estimated cropping rate is 90 % or more per year.

b) To reduce the risks of market price fluctuation, three kinds of crops are planned to be cultivated in one irrigation district.

c) Sowing and/or transplanting period is assumed to take 20-30 days.

3) Water Requirement

The required water volume is calculated as follows:

Etcrop = Kc•Eto

where,

Etcrop = Required water volume (mm/day)
Kc = Crop Coefficient

Eto = Potential of evapotranspiration (mm/day)

The values of Eto are based on the climatic data of the La Provincia observation station on the right bank of Jiboa River.

Month	t	t + 17.8	t max ()	t min ()	TD ()	0.5 TD	RA mm/day	Eto mm/day
Jan	27.6	45.4	35.8	19.4	16.4	4.05	12.4	5324
Feb	27.9	45.7	35.9	19.8	16.1	4.01	13.6	5.74
Mar	28.6	46.4	36.0	21.1	14.9	3.86	14.9	6.14
Apr	29.3	47.1	35.9	22.6	13.3	3.65	15.7	6.20
May	29.0	46.8	34.9	23.0	11.9	3.45	14.8	5.87
Jun	27.9	45.7	33.3	22.4	10.9	3.30	15.7	5.45
Jul	28.2	46.0	34.4	22.0	12.4	3.52	15.7	5.85
Aug	28.1	45.9	34.1	22.0	12.1	3.48	15.7	5.77
Sept	27.2	45.0	32.8	21.5	11.3	3.36	15.1	5.25
Oct	27.5	45.3	33.2	21.7	11.5	3.39	14.1	4.98
Nov	27.2	45.0	34.2	20.2	14.0	3.74	12.8	4.98
Dec	27.3	45.1	35.2	19.4	15.8	3.97	12.0	4.94

Crop coefficient differs by crop variety and the growth stage of the crop. The Kc and average Kc of main crops in each growing stage are shown in the following table.

Table- Crop Coefficient

Period	Crop	Percentage of Cultivation	Average of Crop Coefficient
January ~ April	tomato watermelon melon		0.84
May ~ August	tomato maize pasture		0.85
September ~ December	sesame cucumber eggplant		0.84

Table- Crop Coefficient Per Growing Stage

Stage / Crops	Planting Stage	First Stage	Second Stage	Third Stage	Harvest	Average
Maize	0.30-0.50	0.70-0.85	1.05-1.20	0.8-0.95	0.55-0.60	0.75-0.90
Sorghum	0.30-0.40	0.70-0.75	1.00-1.15	0.75-0.80	0.50-0.55	0.75-0.85
Tomato	0.40-0.50	0.70-0.80	1.05-1.25	0.80-0.95	0.60-0.65	0.75-0.90
Watermelon	0.40-0.50	0.70-0.80	0.95-1.05	0.80-0.90	0.65-0.75	0.75-0.95
Melon	0.40-0.50	0.70-0.80	0.95-1.05	0.80-0.90	0.65-0.75	0.75-0.85
Cucumber	0.40-0.50	0.70-0.80	0.95-1.05	0.80-0.90	0.65-0.75	0.75-0.85
Eggplant	0.40-0.50	0.70-0.80	0.95-1.05	0.80-0.90	0.65-0.75	0.75-0.85

Note: These coefficients were determined from regions with a relative humidity ranging from 70 % or more, and a wind velocity of 5.0 m/s or less.

(6) Examination of Net Irrigation Water (In)

The net irrigation water is calculated as follows: In = Etcrop - (Pe+Ge+Wo)
where,

In = Net irrigation water
Pe = Rainfall
Ge = Amount of groundwater supplied by capillarity
Wo = Residual moisture in the soil in the initial cropping stage.

The rainfall data of the San Salvador airport will be used for the groundwater irrigation project in lower Jiboa River basin. Assuming a drip irrigation system, the effective rainfall for the crops was decided based on the standard table of USDA.

Ge and Wo were disregarded for safety reasons, in consideration of the decrease in the groundwater level in the dry season, the dryness of the surface soil and the continuous drought conditions. Moreover, the amount of effective moisture in the soil layer was assumed to be 62.5 %.

Effective Rainfall for Etcrop

Rainfall(mm)/ month		12.5	25	37.5	50	62.5	75	87.5	100	113	125	138	150	163	175	188	200
	25	8	16	24													
	50	8	17	25	32	39	46										
	75	9	18	27	34	41	48	56	62	69							
	100	9	19	28	35	43	52	59	66	73	80	87	94	100			
Etcrop	125	10	20	30	37	46	54	62	70	76	85	92	98	107	116	120	
mm/M	150	10	21	31	39	49	57	66	74	81	89	97	104	112	119	127	133
	175	11	23	32	42	52	61	69	78	86	95	103	111	118	126	134	141
	200	11	24	33	44	54	64	73	82	91	100	109	117	125	134	142	150
	225	12	25	35	47	57	68	78	87	96	106	115	124	132	141	150	159
	250	13	25	38	50	61	72	84	92	102	112	121	132	140	150	158	167
•Effective Water		20		25	37.5		50	62.5		75	100		125	150	175		200
•Revised Values		0.73		0.77	0.86		0.93	0.97		1.00	1.02		1.04	1.06	1.07		1.08

(7) Examination of Design Irrigation Water Volume

a) Net Irrigation Water: Io

In general, the volume of water which should be given at one time is decided by the depth of the effective root group zone and the water storage capacity of the soil, according to the following procedures:

d : Depth of effective root zone
Cp : Moisture absorption figure of crops
AM : Amount of effective moisture according to each level

$AM = 1/100 \cdot (F_{24}-Mi) \cdot Sa \cdot d$

where,

AM : Amount of effective moisture
F_{24} : Volume of water for 24 hours at each level
Mi : Moisture ratio in growing obstruction points at each level (%)
Sa : Specific gravity at each level
d : Depth of each level (mm)
TRAM : Total readily available moisture

TRAM = AM/Cp•100

or 0.6 AM

Cp: The moisture absorption figure of crops was determined as follows:

TRAM of two soil types was obtained with the depth of the effective root group zone based on the results of a general investigation on the soil of each planning district. The effective depth was set at 60 cm and the following case studies were carried out (Case I: clay loam type soil and Case II: clay type soil):

Case I Clay loam type soil TRAM

d cm	F 24	M 1	Sd	AM	Cp	TRAM	IO(mm)
0 ~ 15	41.04	28.3	1.03	19.68	40	49.2	49.2
15 ~ 30	41.04	28.3	1.03	19.68	30	65.6	
30 ~ 45	37.37	26.69	1.18	18.90	20	94.5	
45 ~ 60	37.37	26.69	1.18	18.90	10	189.0	
60	‡" 77.16 x 0.6 = 46.3						

Case II Clay type soil TRAM

d cm	F 24	M 1	Sd	AM	Cp	TRAM	IO(mm)
0 ~ 15	28.01	14.76	1.47	29.21	40	73.0	73.0
15 ~ 30	28.01	14.76	1.47	29.21	30	97.3	
30 ~ 45	25.86	13.19	1.49	28.31	20	141.5	
45 ~ 60	25.86	13.19	1.49	28.31	10	283.1	
‡"	‡" 115.04 x 0.6 = 69.0						

b) Design Interval

Irrigation interval should be calculated as follows:

Irrigation interval = TRAM/maximum consumption rate = Io(mm)/I(mm/day)

The peak consumption percentage is 5.5 mm/or less per day. If a maximum TRAM of 49.2m is assumed, the irrigation interval shall be 8 days (49.2 ÷ 5.5 = 8.9).

On the other hand, if P is assumed to be 50 % for spray irrigation and 100 % for drip irrigation, the crop coefficient (Cr) shall be 0, and the point of irrigation (Pf) shall be equal to 3 (see calculation below), making the irrigation interval 4 days (24.6 ÷ 5.5 4).

DTRAM = (1-Cr) x TRAM
= TRAM
TRAM x P = 49.2 x 0.5 = 24.6

c) Design irrigation water volume

When irrigation efficiency is assumed to be 75 % in sprinkling irrigation, the maximum irrigation water volume required would be 7.1 ~ 7.4 mm/day. The following irrigation method shall be applied:

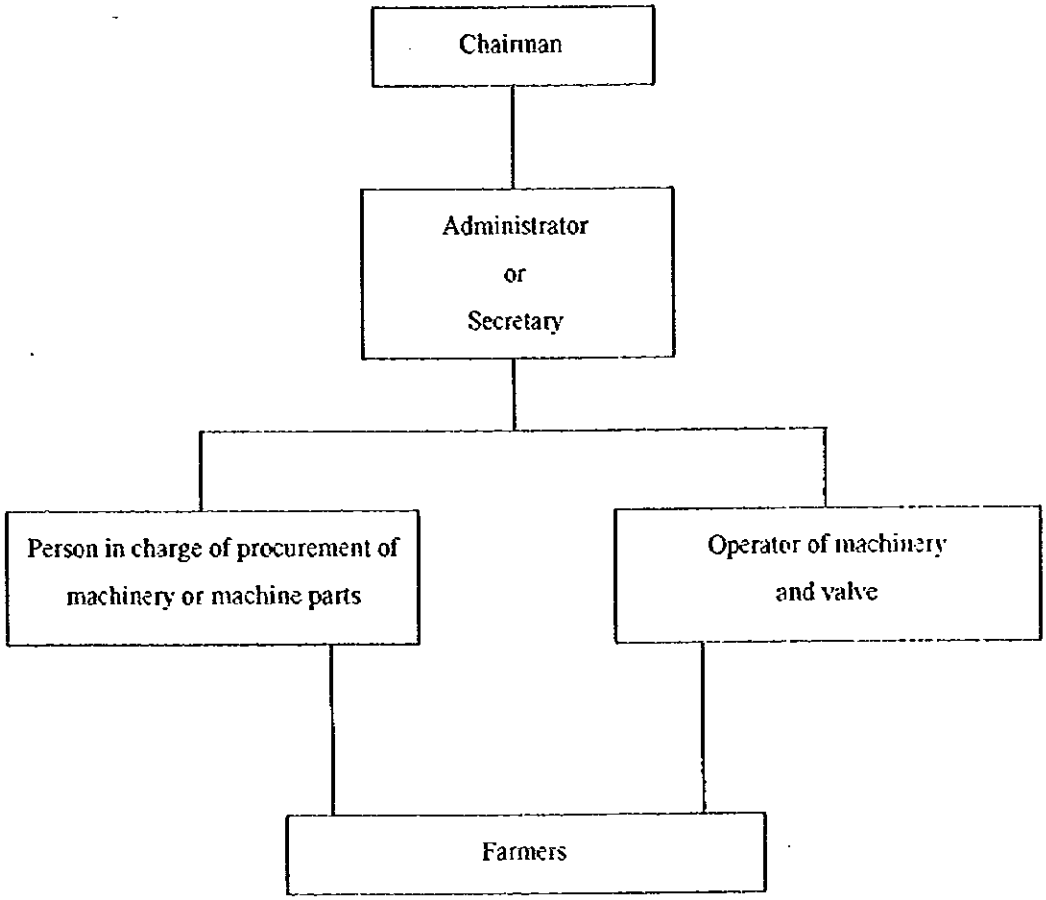
Irrigation interval	:	8 days
Irrigation hour	:	10,12 or 15 hours/block
Required water volume	:	14.2 l/sec/10 hr, 11.8 l/sec/12 hr, and 9.5 l/sec/15 hr

The total irrigation water volume required in drip irrigation is 60 ~ 70 % of the sprinkling irrigation system.

(8) Farmers' Organization (Water Management Organization)

The introduction of a groundwater irrigation system would require the set up of a farmers' organization (irrigation committee) at every irrigation district. Each irrigation committee should be organized with at least one chairman, one administrator or secretary, one person in charge of procurement of machinery or machine parts, and one operator of machinery and valve.

Fig.- Proposed Organization of Irrigation Committee



I.3 Drainage Facilities Plan

(1) Drainage Plan

The area in lower Jiboa River basin damaged by the flood is estimated to be about 3,500 ha. If an embankment is constructed on the shores of Jiboa River, between the old CA-2 highway and the river mouth as a flood control measure, inundation damage can be drastically reduced. However, it is presumed that about 1,800 ha will be inundated in the rainy season because of the topography of the area: very flat.

1) Drainage ScaleThe planned discharge from the field was calculated by adopting the McMath's Formula described in the drainage manual of USDA using the amount of rainfall with a probability of five days.

$Q = 2.3 \times 10^{-3} \times C \times S^{1/5} \times A^{(4/5)}$

where,

Q : Design discharge (m^3/sec)
C : Basin characteristic coefficient (Cu=038)
i : Rainfall intensity (38.93 mm/hr)
S : Average head every 1,000 m from the highest point to the lowest point. (m/km)
A : Drainage area (ha)

Area ha	Design Discharge m^3/sec	Canal Type
50	0.99	Type V
100	1.73	Type V
200	3.01	Type V
300	4.17	Trapezoid
400	5.24	Trapezoid
500	6.287	Trapezoid
600	7.25	Trapezoid
700	8.21	Trapezoid
800	9.13	Trapezoid
900	10.03	Trapezoid
1000	10.92	Trapezoid
1200	12.63	Double Section
1300	13.47	Double Section
1400	14.29	Double Section
1500	15.10	Double Section

Pipe drainage is planned due to the topographical features of the agricultural land.

2) Drainage facilities plan

The drainage channel is composed of the main channel, the branch channel and the receiving waterway and pipe drainage, which are designed to promptly evacuate excess water in the development area and the water flowing in from outside. The drainage facilities are as follows:

Type	depth (m)	slope gradient
Type V	0.3 - 0.6	1 : 2
Trapezoid Type	0.6 - 2.0	1 : 2
Double section (collecting channel)	>2.0	1 : 2

3) Collecting channel

Right bank: El Lirial Drainage Canal
Total length: 11.34 km, width: 15.0 m, depth: 3.0 m, double section

Left bank: Central Drainage Canal
Total length: 4.3 km, width: 10.0 m, depth: 1.5 m, trapezoid section

4) Density of drainage canal

Density of drainage canal is 1,240 m/km^2 (except for farm ditch)

5) Pipe Drainage

a) Interval of pipe drainage

In general, the interval of the pipe drainage is calculated by the Donnan Formula. However, because the intake rate of every level is different, the Hooghoudt Formula is considered suitable.

Hooghoudt Formula: $q = (8K_2dh + 4K_1h^2)/L^2$

I.4 Rural Roads

1) General

Rural roads are under the jurisdiction of the Road Bureau (DGC) of the Ministry of Public Works, and are classified as follows based on traffic volume.

CLASS	EFFECTIVE WIDTH (m)	PAVEMENT WIDTH (m)	PAVEMENT THICKNESS (m)
(1) SPECIAL ROAD	30.6	14.6	9.0
(2) FIRST CLASS	12.0	7.3	9.0
(3) SECOND CLASS	9.5	6.5	6.0
(4) Imp. THIRD CLASS	8.0	6.0	5.0
(5) THIRD CLASS	6.0	6.0	5.0
(6) RURAL A	5.0		
(7) RURAL B	5.0		

2) Existing Condition of the Roads in the Study Area

The Study Area is located southeast of the capital city, San Salvador, the northern boundary being the Pan American Highway (CA-1) which connects San Salvador, Cojutepeque and San Vicente to the east. National road (CA-2) is the main road in the southern part of the Study Area. Both roads are major arteries for the agricultural distribution system of El Salvador. The road network in the Study Area is good. However there are a lot of dirt roads and traffic is usually bad. The existing condition of the road network in the Study Area is as follows:

CLASS	Condition L. MB (km)	Condition L. B (km)	Condition L. R (km)	Condition L. M (km)
(1) SPECIAL ROAD	33.0	15.0	15.2	0
(2) FIRST CLASS	0	40.0	36.9	2.1
(3) SECOND CLASS	0	10.0	20.6	45.7
(4) Imp> THIRD CLASS	0	0	0	0
(5) THIRD CLASS	0	26.5	4.9	78.5
(6) RURAL A	0	0	33.3	9.3
(7) RURAL B	0	6.5	13.0	128.5
TOTAL	33.0	98.0	123.9	264.1

MB: Very Good R: Fair

B: Good M: Bad

I.5 Rural Road Improvement Plan

The defective span of the Third Class Road and Rural Roads A and B in the Study Area will be repaired to improve the efficiency of transporting agricultural products and carrying out farming operations, as well as for environmental improvement.

	Road Length
Third Class Road	83.4 km
Rural Road A	42.6 km
Rural Road B	148.0 km

As previously mentioned, roads are under the jurisdiction of the Ministry of Public Works (MOP). This implies the need for coordination between MAG and MOP when rural roads are included as components of the Project.

(1) Basic policy

1) Only repair of existing roads is considered, and linear plan will be conducted during the detailed design stage.
2) Roads in the mountain area will have ditches on both sides.
3) For the benefit of livestock farmers in the area, a dirt road will be constructed on one side for cattle and horses, as long as land expropriation is possible.
4) After the subgrade and the road board are repaired, mortar coating or concrete block pavement will be included in the short-term plan.
5) In the long-term plan, asphalt pavement will be conducted.

(2) Proposed road improvement plan

(Third Class Road)

SANTIAGO TEXACUANGOS - SAN MIGUEL TEPEZONTES

DESVIO PARAISO DE OSORO	41.1 km
EL ROSARIO - SAN MIGUEL TEPEZONTES	15.8 km
KM 50 - GUADALUPE - SAN PEDRO NONUALCO	26.5 km
SUB-TOTAL	83.4 km

(Rural Road A)

RAMAL (COJUTEPEQUE - SAN RAMON) - CANDELARIA..... 6.8km
EST. FENADESAL - SAN CRISTOBAL..... 4.0 km
RAMAL (CA.: 1 - SAN RAMON) - JIBOA ..... 7.0 km
SAN SEBASTIAN - LA LABOR - L.D.CABAÑS ..... 2.5 km
SAN PEDRO MASAHUAT - BUENA VISTA - TAPALHUACA ..... 6.8 km
CA: 2 COMALAPA - TAPALHUACA ..... 8.1 km
SAN PEDRO MASAHUAT - CANTON CICAHUITE - ROSARIO DE LA PAZ ..... 4.9 km
RAMAL (SAN SEBASTIAN-TECOLUCA) - HACIENDA SAN FRANCISCO ..... 2.5 km

SUB-TOTAL..... 42.6 km

(Rural Road B)

COJUTEPEQUE - CANTON EL CARRIZAL ..... 3.3 km
CANDELARIA - CANTON EL CARRIZAL ..... 2.3 km
CANDELARIA - CANTON SAN ANTONIO - BOCANA LAGO DE ILOPANGO ..... 4.5 km
RAMAL (SAN RAMON - SANTA CRUZ ANALQUITO) - SAN JUAN MIRAFLORES-RAMAL (CANDELARIA - SAN RAMON) ..... 5.0 km
RAMAL (COJUTEPEQUE - SAN CRISTOBAL) - CANTON LA VIRGEN - SANTA ANITA - DESVIO SAN RAMON..... 6.1 km
RAMAL (SAN CRISTOBAL - SAN FRANCISCO) -DESVIO SAN ANTONIO - RIO JIBOA..... 4.0 km
RAMAL (SANTIAGO TEXACUANGOS - COJUTEPEQUE) - PARAISO DE OSORO..... 1.6 km
RAMAL (SANTIAGO TEXACUANGOS - COJUTEPEQUE) - SAN BARTOLO - PARAISO DE OSORIO ..... 10.0 km
MERCEDES LA CEIBA - JERUSALEN - L.D.LA PAZ..... 5.2 km
CANTON CONCEPCION - DESVIO NUEVO JERUSALEN..... 3.9 km
CANTON EL CARRIZAL - SANTA MARIA OSTUMA - CANTON SAN ANTONIO ..... 4.2 km
SAN PEDRO NONUALCO - SANTA MARIA OSTUMA ..... 3.8 km
SAN JUAN TEPEZONTES - CANTON LOS LAURELES ..... 3.3 km
SAN PEDRO NONUALCO - CANTON HACIENDA VIEJA ..... 4.3 km
SAN JUAN TEPEZONTES - LA ESPERANZA - CANTON SANTA CRUZ 8.0 km

SAN ANTONIO MASSAHUAT - LA LOMA - SAN JUAN TEPEZONTES. 7.9 km
RAMAL (CA - 2SAN PEDRO NONUALCO) KM4 - RAMAL (CA-2 - SAN PEDRO NONUALCO)KM 10 ..... 7.5 km
CA-2 SANTA CRUZ EL TUNAN - BARAHONA ..... 6.4 km
SAN PEDRO MASAHUAT - BUENA VISTA - TAPALHUACA ..... 6.8 km

INTERCONEXION (CA-1 - CA-2) KM 22 - CONCEPCION - LOS PLANES - SAN FRANCISCO CHINAMECA ..... 8.0 km
RAMAL (SANTIAGO TEXACUANGOS - SAN MIGUEL TEPEZONTES) - SAN FRANCISCO CHINAMECA ..... 3.1 km
ILOPANGO - ASINO ..... 6.5 km
RAMAL (SAN SALVADOR - COMALAPA-KM 13) - DESVIO ASINO ..... 4.5 km
LAS FLORES - EL ACHIOTAL - BALNEARIO LAS HOJAS ..... 14.8 km
SUB-TOTAL 148.0 km

(3) On - farm road

The 3.0 wide inspection road is constructed in the groundwater irrigation district along the trunk pipeline for the operation of the valve and installation of irrigation facilities. Moreover, the roads between each irrigation district shall be paved in gravel. The farm roads will be 4.0 meters in width in consideration of the passage of agricultural implements, and the density will be 25 m/ha.

I.6 Grandwater Irrigation

El Carmen in the district of San Pedro Masahuat of the La Paz Department was selected as the pilot area for the conduct of a small-scale groundwater irrigation project, because it already has a farmers' organization.

This district is located approximately 25 km south-southeast of the capital, San Salvador, and by the narrow National road CA 2 and by-pass road. It is also located on the left bank of the Sepaquiapa river. El Carmen is located between the west longitude of 89° 02' 00" ~ 89° 02' 30" and the north latitude of 03° 28' 40" ~ 13° 29' 30".

1 Actual Condition of the Project Area

The project area is in a subtropical zone. The rainy season is from May to October and the dry season, from November to April. Maize, beans and other vegetables are cultivated for private consumption in the rainy season. No crops are cultivated in the dry season. There are 49 farmers in the district owning 1 to 3 ha of lands. According to the geological and groundwater study conducted in the area in 1996, a 100 meter deep well is estimated to produce 370 gal/m of groundwater.

The area is geologically made up of the San Salvador formation, the Cuscatlan formation and the Balsamo formation. The surface geology of the agricultural lands is made up of black-brown fertile loam.

2 Purpose of the Project

In the Jiboa River basin, the development and utilization of surface water is difficult in view of water quality and water availability.

The Sepaquiapa River, a tributary of the Jiboa River, flows southwest of the area at a rate of 2.4 m^3/s in the rainy season and 170 l/s in the dry season. The mountain area to the south of the Ilopango Lake is assumed to contain a sufficient amount of groundwater resources.
Agricultural lands are not used in the dry season due to the absence of irrigation facilities. Farmers in the area are, therefore, engaged in another industry during this time of the year.

The objectives of the Project are mentioned below:

1) To effectively use natural resources.
2) To convert to the cultivation of non-traditional crops by introducing irrigation techniques, and to promote crop diversification to improve productivity.
3) To improve the farmers' standard of living by increasing their income through improved productivity and the cultivation of cash crops.

3 Outline of the Project

The Project Area measures 120 ha, and has 49 farmers. The use of groundwater resources for irrigation shall require, electrical facilities and irrigation facilities. El Carmen shall be divided into four blocks to operate and maintain these facilities efficiently. Each block shall be constructed with one well. The outline of the facilities is as follows:

1) Production facilities

   a) Deep well
      Depth: 100 m, Diameter: ƒÓ 8"
   b) Submersible motor pump: 60 HP

2) Electrical facilities

   a) Generator: 60 KW
   b) Control panel

3) Irrigation facilities

   a) Principal pipe line: PVC ƒÓ 4"
   b) Check valve, Gate valve
   c) Filter facilities
   d) Drip irrigation facilities
   e) Counter meter

4) Pump and Generator house

SUPPORTING REPORT [J]

RURAL INFRASTRUCTURE

ANNEX J: RURAL INFRASTRUCTURE

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J. Rural Infrastructure and Model Area

J.1 Rural Infrastructure

J.1.1 Present Condition

J.1.1.1 Education

The compulsory education system is composed of three (3) terms and each term lasts three (3) years. But children actually attend school for three (3) years in average, then they have to work. According to the 1992 Census, the average illiteracy ratio in El Salvador is 22.7% nationwide, 13.7% in San Salvador Department, 29.3% in Cuscatlan Department, 32.5% in San Vicente Department, and 29.5% in La Paz Department. This trend is more remarkable in the rural areas, with 25.9% in San Salvador, 36.3% in Cuscatlan, 30.7% in San Vicente and 34.9% in La Paz Departments.

The Ministry of Education carried out the EDUCO Project, supported by governmental funds, in 1991. This system consists in dispatching teachers to remote villages, and teaching to children in existing public buildings or private houses.

As for 1995, the number of public schools in the study area was 451, private schools 183, that is 634 in total. Total number of students enrolled was 200,097, and total number of teachers was 6,665 (See Table-J.1.1.1). The average school area was estimated at 1.64km^2. Average number of students enrolled per school was 1,200, and average number of students per teacher 30.

J.1.1.2 Health Care Facilities

There are seven (7) kinds of public health facilities:

- Hospital which is an integrated health care facility without beds;
- Centro (clinic) that conducts minor operations but does not accept inpatients;
- Unidad de Salud which is a public health center with doctors,
- Puesto de Salud which is a public health center with doctors on call,
- Puesto Communitario which has nurses and specialists,
- Dispensario (dispensary) which is a drugstore, and
- Centro Rural de Nutrición which is a nutrition improvement center.

In 1995, there were 1 hospital, 2 Centros (clinic), 18 Unidad de Salud public health centers, 19 Puesto de Salud public health centers, 1 Puesto Communitario, and 1 Dispensario in the study area. Each municipality is equipped with at least one Puesto de Salud, with the exception of the Mercedes La Ceiba which has only 1 Dispensario (See Table-J.1.1.2).

J.1.1.2 Water Supply and Sanitation Facilities

Water supply pipelines are installed within and in the vicinity of cities such as San Salvador, Cojutepeque and capital towns of the municipalities. In rural areas, wells are the most popular water supply facility. According to the 1992 Census, the average rate of households having access to water supply systems was 78.0% in the whole study area, and 49.3% in the rural area. Generally speaking, municipalities in the B block and E block have less water supply facilities.

Residents using water flush toilets amount to 54.2%, while 37.5% use simple latrines. Accordingly the remaining population (8.3%) do not have any latrines. However, as these values include a part of the city of San Salvador, they cannot truly account for the actual sanitary situation in rural areas which is worse, since only 10.9% of rural residents use flush toilets, 65.1% simple latrines and 24.0% have no latrines. The occurrence of serious diseases is largely attributed to deficiency in sewage treatment facilities.

J.1 3 Electricity and Fuel Resources

Electric network spreads over almost the whole study area, except some parts of rural area where residents use kerosene more than electricity. The average electrification rate is 81.0%, and 49.9% in the rural area. Electricity in rural areas is mostly used for lighting. The rate of families using electricity for fuel is only 6.2% in the whole area, and 1.8% in the rural area. The rate of households using firewood for fuel is 36.2% in the whole area, and 79.4% in the rural area.

Propane gas, kerosene, etc. are used as fuel resource by 56.7% of residents more than electricity, wood and charcoal. However, in rural areas, wood is used by 79.4% of residents.

Table-J.1.1.1 Number of schools by Municipality (1995) Source: Ministry of Education

Municipalities	Public Schools				Private Schools				Illiteracy %
	#	Student		Teacher	#	Student		Teacher	
		Male	Female			Male	Female		
Ilopango	44	8490	8530	493	40	5136	5162	384	12.6
San Martin	26	5993	5363	293	14	2033	2274	169	22.0
Santiago Texacuangos	12	1184	1066	81	3	427	400	34	23.3
Santo Tomas	12	1759	1773	107	1	355	356	15	18.7
Soyapango	80	14350	14960	907	93	14449	13127	1061	10.4
San Marcos	37	7030	6615	456	13	1742	1952	135	14.5
Candelaria	5	1425	1122	60	0	0	0	0	26.6
Cojutepeque	34	7054	6836	432	8	1840	2365	169	18.0
El Carmen	4	1077	988	60	0	0	0	0	36.5
San Cristobal	4	717	614	38	0	0	0	0	39.2
San Pedro Perulapan	26	4304	3864	238	1	34	39	5	34.5
San Raafael Cedros	10	2100	2110	116	1	55	63	6	25.6
San Ramon	2	573	495	32	0	0	0	0	26.3
Santa Cruz Analquito	3	300	286	17	0	0	0	0	30.7
Santa Cruz Michapa	7	902	865	53	1	16	24	3	31.8
El Rosario	9	1280	1282	101	2	138	118	30	29.4
Jerusalen	5	328	316	24	0	0	0	0	27.6
Mercedes La Ceiba	2	135	104	11	0	0	0	0	33.6
Paraiso de Osorio	1	342	299	28	0	0	0	0	26.7
San Antonio Masahuat	4	428	382	26	0	0	0	0	26.7
San Emigdio	4	511	443	30	0	0	0	0	30.7
S. Francico Chinameca	7	578	476	35	0	0	0	0	35.5
San Juan Tepezontes	5	468	435	39	0	0	0	0	25.4
San Miguel Tepezontes	4	487	444	26	0	0	0	0	33.1
San Pedro Masahuat	20	2789	2677	193	1	81	85	9	35.0
San Pedro Nonualco	11	1312	1186	108	2	50	51	4	26.3
Santa Maria Ostuma	9	807	649	57	0	0	0	0	25.9
Santiago Nonualco	34	4707	4595	318	2	399	325	22	27.2
Tapalhuca	4	389	308	30	0	0	0	0	26.7
Guadalupe	6	892	796	58	0	0	0	0	26.2
Verapaz	12	1001	995	77	0	0	0	0	25.7
Santo Domingo	8	1138	1134	68	1	0	143	7	28.4

Table-J.1.1.2 Medical Facilities by Municipality Source: Ministry of Health

Municipalities	Hospital	Centro	Unidad Salud	Puest Salud	Pust Comm.	Dispen.	Cent Rural
Ilopango		1	1				
San Martin			1				
Santiago Texacuangos			1				
Santo Tomas			1				
Soyapango	1		3		1		
San Marcos			1				
Candelaria				1			
Cojutepeque		1					
El Carmen				1			
San Cristobal				1			
San Pedro Perulapan			1				
San Raafael Cedros			1				
San Ramon				1			
Santa Cruz Analquito				1			
Santa Cruz Michapa			1				
El Rosario			1				
Jerusalen				1			
Mercedes La Ceiba						1	
Paraiso de Osorio				1			
San Antonio Masahuat				1			
San Emigdio				1			
S. Francico Chinameca				1			
San Juan Tepezontes				1			
San Miguel Tepezontes				1			
San Pedro Masahuat			1	3			
San Pedro Nonualco			1				
Santa Maria Ostuma				1			
Santiago Nonualco			1	1			
Tapalhuca				1			
Guadalupe			1				
Verapaz			1				
Santo Domingo			1				

Table-1.1.3 Expansion of Water Supply Unit: Household

Municipalities	#House-hold	1992 Census			%			93-95
		Pipe	Well	None	Pipe	None	Well	
Ilopango	21455	17214	2467	1774	80.2	11.5	8.3	2454
San Martin	12224	5632	2278	4314	46.1	18.6	35.3	685
Santiago Texacuangos	3467	1010	1098	1359	29.1	31.7	39.2	40
Santo Tomas	4453	1490	1060	1903	33.5	23.8	42.7	99
Soyapango	61326	52668	6541	2117	85.9	10.7	3.5	8305
San Marcos	13108	8805	1876	2427	67.2	14.3	18.5	202
Candelaria	1896	412	274	1210	21.7	14.5	63.8	1371
Cojutepeque	9530	6109	1452	1969	64.1	15.2	20.7	1271
El Carmen	2228	78	768	1382	3.5	34.5	62.0	
San Cristobal	1211	63	37	1111	5.2	3.1	91.7	
San Pedro Perulapan	5150	491	1458	3201	9.5	28.3	62.2	3
San Raafael Cedros	2155	648	811	696	30.1	37.6	32.3	21
San Ramon	840	158	237	445	18.8	28.2	53.0	18
Santa Cruz Analquito	494	132	132	230	26.7	26.7	46.6	6
Santa Cruz Michapa	2063	360	753	950	17.5	36.5	46.0	6
El Rosario	2004	522	1052	430	26.0	52.5	21.5	52
Jerusalen	431	36	102	293	8.4	23.7	68.0	1973
Mercedes La Ceiba	148	14	70	64	9.5	47.3	43.2	(1973)
Paraiso de Osorio	680	214	150	316	31.5	22.1	46.5	22
San Antonio Masahuat	821	155	128	538	18.9	15.6	65.5	2
San Emigdio	548	129	84	335	23.5	15.3	61.1	2
S. Francico Chinameca	1238	19	112	1107	1.5	9.0	89.4	
San Juan Tepezontes	676	60	45	571	8.9	6.7	84.5	
San Miguel Tepezontes	996	249	78	669	25.0	7.8	67.2	13
San Pedro Masahuat	4634	627	3335	672	13.5	72.0	14.5	197
San Pedro Nonualco	2001	465	145	1391	23.2	7.2	69.5	6
Santa Maria Ostuma	1190	78	275	837	6.6	23.1	70.3	3204
Santiago Nonualco	6252	1278	2341	2633	20.4	37.4	42.1	91
Tapalhuca	884	84	645	155	9.5	73.0	17.5	
Guadalupe	1094	136	308	650	12.4	28.2	59.4	6
Verapaz	1187	270	333	584	22.7	28.1	49.2	11
Santo Domingo	1273	471	221	581	37.0	17.4	45.6	14
Total	167657	100077	30666	36914	59.7	18.3	22.0	

Table-J.1.1.4 Expansion of Water Supply in Rural Area Unit: Household

Municipalities	#House-hold	1992Census			%		
		Pipe	Well	None	Pipe	Well	None
Ilopango	2613	1451	785	377	55.5	30.0	14.4
San Martin	5182	978	1466	2738	18.9	28.3	52.8
Santiago Texacuangos	2747	538	964	1245	19.6	35.1	45.3
Santo Tomas	2009	226	437	1346	11.2	21.8	67.0
Soyapango	-	-	-	-	-	-	-
San Marcos	3470	1578	845	1047	45.5	24.4	30.2
Candelaria	1529	283	201	1045	18.5	13.1	68.3
Cojutepeque	1397	138	289	970	9.9	20.7	69.4
El Carmen	2053	61	712	1280	3.0	34.7	62.3
San Cristobal	1019	48	34	937	4.7	3.3	92.0
San Pedro Perulapan	4881	374	1366	3141	7.7	28.0	64.4
San Raafael Cedros	1396	218	607	571	15.6	43.5	40.9
San Ramon	602	58	213	331	9.6	35.4	55.0
Santa Cruz Analquito	205	54	30	121	26.3	14.6	59.0
Santa Cruz Michapa	1526	244	465	817	16.0	30.5	53.5
El Rosario	1049	11	916	122	1.0	87.3	11.6
Jerusalen	303	14	33	256	4.6	10.9	84.5
Mercedes La Ceiba	68	4	1	63	5.9	1.5	92.6
Paraiso de Osorio	141	16	33	92	11.3	23.4	65.2
San Antonio Masahuat	441	2	58	381	0.5	13.2	86.4
San Emigdio	211	1	0	210	0.5	0	99.5
S. Francico Chinameca	750	6	94	650	0.8	12.5	86.7
San Juan Tepezontes	307	0	5	302	0	1.6	98.4
San Miguel Tepezontes	285	2	15	268	0.7	5.3	94.0
San Pedro Masahuat	4023	342	3179	502	8.5	79.0	12.5
San Pedro Nonualco	1159	120	33	1006	10.4	2.8	86.8
Santa Maria Ostuma	819	17	152	650	2.1	18.6	79.4
Santiago Nonualco	4712	493	1924	2295	10.5	40.8	48.7
Tapalhuca	605	44	480	81	7.3	79.3	13.4
Guadalupe	573	28	199	346	4.9	34.7	60.4
Verapaz	767	19	282	466	2.5	36.8	60.8
Santo Domingo	599	122	73	404	20.4	12.2	67.4
Total	47441	7490	15891	24060	15.8	33.5	50.7

Table-J.1.1.5 Expansion of Latrines Unit: Household

Municipalities	House-hold	1992 Census			%			93-95
		Flush	Simple	None	Flush	Simple	None	
Ilopango	21455	16072	4645	738	74.9	21.6	3.4	2440
San Martin	12224	4643	6862	719	38.0	56.1	5.9	28
Santiago Texacuangos	3467	478	2759	230	13.8	79.6	6.6	
Santo Tomas	4453	881	3286	291	19.8	73.8	6.5	
Soyapango	61326	53252	7510	564	86.8	12.2	0.9	8276
San Marcos	13108	7175	5625	308	54.7	42.9	2.3	190
Candelaria	1896	156	1459	281	8.2	77.0	14.8	
Cojutepeque	9530	4510	4573	447	47.3	48.0	4.7	80
El Carmen	2228	107	1055	1066	4.8	47.4	47.8	
San Cristobal	1211	78	587	546	6.4	48.5	45.1	
San Pedro Perulapan	5150	302	3615	1233	5.9	70.2	23.9	2
San Raafael Cedros	2155	378	1384	393	17.5	64.2	18.2	
San Ramon	840	47	680	113	5.6	81.0	13.5	
Santa Cruz Analquito	494	131	299	64	26.5	60.5	13.0	
Santa Cruz Michapa	2063	147	1442	474	7.1	69.9	23.0	
El Rosario	2004	408	1183	413	20.4	59.0	20.6	15
Jerusalen	431	12	302	117	2.8	70.1	27.1	
Mercedes La Ceiba	148	2	103	43	1.4	69.6	29.1	
Paraiso de Osorio	680	35	563	82	5.1	82.8	12.1	
San Antonio Masahuat	821	34	440	347	4.1	53.6	42.3	
San Emigdio	548	24	401	123	4.4	73.2	22.4	
S. Francico Chinameca	1238	66	828	344	5.3	66.9	27.8	
San Juan Tepezontes	676	34	488	154	5.0	72.2	22.8	
San Miguel Tepezontes	996	33	822	141	3.3	82.5	14.2	
San Pedro Masahuat	4634	357	2808	1469	7.7	60.6	31.7	
San Pedro Nonualco	2001	247	1323	431	12.3	66.1	21.5	1
Santa Maria Ostuma	1190	39	799	352	3.3	67.1	29.6	
Santiago Nonualco	6252	736	3817	1699	11.8	61.1	27.2	70
Tapalhuca	884	49	668	167	5.5	75.6	18.9	
Guadalupe	1094	92	880	122	8.4	80.4	11.2	
Verapaz	1187	78	894	215	6.6	75.3	18.1	
Santo Domingo	1273	251	789	233	19.7	62.0	18.3	5
Total	167657	90854	62889	13919	54.2	37.5	8.3	

Table-J.1.1.6 Expansion of Latrines in Rural Area Unit: Household

Municipalities	#House-hold	1992 Census			%		
		Flush		Simple	Flush	Simple	None
		None					
Ilopango	2613	1256	1092	265	48.1	41.8	10.1
San Martin	5182	883	3670	629	17.0	70.8	12.1
Santiago Texacuangos	2747	209	2314	224	7.6	84.2	8.2
Santo Tomas	2009	105	1636	268	5.2	81.4	13.3
Soyapango	-	-	-	-	-	-	-
San Marcos	3470	1291	2052	127	37.2	59.1	3.7
Candelaria	1529	75	1187	267	4.9	77.6	17.5
Cojutepeque	1397	45	1084	268	3.2	77.6	19.2
El Carmen	2053	84	963	1006	4.1	46.9	49.0
San Cristobal	1019	45	495	479	4.4	48.6	47.0
San Pedro Perulapan	4881	275	3380	1226	5.6	69.2	25.1
San Raafael Cedros	1396	85	939	372	6.1	67.3	26.6
San Ramon	602	6	499	97	1.0	82.9	16.1
Santa Cruz Analquito	205	86	82	37	42.0	40.0	18.0
Santa Cruz Michapa	1526	60	1046	420	3.9	68.5	27.5
El Rosario	1049	96	575	378	9.2	54.8	36.0
Jerusalen	303	6	215	82	2.0	71.0	27.1
Mercedes La Ceiba	68	0	38	30	0	55.9	44.1
Paraiso de Osorio	141	5	106	30	3.5	75.2	21.3
San Antonio Masahuat	441	2	150	289	0.5	34.0	65.5
San Emigdio	211	4	160	47	1.9	75.8	22.3
S. Francico Chinameca	750	14	497	239	1.9	66.3	31.9
San Juan Tepezontes	307	2	221	84	0.7	72.0	27.4
San Miguel Tepezontes	285	2	216	67	0.7	75.8	23.5
San Pedro Masahuat	4023	281	2296	1446	7.0	57.1	35.9
San Pedro Nonualco	1159	10	735	414	0.9	63.4	35.7
Santa Maria Ostuma	819	6	482	331	0.7	58.9	40.4
Santiago Nonualco	4712	198	2900	1614	4.2	61.5	34.3
Tapalhuca	605	28	430	147	4.6	71.1	24.3
Guadalupe	573	6	454	113	1.0	79.2	19.7
Verapaz	767	20	563	184	2.6	73.4	24.0
Santo Domingo	599	7	400	192	1.2	66.8	32.1
Total	47441	5192	30877	11372	10.9	65.1	24.0

Table-J.1.1.7 Sources of Energy for Lighting

Municipalities	Households	1992 Census			%		
		Electric	Kerosene	Others	Electric	Kerosene	Others
Ilopango	21455	19918	987	550	92.8	4.6	2.6
San Martin	12224	9909	1613	702	81.1	13.2	5.7
Santiago Texacuangos	3467	2272	770	425	65.5	22.2	12.3
Santo Tomas	4453	3162	804	487	71.0	18.1	10.9
Soyapango	61326	59406	1410	510	96.9	2.3	0.8
San Marcos	13108	12039	631	438	91.8	4.8	3.3
Candelaria	1896	679	1026	191	35.8	54.1	10.1
Cojutepeque	9530	7720	1423	387	81.0	14.9	4.1
El Carmen	2228	566	1542	120	25.4	69.2	5.4
San Cristobal	1211	438	744	29	36.2	61.4	2.4
San Pedro Perulapan	5150	1545	3348	257	30.0	65.0	5.0
San Raafael Cedros	2155	1712	366	77	79.4	17.0	3.6
San Ramon	840	413	422	5	49.2	50.2	0.6
Santa Cruz Analquito	494	238	239	17	48.2	48.4	3.4
Santa Cruz Michapa	2063	788	1173	102	38.2	56.9	4.9
El Rosario	2004	1445	488	71	72.1	24.4	3.5
Jerusalen	431	299	118	14	69.4	27.4	3.2
Mercedes La Ceiba	148	75	71	2	50.7	48.0	1.4
Paraiso de Osorio	680	459	216	5	67.5	31.8	0.7
San Antonio Masahuat	821	559	252	10	68.1	30.7	1.2
San Emigdio	548	236	312	0	43.1	56.9	0
S. Francico Chinameca	1238	496	675	67	40.1	54.5	5.4
San Juan Tepezontes	676	380	285	11	56.2	42.2	1.6
San Miguel Tepezontes	996	483	493	20	48.5	49.5	2.0
San Pedro Masahuat	4634	2769	1742	123	59.8	37.6	2.7
San Pedro Nonualco	2001	1007	978	16	50.3	48.9	0.8
Santa Maria Ostuma	1190	414	759	17	34.8	63.8	1.4
Santiago Nonualco	6252	3596	2562	94	57.5	41.0	1.5
Tapalhuca	884	515	352	17	58.3	39.8	1.9
Guadalupe	1094	748	329	17	68.4	30.1	1.6
Verapaz	1187	831	293	63	70.0	24.7	5.3
Santo Domingo	1273	903	330	40	70.9	25.9	3.1
Total	167657	136020	26753	4884	81.1	16.0	2.9

Table-J.1.1.8 Sources of Energy for Lighting in Rural Area

Municipalities	Households	1992 Census			%		
		Electric	Kerosene	Others	Electric	Kerosene	Others
Ilopango	2613	2179	307	127	83.4	11.7	4.9
San Martin	5182	3553	1236	393	68.6	23.9	7.6
Santiago Texacuangos	2747	1596	742	409	58.1	27.0	14.9
Santo Tomas	2009	985	718	306	49.0	35.7	15.2
Soyapango	-	-	-	-			
San Marcos	3470	2843	382	245	81.9	11.0	7.1
Candelaria	1529	401	953	175	26.2	62.3	11.4
Cojutepeque	1397	348	934	115	24.9	66.9	8.2
El Carmen	2053	449	1495	109	21.9	72.8	5.3
San Cristobal	1019	307	683	29	30.1	67.0	2.8
San Pedro Perulapan	4881	1338	3298	245	27.4	67.6	5.0
San Raafael Cedros	1396s	1028	306	62	73.6	21.9	4.4
San Ramon	602	218	381	3	36.2	63.3	0.5
Santa Cruz Analquito	205	59	142	4	28.8	69.3	2.0
Santa Cruz Michapa	1526	440	1024	62	28.8	67.1	4.1
El Rosario	1049	615	388	46	58.6	37.0	4.4
Jerusalen	303	208	89	6	68.6	29.4	2.0
Mercedes La Ceiba	68	17	49	2	25.0	72.1	2.9
Paraiso de Osorio	141	29	111	1	20.6	78.7	0.7
San Antonio Masahuat	441	254	187	0	57.6	42.4	0
San Emigdio	211	46	165	0	21.8	78.2	0
S. Francico Chinameca	750	188	533	29	25.1	71.1	3.9
San Juan Tepezontes	307	90	217	0	29.3	70.7	0
San Miguel Tepezontes	285	7	264	14	2.5	92.6	4.9
San Pedro Masahuat	4023	2255	1666	102	56.1	41.4	2.5
San Pedro Nonualco	1159	329	826	4	28.4	71.3	0.3
Santa Maria Ostuma	819	127	680	12	15.5	83.0	1.5
Santiago Nonualco	4712	2301	2330	81	48.8	49.4	1.7
Tapalhuca	605	292	297	16	48.3	49.1	2.6
Guadalupe	573	304	261	8	53.1	45.5	1.4
Verapaz	767	502	240	25	65.4	31.3	3.3
Santo Domingo	599	380	212	7	63.4	35.4	1.2
Total	47441	23688	21116	2637	49.9	44.5	5.6

Table-J.1.1.9 Fuel Resources

Municipalities	92 Census				%			
	Electricity	Wood	Charcoal	Others	Electric.	Wood	Charcoal	Others
Ilopango	1643	3093	179	16540	7.7	14.4	0.8	77.1
San Martin	602	4931	97	6594	4.9	40.3	0.8	53.9
Santiago Texacuangos	83	2224	59	1101	2.4	64.1	1.7	31.8
Santo Tomas	163	2512	44	1734	3.7	56.4	1.0	38.9
Soyapango	6103	5365	418	49440	10.0	8.7	0.7	80.6
San Marcos	978	3043	206	8881	7.5	23.2	1.6	67.8
Candelaria	16	1625	18	237	0.8	85.7	0.9	12.5
Cojutepeque	327	3707	97	5399	3.4	38.9	1.0	56.7
El Carmen	16	2018	34	160	0.7	90.6	1.5	7.2
San Cristobal	5	1090	17	99	0.4	90.0	1.4	8.2
San Pedro Perulapan	66	4439	99	546	1.3	86.2	1.9	10.6
San Raafael Cedros	48	1511	11	585	2.2	70.1	0.5	27.1
San Ramon	4	746	4	86	0.5	88.8	0.5	10.2
Santa Cruz Analquito	7	428	0	59	1.4	86.6	0	11.9
Santa Cruz Michapa	19	1680	25	339	0.9	81.4	1.2	16.4
El Rosario	41	1468	20	475	2.0	73.3	1.0	23.7
Jerusalen	12	387	3	29	2.8	89.8	0.7	6.7
Mercedes La Ceiba	1	132	1	14	0.7	89.2	0.7	9.5
Paraiso de Osorio	35	545	3	97	5.1	80.1	0.4	14.3
San Antonio Masahuat	8	727	5	81	1.0	88.6	0.6	9.9
San Emigdio	6	489	3	50	1.1	89.2	0.5	9.1
S. Francico Chinameca	19	1075	16	128	1.5	86.8	1.3	10.3
San Juan Tepezontes	1	600	6	69	0.1	88.8	0.9	10.2
San Miguel Tepezontes	5	896	6	89	0.5	90.0	0.6	8.9
San Pedro Masahuat	64	3980	51	539	1.4	85.9	1.1	11.6
San Pedro Nonualco	20	1727	3	251	1.0	86.3	0.1	12.5
Santa Maria Ostuma	11	1074	4	101	0.9	90.3	0.3	8.5
Santiago Nonualco	91	5328	39	794	1.5	85.2	0.6	12.7
Tapalhuca	6	761	13	104	0.7	86.1	1.5	11.8
Guadalupe	8	1005	16	65	0.7	91.9	1.5	5.9
Verapaz	23	1055	2	107	1.9	88.9	0.2	9.0
Santo Domingo	22	981	4	266	1.7	77.1	0.3	20.9
Total	10453	60642	1503	95059	6.2	36.2	0.9	56.7

Table-J.1.1.10 Fuel Resources in Rural Area

Municipalities	92 Census				%			
	Electricity	Wood	Charcoal	Others	Electric.	Wood	Charcoal	Others
Ilopango	125	987	26	1475	4.8	37.8	1.0	56.4
San Martin	149	2953	30	2050	2.9	57.0	0.6	39.6
Santiago Texacuangos	60	2014	55	618	2.2	73.3	2.0	22.5
Santo Tomas	19	1683	19	288	0.9	83.8	0.9	14.3
Soyapango	-	-	-	-				
San Marcos	246	1480	78	1666	7.1	42.7	2.2	48.0
Candelaria	7	1390	12	120	0.5	90.9	0.8	7.8
Cojutepeque	10	1259	10	118	0.7	90.1	0.7	8.4
El Carmen	15	1901	31	106	0.7	92.6	1.5	5.2
San Cristobal	4	914	17	84	0.4	89.7	1.7	8.2
San Pedro Perulapan	48	4284	95	454	1.0	87.8	1.9	9.3
San Raafael Cedros	19	1218	9	150	1.4	87.2	0.6	10.7
San Ramon	3	573	4	22	0.5	95.2	0.7	3.7
Santa Cruz Analquito	0	200	0	5	0	97.6	0	2.4
Santa Cruz Michapa	8	1330	17	171	0.5	87.2	1.1	11.2
El Rosario	14	881	11	143	1.3	84.0	1.0	13.6
Jerusalen	5	283	1	14	1.7	93.4	0.3	4.6
Mercedes La Ceiba	0	60	1	7	0	88.2	1.5	10.3
Paraiso de Osorio	0	121	0	20	0	85.8	0	14.2
San Antonio Masahuat	1	421	0	19	0.2	95.5	0	4.3
San Emigdio	0	196	1	14	0	92.9	0.5	6.6
S. Francico Chinameca	13	646	8	83	1.7	86.1	1.1	11.1
San Juan Tepezontes	1	294	2	10	0.3	95.8	0.7	3.3
San Miguel Tepezontes	1	278	1	5	0.4	97.5	0.4	1.8
San Pedro Masahuat	45	3567	43	368	1.1	88.7	1.1	9.1
San Pedro Nonualco	4	1136	2	17	0.3	98.0	0.2	1.5
Santa Maria Ostuma	4	786	4	25	0.5	96.0	0.5	3.1
Santiago Nonualco	51	4400	22	239	1.1	93.4	0.5	5.1
Tapalhuca	3	553	11	38	0.5	91.4	1.8	6.3
Guadalupe	0	550	5	18	0	96.0	0.9	3.1
Verapaz	6	735	2	24	0.8	95.8	0.3	3.1
Santo Domingo	7	554	2	36	1.2	92.5	0.3	6.0
Total	868	37647	519	8407	1.8	79.4	1.1	17.7

J.1.2 Rural Infrastructure Development Plan

(1) Water supply and Sewerage

To improve the health and sanitary environment of farmers, water supply and sewerage systems will be planned for all households by 2010, in purpose to change hygienic habits of inhabitants which presently drink unsanitary surface water and excrete nearby the rivers. These facilities will be constructed by ANDA.

The number of households which is expected to be equipped with water supply and sewerage systems by 2010 is shown in Tables J.1.2.1 to J.1.2.4.

(2) Multipurpose Buildings

The number of multipurpose buildings to be constructed will be planned taking the population by canton (data of 1992 Census) into consideration, as shown in Table J.1.2.5.

Table-J.1.2.1 Estimated Number of Households to be Supplied in Water by 2010 Unit: household

Municipalities	1992 Supply	# 1995	1993-1995	1995 Supply	# 2010	Supply Plan 96-2010 Whole	in Basin
Ilopango	19681	22588	2454	22135	29215	7080	4602
San Martin	7910	12869	685	8595	16645	8050	2737
Santiago Texacuangos	2108	3650	40	2148	4721	2573	1652
Santo Tomas	2550	4688	99	2649	6064	3415	1315
Soyapango	59209	64564	5355	64564	83508	18944	2917
San Marcos	10681	13800	202	10883	17849	6966	1950
Candelaria	686	1996	1310	1996	2582	586	586
Cojutepeque	7561	10033	1271	8832	12977	4145	2707
El Carmen	846	2346		846	3034	2188	650
San Cristobal	100	1275		100	1649	1549	1549
San Pedro Perulapan	1949	5422	3	1952	7013	5061	1285
San Raafael Cedros	1459	2269	21	1480	2934	1454	771
San Ramon	395	884	18	413	1144	731	731
Santa Cruz Analquito	264	520	6	270	673	403	403
Santa Cruz Michapa	1113	2172	6	1119	2809	1690	544
El Rosario	1574	2110	52	1626	2729	1103	497
Jerusalen	138	454	316	454	587	133	133
Mercedes La Ceiba	84	156	72	156	202	46	46
Paraiso de Osorio	364	716	22	386	926	540	540
San Antonio Masahuat	283	864	2	285	1118	833	833
San Emigdio	213	577	2	215	746	531	531
S. Francico Chinameca	131	1303		131	1686	1555	869
San Juan Tepezontes	105	712		105	921	816	816
San Miguel Tepezontes	327	1049	13	340	1356	1016	1016
San Pedro Masahuat	3962	4879	197	4159	6310	2151	1796
San Pedro Nonualco	610	2107	6	616	2725	2109	922
Santa Maria Ostuma	353	1253	900	1253	1620	367	361
Santiago Nonualco	3619	6582	91	3710	8513	4803	341
Tapalhuca	729	931		729	1204	475	340
Guadalupe	444	1152	6	450	1490	1040	858
Verapaz	603	1250	11	614	1616	1002	793
Santo Domingo	692	1340	14	706	1733	1027	593
Total							35684

Table-J.1.2.1 Estimated Number of Households to be Supplied in Water by 2010 in the Rural Area

Unit: household

Municipalities	1992 Supply	# 1995	1993-1995	1995 Supply	# 2010	Supply Plan 96-2010 Whole	in Basin
Ilopango	2236	2751	62	2298	3558	1260	819
San Martin	2444	5456		2444	7056	4612	1568
Santiago Texacuangos	1502	2892		1502	3741	2239	1437
Santo Tomas	663	2115		663	2736	2073	798
Soyapango	-	-		-	-	-	-
San Marcos	2423	3653		2423	4725	2302	645
Candelaria	484	1510	1026	1510	2082	572	572
Cojutepeque	427	1471		427	1902	1475	963
El Carmen	773	2161		773	2796	2023	601
San Cristobal	82	1073		82	1388	1306	1306
San Pedro Perulapan	1740	5139		1740	6646	4906	1246
San Raafael Cedros	825	1470		825	1901	1076	570
San Ramon	271	634		271	820	549	549
Santa Cruz Analquito	84	216		84	279	195	195
Santa Cruz Michapa	709	1607		709	2078	1369	441
El Rosario	927	1104		927	1428	501	226
Jerusalen	47	319	272	319	413	94	94
Mercedes La Ceiba	5	72	67	72	93	21	21
Paraiso de Osorio	49	148		49	192	143	143
San Antonio Masahuat	60	464		60	601	541	541
San Emigdio	1	222		1	287	286	286
S. Francico Chinameca	100	790		100	1021	921	515
San Juan Tepezontes	5	323		5	418	413	413
San Miguel Tepezontes	17	300		17	388	371	371
San Pedro Masahuat	3521	4235		3521	5478	1957	1634
San Pedro Nonualco	153	1220		153	1578	1425	623
Santa Maria Ostuma	169	862	693	862	1115	253	249
Santiago Nonualco	2417	4961		2417	6416	3999	284
Tapalhuca	524	637		524	824	300	215
Guadalupe	227	603		227	780	553	456
Verapaz	301	807		301	1044	743	588
Santo Domingo	195	631		195	816	521	301
Total							18670

Table-J.1.2.1 Estimated Number of Households to be Equipped with Sewerage System by 2010

Unit: household

Municipalities	1992 Equip.	# 1995	1993-1995	1995 Equip.	# 2010	Equip. Plan 96-2010 Whole	in Basin
Ilopango	20717	22588	1871	22588	29215	6627	4308
San Martin	11505	12869	28	11533	16645	5112	1738
Santiago Texacuangos	3237	3650		3237	4721	1484	953
Santo Tomas	4167	4688		4167	6064	1897	730
Soyapango	60762	64564	3802	64564	83508	18944	2917
San Marcos	12800	13800	190	12990	17849	4859	1361
Candelaria	1615	1996		1615	2582	967	967
Cojutepeque	9083	10033	80	9163	12977	3814	2491
El Carmen	1162	2346		1162	3034	1872	556
San Cristobal	665	1275		665	1649	984	984
San Pedro Perulapan	3917	5422	2	3919	7013	3094	786
San Raafael Cedros	1762	2269		1762	2934	1172	621
San Ramon	727	884		727	1144	417	417
Santa Cruz Analquito	430	520		430	673	243	243
Santa Cruz Michapa	1589	2172		1589	2809	1220	393
El Rosario	1591	2110	15	1606	2729	1123	506
Jerusalen	314	454		314	587	273	273
Mercedes La Ceiba	105	156		105	202	97	97
Paraiso de Osorio	598	716		598	926	328	328
San Antonio Masahuat	474	864		474	1118	644	644
San Emigdio	425	577		425	746	321	321
S. Francico Chinameca	894	1303		894	1686	792	443
San Juan Tepezontes	522	712		522	921	399	399
San Miguel Tepezontes	855	1049		855	1356	501	501
San Pedro Masahuat	3165	4879		3165	6310	3145	2626
San Pedro Nonualco	1570	2107	1	1571	2725	1154	504
Santa Maria Ostuma	838	1253		838	1620	782	770
Santiago Nonualco	4553	6582	70	4623	8513	3890	276
Tapalhuca	717	931		717	1204	487	349
Guadalupe	972	1152		972	1490	518	427
Verapaz	972	1250		972	1616	644	509
Santo Domingo	1040	1340	5	1045	1733	688	400
Total							28838

Table-J.1.2.1 Estimated Number of Households to be Equipped with Sewer System by 2010 in Rural Area

Unit: household

Municipalities	1992 Equip.	# 1995	1993-1995	1995 Equip.	# 2010	Equip. Plan 96-2010 Whole	in Basin
Ilopango	2348	2751	403	2751	3558	807	525
San Martin	4553	5456		4553	7056	2503	851
Santiago Texacuangos	2523	2892		2523	3741	1218	782
Santo Tomas	1741	2115		1741	2736	995	383
Soyapango	-	-		-	-	-	-
San Marcos	3343	3653		3343	4725	1382	387
Candelaria	1262	1510		1262	2082	820	820
Cojutepeque	1129	1471		1129	1902	773	505
El Carmen	1047	2161		1047	2796	1749	519
San Cristobal	540	1073		540	1388	848	848
San Pedro Perulapan	3655	5139		3655	6646	2991	760
San Raafael Cedros	1024	1470		1024	1901	877	465
San Ramon	505	634		505	820	315	315
Santa Cruz Analquito	168	216		168	279	111	111
Santa Cruz Michapa	1106	1607		1106	2078	972	313
El Rosario	671	1104		671	1428	757	341
Jerusalen	221	319		221	413	192	192
Mercedes La Ceiba	38	72		38	93	55	55
Paraiso de Osorio	111	148		111	192	81	81
San Antonio Masahuat	152	464		152	601	449	449
San Emigdio	164	222		164	287	123	123
S. Francico Chinameca	511	790		511	1021	510	285
San Juan Tepezontes	223	323		223	418	195	195
San Miguel Tepezontes	218	300		218	388	170	170
San Pedro Masahuat	2577	4235		2577	5478	2901	2422
San Pedro Nonualco	745	1220		745	1578	833	364
Santa Maria Ostuma	488	862		488	1115	627	618
Santiago Nonualco	3098	4961		3098	6416	3318	236
Tapalhuca	458	637		458	824	366	262
Guadalupe	460	603		460	780	320	264
Verapaz	583	807		583	1044	441	365
Santo Domingo	407	631		407	816	409	236
Total							14242

Table-J.1.2.5 Population by Canton (1/3)

Canton	Population	Canton	Population
San Salvador		Candelaria	
Ilopango		Candelaria	928
Ilopango	41,386	Concepcion	436
Changallo	1,082	El Rosario	293
Dolores Apulo	4,931	San Antonio	378
San Marcos		San Jose La Ceiba	530
San Marcos	22,285	San Juan Miraflores Abajo	594
Casa de Piedra	308	San Juan Miraflores Arriba	294
El Pepeto	4,759	San Miguel Nance Verde	714
San Martin		San Rafael La Loma	742
El Sauce	487	El Carmen	
La Palma	8,236	El Carmen	470
Santiago Texacuangos		Candelaria	540
Santiago Texacuangos	1,763	Concepcion	594
Asino	2,436	El Carmen	333
Joya Grande	1,103	La Paz	1,442
Shaltipa	687	San Antonio	1,477
Santo Tomas		Santa Lucia	929
Caña Brava	379	San Cristobal	
Chaltepe	411	San Cristobal	610
Cuapa	556	La Virgen	569
El Cipres	840	San Antonio	364
Soyapango		San Francisco	769
Soyapango	137,200	San Jose	328
		Santa Anita	705
Cuscatlan		Santa Cruz	284
Cojutepeque		San Pedro Perulapan	
Cojutepeque	20,556	Buena Vista	561
Cujuapa	519	Buenos Aires	484
El Carrizal	1,086	San Agustin	745
Jiñuco	368	San Rafael Cedros	
La Palma	371	San Rafael Cedros	2,006
Los Naranjo	708	El Copinol	550
		El Espinal	973
		Jiboa	458
		Palacios	669

Table -J.1.2.5 Population by Canton (2/3)

Canton	Population	Canton	Population
San Ramon		San Vicente	
San Ramon	682	Guadalupe	
San Agustin	508	San Antonio Los Ranchos	81
San Pablo	421	San Benito Piedra Gorda	324
San Pedro	578	San Emigdio El Tablon	757
Santa Isabel	278	San Francisco Aguas Agrias	401
Santa Cruz Analquito		San Jose Carbonel	48
Santa Cruz Analquito	755	Santo Domingo	
Barrio Abajo	420	Santo Domingo	1,694
Santa Cruz Michapa		Izcanales	712
Dlicias	518	Los Rodriguez	154
Rosales	762	Verapaz	
El Rosario		Verapaz	1,107
El Rosario	2,359	El Carmen	291
El Cerro	216	Molineros	384
Asuncion Amatepec	192	San Antonio Jiboa	375
El Pedregal	1,578	San Isidro	452
Tilapa	715	San Jeronimo Limon	204
Jerusalen		San Jose Borja	76
Jerusalen	316	San Juan Buena Vista	184
El Conacaste	54		
El Espino	142	La Paz	
Los Romero	172	San Antonio Masahuat	
Veracruz	366	San Antonio Masahuat	915
Mercedes La Ceiba		Belen	98
Mercedes La Ceiba	154	El Socorro	488
San Antonio	76	San Antonio La Loma	431
San Luis	56	San Jose La Instancia	49
Paraiso de Osorio		San Jose Los Solares	113
Paraiso de Osorio	1,225	San Emigdio	
El Copinol	133	San Emigdio	812
Los Zacatales	182	Concepcion Lourdes	357
		San Jose Costa Rica	236

Table -J.1.2.5 Population by Canton (3/3)

Canton	Population	Canton	Population
San Francisco Chinameca		San Pedro Nonualco	
San Antonio Panchmilama	310	San Pedro Nonualco	1,839
San Jose La Montaña	367	El Lazareto	370
Santa Cruz La Vega	271	El Roble	134
San Juan Tepezontes		Hacienda Vieja	505
San Juan Tepezontes	808	La Carbonera	178
La Cruz	168	La Comunidad	347
La Esperanza	305	Nahuilstepeque	732
Los Laureles	271	Santa Maria Ostuma	
San Luis		Santa Maria Ostuma	817
El Pimiental	603	Concepcion	260
El Porvenir	48	El Chaperno	197
San Miguel Tepezontes		El Transito	147
San Miguel Tepezontes	1,648	Loma Larga	143
San Bartolo	406	San Antonio	451
Soledad Las Flores	373	San Isidro	229
San Pedro Masahuat		San Jose Carrizal	567
San Pedro Masahuat	1,299	Tapalhuaca	
Barahona	554	La Basa	715
Buenavista	114	Las Lajas	171
Dulce Nombre	542	San Pedro La Palma	398
El Achotal	638		
El Angel	53		
El Carmen	2,208		
El Paredon	193		
El Pimiental	135		
El Porvenir	226		
El Sicahuite	162		
Las Delicias	122		
Las Flores	852		
Las Hojas	271		
Las Isletas	2,370		
Marcelino	1,098		
Santa Maria La Sabana	41		
San Jose Luna	196		

J.2 Model Project

J.2.1 Model Project Selection

An integrated agricultural development plan must take into consideration the standard of living of the farmers, farm household economy, and the farmers' agricultural skills. It is, therefore, significantly important to first of all construct infrastructures for basin conservation and agricultural development and conduct supporting projects that would promote these two pursuits. The selection of the model projects was based on the items below.

(1) Criteria

The selection was based on the following 6 criteria:

a) Criteria 1

The project must be very economically effective, can generate benefits within a short term, must have an impact on farmers in neighboring areas, and must serve as a model for the agricultural development of other basins (Lempa River basin, San Miguel River basin).

b) Criteria 2

The project must be socially very effective and crucial to the socioeconomic conditions of El Salvador.

c) Criteria 3

A project whose implementation is faced with very few restrictions.

d) Criteria 4

A project that meets the farmers' needs indicated in the questionnaire survey results

e) Criteria 5

A project that meets the farmers' needs specified by the municipal mayors interviewed.

f) Criteria 6

A project that would generate greater benefits when combined with another, is not limited to basin conservation, but one that also endeavors to activate local economy.

(2) Method of Assessment

a) Assessors

The project shall be assessed by both the Japanese and the El Salvador counterparts.

b) Assessment Points

Excellent (1)	=	4 points
Good (2)	=	3 points
Feasible (3)	=	2 points

Unfeasible (4) = 1 point

c) The criteria shall be given the following points by importance (see Table 6.1.1):

criteria 1 = 0.2
criteria 2 = 0.2
criteria 3 = 0.1
criteria 4 = 0.2
criteria 5 = 0.2
criteria 6 = 0.1

d) Model Project:

The model projects shall be arranged by assessment points. The project with the highest points shall be given priority; in all, ten projects shall be given priority and carried out within a short term, from 1998 to 2000. The priority shall not be altered even if the project evaluated to induce internal revenues is within the priority list (see Table J.2.1 Details on Project Evaluation).

(3) Evaluation Results and Prioritized Development

Table J.2.2 shows the results of the evaluation. The 7 prioritized model development projects are as follows:

Table J.2.1 Details on Project Evaluation

Project Names	Assessor	Criteria 1(x0.2)	Criteria 2(x0.2)	Criteria 3(x0.1)	Criteria 4(x0.2)	Criteria 5(x0.2)	Criteria 6(x0.1)	Total Points	Ranking
1) Land Use Plan	JICA Study Team	2	2	2	2	2	2		
	DGRNR	3	4	3	2	2	4		
	Total Assessment Points	5	6	5	4	4	6		
	Assessment Points	1	1.2	0.5	0.8	0.8	0.6	4.9	14
2) Flood Control Plan	JICA Study Team	2	2	2	4	2	3		
	DGRNR	4	4	3	4	2	4		
	Total Assessment Points	6	6	5	8	4	7		
	Assessment Points	1.2	1.2	0.5	1.6	0.8	0.7	6	12
3) Afforestration Plan	JICA Study Team	3	4	4	4	4	4		
	DGRNR	3	3	8	4	4	3		
	Total Assessment Points	6	7	12	8	8	7		
	Assessment Points	1.2	1.4	1.2	1.6	1.6	0.7	7.7	2
4) Soil Conservation Plan	JICA Study Team	4	4	4	4	4	4		
	DGRNR	4	4	3	4	4	3		
	Total Assessment Points	8	8	7	8	8	7		
	Assessment Points	1.6	1.6	0.7	1.6	1.6	0.7	7.8	1
5) Integrated Water Management Plan	JICA Study Team	3	4	4	2	3	2		
	DGRNR	4	4	4	2	3	4		
	Total Assessment Points	7	8	8	4	6	6		
	Assessment Points	1.4	1.6	0.8	0.8	1.2	0.6	6.4	8
6) Farm Management Plan	JICA Study Team	2	3	3	2	3	3		
	DGRNR	3	4	2	2	3	4		
	Total Assessment Points	5	7	5	4	6	7		
	Assessment Points	1	1.4	0.5	0.8	1.2	0.7	5.6	13
7) Livestock Promotion Plan	JICA Study Team	4	4	3	3	3	4		
	DGRNR	3	2	2	3	3	2		
	Total Assessment Points	7	6	5	6	6	6		
	Assessment Points	1.4	1.2	0.5	1.2	1.2	0.6	6.1	10
8) Inland Fisheries Extension Plan	JICA Study Team	4	4	3	3	3	4		
	DGRNR	3	3	2	3	3	3		
	Total Assessment Points	7	7	5	6	6	7		
	Assessment Points	1.4	1.4	0.5	1.2	1.2	0.7	6.4	8
9) Agricultural Infrastructure Development Plan	JICA Study Team	4	4	3	4	3	4		
	DGRNR	4	3	3	4	3	3		
	Total Assessment Points	8	7	6	8	6	7		
	Assessment Points	1.6	1.4	0.6	1.6	1.2	0.7	7.1	6
10) Rural Infrastructure Development Plan	JICA Study Team	4	4	4	4	4	4		
	DGRNR	3	4	3	4	4	2		
	Total Assessment Points	7	8	7	8	8	6		
	Assessment Points	1.4	1.6	0.7	1.6	1.6	0.6	7.5	3
11) Land Tenure Improvement Plan	JICA Study Team	2	2	2	2	2	4		
	DGRNR	2	4	2	2	2	3		
	Total Assessment Points	4	6	4	4	4	7		
	Assessment Points	0.8	1.2	0.4	0.8	0.8	0.7	4.7	16
12) Technical Assistance Improvement plan	JICA Study Team	3	4	4	4	4	4		
	DGRNR	4	3	3	4	4	4		
	CENTA								
	Total Assessment Points	7	7	7	8	8	8		
	Assessment Points	1.4	1.4	0.7	1.6	1.6	0.8	7.5	3
13) Financial Assistance Improvement Plan	JICA Study Team	4	2	2	4	2	3		
	JICA Study Team								
	DGRNR	4	4	2	4	3	4		
	CENTA								
	Total Assessment Points	8	6	4	8	5	7		
	Assessment Points	1.6	1.2	0.4	1.6	1	0.7	6.5	7
14) Marketing Improvement Plan	JICA Study Team	4	4	4	4	3	4		
	JICA Study Team								
	DGRNR	4	3	2	4	3	4		
	Total Assessment Points	8	7	6	8	6	8		
	Assessment Points	1.6	1.4	0.6	1.6	1.2	0.8	7.2	5
15) Farmer's Organization Improvement Plan	JICA Study Team	2	2	4	2	2	2		
	DGRNR	3	3	3	2	2	3		
	Total Assessment Points	5	5	7	4	4	5		
	Assessment Points	1	1	0.7	0.8	0.8	0.5	4.8	15
16) Women's Organization Improvement Plan	JICA Study Team	3	3	4	3	3	3		
	DGRNR	3	3	3	3	3	3		
	Total Assessment Points	6	6	7	6	6	6		
	Assessment Points	1.2	1.2	0.7	1.2	1.2	0.6	6.1	10

Table J.2.2 Project Evaluation

Project Names	*Evaluation*	*Ranking*
1) Land Use Plan	4.9	14
2) Flood Control Plan	6.0	12
3) Afforestation Plan	7.7	2
4) Soil Conservation Plan	7.8	1
5) Water Management Plan	6.4	8
6) Farming Plan	5.6	13
7) Livestock Extension Plan	6.1	10
8) Inland Fisheries Plan	6.4	8
9) Agricultural Infrastructure Plan	7.1	6
10) Rural Infrastructure Plan	7.5	3
11) Land Tenure Improvement Plan	4.7	16
12) Technical Assistance Improvement Plan	7.5	3
13) Financial Assistance Improvement Plan	6.5	7
14) Marketing Improvement Plan	7.2	5
15) Farmers Organization Plan	4.8	15
16) Women's Organization Plan	6.1	10

a) Basin Conservation Model Project Plans

- Afforestation Model Project Plan
- Soil Conservation Model Project Plan
- Water Management Improvement Model Project Plan

b) Agricultural Development Model Project Plans

- Agricultural Diversification Model Project Plan (upstream and downstream basins)
- Agricultural Production Improvement Model Project Plan (upstream and downstream basins)

  (Livestock development model project, inland fisheries development model project, agricultural infrastructure development model project, rural infrastructure development model project)

c) Agricultural Support Group and Farmers' Organization Model Project Plans

- Agricultural Technology Extension Reinforcement Model Project Plan
- WID Development Model Project Plan

  (The improvement of the financing system and agricultural distribution system shall not be considered as it requires time to materialize.)

If there are programs or projects that when combined with the aforementioned priority projects would make implementation more effective, these programs or projects shall be incorporated in the implementation plan without delay.

The model projects selected based on the criteria aforementioned are the basin conservation project, the agricultural development project, and the agricultural support project. Areas with a high agricultural development potential shall be selected as pilot areas in terms of agricultural sustainability, the importance of the model projects, and their feasibility in the area. The model projects shall be arranged according to the characteristics of the selected pilot area therefore.

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J.3 Pilot Area

J.3.1 Selection of Pilot Area

Model projects will be implemented in pilot areas to confirm the effectivity and promote the development of the Project. For this purpose, municipalities were considered as a suitable unit for pilot areas. These pilot areas were selected based on an integrated study of four parameters: ① model areas shall be farming areas, ② highly in need of the Project, ③ the implementation of the project must be highly feasible, and ④ the conduct of extension activities highly possible. Though the target year of the project is 2010, the selection of the pilot areas was carried out based on the present situation because it is necessary to implement model projects as soon as possible.

Municipalities covering less than 20% of the study area were excluded from the selection.

Each area was surveyed and graded from 1 to 3 points by parameter. In the final evaluation including the four parameters, the highest ranking areas were selected as the pilot areas.

J.3.2 Agricultural Area

It was necessary to select pilot areas that will continue agricultural activities in the future. The evaluation was therefore based on the ratio of farmers to economic active population which provided an evaluation of farmers' population, the ratio of full-time farmers, and the area of farm lands.

(1) Ratio of farmers to economic active population

The ratio of farmers to economic active population according to the 1992 Census, and the points given were as follows:
≧75%: 3points, 75%-50%: 2points, ≦50%: 1point

(2) Ratio of full-time farmers

The ratio of farmers who have no income from off-farm employment was checked during the questionnaire survey, and the points are as follows: ≧60%: 3points, 60%-50%: 2points, ≦50%: 1point

(3) Area of farm lands

Agricultural land area was graded into 3 classes using the present land use maps.

J.3.3 Necessity of the Project

Areas, including farmers in these areas, that are in need of agricultural development should be selected as pilot areas. However, the availability of agricultural infrastructures and situation of natural resource conservation shall not be used as a criteria for evaluation since they are

very scarce. Evaluation was based therefore on the farmers' desire and willingness for the implementation of the Project, the present situation of rural infrastructures, the degree of firewood utilization which causes the forest destruction, and natural risks of erosion and flood.

(1) Farmers' Needs

During the questionnaire survey, the average ratio of farmers requesting erosion control measures, afforestation, flood control, irrigation, road improvement and organization of farmers' organization was evaluated. The points conferred according to the ratio of requesting farmers by area were as follows:

≧60%: 3points, 60%-45%: 2points, ≦45%: 1point

(2) Present Condition of rural infrastructure

An average value of the electrification rate, extension of sewerage and water supply in 1992 Census was evaluated. The points given were as follows; ≧65%; 1points, 65%-40%; 2points, ≦40%; 1point

(3) Firewood Utilization

The ratio of households using firewood for fuel was determined based on the 1992 Census. The points were as follows; ≧90%; 3points, 90%-80%; 2points, ≦80%; 1point

J.3.4 Possibility

It is necessary that the model projects to be implemented in the pilot areas will be successful, as the results will influence the progress of the proposed Project. The project's feasibility will be assessed on ① the number of tenant farmers who are very passive towards erosion control and soil improvement measures, etc. ② period of conservation activities which reflects the experience and interest of farmers on farmland conservation, ③ number of farmers who are members of farmers' associations and have knowledge and experience of such organizations, and ④ development potential of the area.

As tenant farmers lease lands by annual contract, they are not encouraged to invest to improve the lands. Accordingly, their positive participation to the project can not be expected.. This aspect was given 50% priority in the evaluation of project's possibility.

(1) Ratio of tenant farmers

The following points were conferred to the ratio of tenant farmers in the questionnaire survey:
≧30%; 1points, 10%-30%; 2points, ≦10%; 3point

(2) Experience in conservation activities

In the results of questionnaire survey, the number of years activities on soil conservation,

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afforestation, flood control and anti-shifting cultivation were evaluated, and the points given were as follows:

≧10years; 3points, 3-10years; 2points, ≦3years; 1point

(3) Ratio of participation in farmers' associations

The points given in the questionnaire survey were as follows:

≧40%; 3points, 40%-0%; 2points, 0%; 1point

(4) Development Potential

The potential for development of each area was assessed based on its water resources and land resources potentials. As for water resources potential, the Chorreron River basin and downstream basin of the Hiboa River where groundwater resources are abundant were given 3 points. Two points were given to E block where water quality is good. As for land resources, evaluation is carried out based on the land use maps.

J.3.5 Extension Effects

As mentioned above, model projects will be implemented in view to diffuse and promote the effects of the Project not only in the study area but also nationwide. Therefore, the evaluation of the effects is based on the population of the municipalities who will benefit from the model projects and the applicability of the model projects to other areas. The accessibility of the area shall not be considered, as the implementation of the model projects will include improvement of road conditions.

(1) Population

Based on the 1992 Census, the points given to population are as follows:

≧7,000; 3points, 7,000-4,000; 2points, ≦4,000; 1point

(2) Applicability

To apply the model project in other areas, the model projects should have something in common with these other areas. Urbanized areas or areas to be urbanized are given 1 point, special farm lands such as coffee plantation and sugar cane plantation areas are given 2 points, and other areas are given 3 points.

J.3.5 Results of the Selection

As the result of evaluation, San Cristobal, San Pedro Masahuat and San Antonio Masahuat are selected.

The agricultural and forest land conservation center formulated in the master plan is not be evaluated because it does not belong to any municipality. But because it will contribute immensely to the development, promotion and diffusion of techniques on basin management, agro-forestry and soil erosion control, elements that are very essential to the development of

the study area, its implementation is seen as urgent. From this viewpoint, it shall be considered as a model project.

(1) Relevance to Agriculture

The center shall play an important role in solving the agricultural problems of the country through the supply of information, technology and basic materials necessary for the development of sustainable agriculture in the slope areas, which makes up 70% of the study area.

(2) Necessity

Of the 30 municipalities in the basin, 19 are badly in need of soil erosion control measures. It is very important to develop and diffuse techniques for the conservation and effective use of water and land resources that are significantly important to agricultural development. It is also necessary to provide the farmers with incentives regarding the use of these techniques. Accordingly, the organization of a body responsible for such activities is highly desired.

Although the farmers acknowledge the importance of soil conservation measures, they are not capable of independently carrying out such activities. Hence, the establishment of a body chiefly for the provision of technology and various seeds and saplings is extremely necessary.

(3) Possibility

DGRNR, the executing agency of the project, has centers that conduct work relevant to forest studies, such as the meteorology and hydrology center, soil conservation centers with demonstration farms, and a nursery center. On the other hand, CENTA has a laboratory for the conduct of water quality and soil analyses. These government agencies used to be very active before the war, but although they still have experts in these fields they are inoperative due to financial reasons. With the installation of necessary facilities and the disposition of a few personnel, these centers can be fully operated as agricultural and forest conservation centers.

(4) Extension effect

In spite of the fact that it is the most densely populated country in Central America, 80% of El Salvador is made up of slopes, and agriculture in these slopes is a national problem. In addition, the management of the basins of the three biggest rivers, including Jiboa River, in the country, is also another cause of concern to the government. The establishment of the agricultural and forest conservation centers will significantly contribute to the mitigation of factors that affect such problems.

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Table-J.3.1 Agricultural Area

Municipalities	Farmers' rate		Full-time	Farmers' rate	Farm	Average
	Rate (%)	Points	Rate(%)	Points	Land	Points
El Rosario	36.8	1	50.0	1	3	1.7
Jerusalen	68.5	3	62.5	2	1	2.0
Mercedes La Ceiba	59.0	2	33.3	1	1	1.3
Paraiso de Osorio	61.4	3	42.9	1	2	2.0
San Antonio Masahuat	62.6	3	86.4	3	3	3.0
San Emigdio	66.1	3	42.1	1	3	2.3
San Francisco Chinameca	64.5	3	82.3	3	2	2.7
San Juan Tepezontes	69.4	3	80.0	3	2	2.7
San Miguel Tepezontes	57.3	2	78.9	3	2	2.3
San Pedro Masahuat	52.9	2	94.3	3	3	2.7
San Pedro Nonualco	52.3	2	15.8	1	2	1.7
Santa Maria Ostuma	74.5	3	59.1	2	2	2.3
Tapalhuca	57.3	2	94.4	3	3	2.7
Cojutepeque	11.6	1	75.0	3	2	2.0
Candelaria	48.6	1	77.8	3	3	2.3
El Carmen	55.3	2	60.0	2	1	1.7
San Cristobal	64.3	3	47.8	1	3	2.3
San Pedro Perulapan	53.5	2	40.9	1	2	1.7
San Rafael Cedros	40.4	1	100	3	3	2.3
San Ramon	64.2	3	100	3	2	2.7
Santa Cruz Analquito	53.4	2	100	3	2	2.3
Santa Cruz Michapa	34.4	1	25.0	1	2	1.3
Guadarupe	71.4	3	66.7	2	2	2.3
Santo Domingo	49.8	1	64.7	2	3	2.0
Verapaz	74.4	3	78.6	3	3	3.0
Ilopango	3.2	1	25.8	1	1	1.0
San Marcos	4.6	1	25.8	1	1	1.0
San Martin	12.8	1	50.0	1	1	1.0
Santiago Texacuangos	23.9	1	60.0	2	2	1.7
Santo Tomas	16.1	1	60.0	2	2	1.7

Table-J.3.2 Necessity (1/2)

Municipio	Farmland Erosion	Need in Afforest.	Flood	Irrigation	(%) Roads	Organization	Average	Points
El Rosario	62.5	87.5	37.5	37.5	62.5	0	47.9	2
Jerusalen	62.5	75.0	0	75.0	87.5	87.5	64.6	3
Mercedes La Ceiba	100	100	0	100	0	100	66.7	3
Paraiso de Osorio	57.1	92.9	0	50.0	42.9	57.1	50.0	2
San Antonio Masahuat	59.1	95.5	9.1	22.7	59.1	0	40.9	1
San Emigdio	73.7	52.6	5.3	42.1	52.6	42.1	44.7	1
S. Frncisco Chinameca	94.4	88.9	22 2	88.9	100	83.3	79.6	3
San Juan Tepezontes	100	93.3	83.3	93.3	100	100	95.0	3
San Miguel Tepezontes	73.7	89.5	21.1	15.8	57.9	0	43.0	1
San Pedro Masahuat	57.1	91.4	31.4	54.3	54.3	2.9	48.6	2
San Pedro Nonualco	47.4	79.0	0	0	100	0	37.7	1
Santa Maria Ostuma	69.6	69.6	0	39.1	95.7	34.8	51.5	2
Tapalhuca	77.8	77.8	0	0	83.3	0	39.8	1
Cojutepeque	75.0	75.0	37.5	100	100	87.5	79.2	3
Candelaria	74.1	59.3	11.1	51.9	81.5	11.1	48.2	2
El Carmen	100	80.0	0	40.0	40.0	20.0	46.7	2
San Cristobal	100	87.0	0	73.9	82.6	60.9	67.4	3
San Pedro Perulapan	59.1	40.9	9.1	31.8	63.3	31.8	39.4	1
San Rafael Cedros	100	83.3	33.3	66.7	100	100	80.6	3
San Ramon	56.8	75.7	16.2	83.8	43.2	40.5	52.7	2
Santa Cruz Analquito	75.0	75.0	0	100	100	100	75.0	3
Santa Cruz Michapa	75.0	75.0	0	0	100	50.0	56.7	2
Guadarupe	83.3	50.0	0	8.3	50.0	33.3	37.5	1
Santo Domingo	94.1	100	17.7	35.3	76.5	23.5	57.9	2
Verapaz	64.3	71.4	21.4	71.4	92.9	64.3	64.3	3
Ilopango	67.7	48.4	19.4	29.0	58.1	25.8	41.4	1
San Marcos	67.7	48.4	19.4	29.0	58.1	25.8	41.4	1
San Martin	70.0	70.0	0	10.0	50.0	40.0	40.0	1
Santiago Texacuangos	100	100	20.0	100	100	100	86.7	3
Santo Tomas	100	100	0	100	20.0	100	70.0	3

Table-J.3.2 Necessity (2/2)

Municipalities	Rural Electric	Infra Water	Lavatories	(%) Average	Point	Firewood %	Point	Slope Flood	Ave-rage
El Rosario	72.1	78.5	45.1	65.2	1	74.3	1	2	1.5
Jerusalen	69.4	32.0	19.7	40.4	2	90.5	3	3	2.8
Mercedes La Ceiba	50.7	56.8	15.5	41.0	2	89.9	2	3	2.5
Paraiso de Osorio	67.5	53.5	25.6	48.9	2	80.6	2	3	2.3
San Antonio Masahuat	68.1	34.5	17.5	40.0	3	89.2	2	3	2.3
San Emigdio	43.1	38.9	21.7	34.6	3	89.8	2	3	2.3
San Francisco Chinameca	40.1	10.6	28.2	26.3	3	88.1	2	3	2.8
San Juan Tepezontes	56.2	15.5	5.9	25.9	3	89.6	2	3	2.8
San Miguel Tepezontes	48.5	32.8	19.3	33.5	3	90.6	3	3	2.5
San Pedro Masahuat	59.8	85.5	43.6	63.0	2	87.0	2	3	2.3
San Pedro Nonualco	50.3	30.5	24.2	35.0	3	86.5	2	3	2.3
Santa Maria Ostuma	34.8	29.7	16.7	27.1	3	90.6	3	3	2.8
Tapalhuca	58.3	82.5	44.7	61.8	2	87.6	2	1	1.5
Cojutepeque	81.0	79.3	95.1	85.1	1	39.9	1	3	2.0
Candelaria	35.8	36.2	83.3	51.9	2	86.7	2	2	2.0
El Carmen	25.4	38.0	51.8	38.4	3	92.1	3	3	2.8
San Cristobal	36.2	8.3	54.8	33.1	3	91.4	3	3	3.0
San Pedro Perulapan	30.0	37.8	74.8	47.5	2	88.1	2	2	1.8
San Rafael Cedros	79.4	67.7	81.2	76.1	1	70.6	1	1	1.5
San Ramon	49.2	47.0	86.3	60.8	2	89.3	2	3	2.3
Santa Cruz Analquito	48.2	53.4	86.8	62.8	2	86.6	2	3	2.5
Santa Cruz Michapa	38.2	54.0	76.4	56.2	2	82.6	2	3	2.3
Guadarupe	68.4	40.6	88.6	65.9	1	93.3	3	3	2.0
Santo Domingo	70.9	54.4	81.5	68.9	1	77.4	1	2	1.5
Verapaz	70.0	50.8	80.8	67.2	1	89.0	2	1	1.8
Ilopango	92.8	91.7	96.1	93.5	1	15.3	1	3	1.5
San Marcos	91.8	81.5	96.0	89.8	1	24.8	1	2	1.3
San Martin	81.1	64.7	92.1	79.3	1	41.1	1	3	1.5
Santiago Texacuangos	65.5	60.8	91.8	72.7	1	65.8	1	3	2.0
Santo Tomas	71.0	57.3	92.1	73.5	1	57.4	1	2	1.8

Table-J.3.3 Possibility (1/2)

Municipio	Experience Years	Point	Farmers' %	Organization Point	Potential Water	Potential Land	Ave-rage
El Rosario	0	1	37.5	2	3	3	2.3
Jerusalen	5	2	100	3	3	1	2.3
Mercedes La Ceiba	0	1	100	3	3	1	2.0
Paraiso de Osorio	0	1	0	1	1	2	1.3
San Antonio Masahuat	6	2	40.9	3	2	3	2.5
San Emigdio	10	3	21.1	2	1	3	2.3
San Francisco Chinameca	5.4	2	44.4	3	1	2	2.0
San Juan Tepezontes	10	3	0	1	1	2	1.8
San Miguel Tepezontes	20	3	5.3	2	1	2	2.0
San Pedro Masahuat	14	3	80.0	3	3	3	3.0
San Pedro Nonualco	0	1	0	1	2	2	1.5
Santa Maria Ostuma	0	1	13.0	2	3	2	2.0
Tapalhuca	3	1	0	1	1	3	1.5
Cojutepeque	12.9	3	75.0	3	1	2	2.3
Candelaria	2.8	1	29.6	2	1	3	1.8
El Carmen	12	3	80.0	3	1	1	2.0
San Cristobal	8.6	2	34.8	2	1	3	2.0
San Pedro Perulapan	5.6	2	22.7	2	1	2	1.8
San Rafael Cedros	3.7	2	0	1	1	3	1.8
San Ramon	17.0	3	8.1	2	1	2	2.0
Santa Cruz Analquito	0	1	0	1	1	2	1.3
Santa Cruz Michapa	14	3	0	1	1	2	1.8
Guadarupe	3.4	1	100	3	2	2	2.0
Santo Domingo	7.5	2	0	1	1	3	1.8
Verapaz	3	1	92.9	3	2	3	2.3
Ilopango	10	3	0	1	1	1	1.5
San Marcos	10	3	0	1	1	1	1.5
San Martin	9	2	70.0	3	1	1	1.8
Santiago Texacuangos	9.7	2	60.0	3	1	2	2.0
Santo Tomas	8.5	2	0	2	1	2	1.5

Table-J.3.4 Possibility (2/2) and Extension Effects

Municipalties	Tenant %	Point	Possibility Average	Population	Point	Universality	Extension Average
El Rosario	25.0	2	2.2	5494	2	3	2.5
Jerusalen	62.5	1	1.7	2043	1	3	2.0
Mercedes La Ceiba	33.3	1	1.5	620	1	3	2.0
Paraiso de Osorio	71.4	1	1.2	2933	1	3	2.0
San Antonio Masahuat	18.2	2	2.3	4047	2	3	2.5
San Emigdio	21.1	2	2.2	2689	1	3	2.0
San Francisco Chinameca	11.1	2	2.0	3379	1	2	1.5
San Juan Tepezontes	13.3	2	1.9	3037	1	3	2.0
San Miguel Tepezontes	57.9	1	1.5	4629	2	2	2.0
San Pedro Masahuat	22.9	2	2.5	14346	3	3	3.0
San Pedro Nonualco	73.7	1	1.3	5797	2	3	2.5
Santa Maria Ostuma	30.4	1	1.5	5246	2	3	2.5
Tapalhuca	0	3	2.3	5078	2	3	2.5
Cojutepeque	12.5	2	2.2	26610	3	2	2.5
Candelaria	3.7	3	2.4	9634	3	3	3.0
El Carmen	10.0	3	2.5	11966	3	3	3.0
San Cristobal	4.4	3	2.5	7130	3	3	3.0
San Pedro Perulapan	27.3	2	1.9	6216	2	1	1.5
San Rafael Cedros	0	3	2.4	4324	2	3	2.5
San Ramon	2.7	3	2.5	4632	2	3	2.5
Santa Cruz Analquito	0	3	2.2	2271	1	3	2.0
Santa Cruz Michapa	0	3	2.4	2341	1	1	1.0
Guadarupe	33.3	1	1.5	5218	2	2	2.0
Santo Domingo	0	3	2.4	3441	1	2	1.5
Verapaz	42.9	1	1.7	5152	2	2	2.0
Ilopango	58.1	1	1.3	40279	3	1	2.0
San Marcos	58.1	1	1.3	12097	3	1	2.0
San Martin	20.0	2	1.9	14933	3	1	2.0
Santiago Texacuangos	60.0	1	1.5	8799	3	1	2.0
Santo Tomas	40.0	1	1.3	9084	3	1	2.0

Table-J.3.5 Selection of Pilot Areas

Municipalities	Agriculture	Necessity	Possibility	Extension	Total	Ranking
El Rosario	1.7	1.5	2.2	2.5	7.9	18
Jerusalen	2.0	2.8	1.7	2.0	8.5	15
Mercedes La Ceiba	1.3	2.5	1.5	2.0	7.3	23
Paraiso de Osorio	2.0	2.3	1.2	2.0	7.5	21
San Antonio Masahuat	3.0	2.3	2.3	2.5	10.1	3
San Emigdio	2.3	2.3	2.2	2.0	8.8	12
San Francisco Chinameca	2.7	2.8	2.0	1.5	9.0	9
San Juan Tepezontes	2.7	2.8	1.9	2.0	9.4	7
San Miguel Tepezontes	2.3	2.5	1.5	2.0	8.3	17
San Pedro Masahuat	2.7	2.3	2.5	3.0	10.5	2
San Pedro Nonualco	1.7	2.3	1.3	2.5	7.8	19
Santa Maria Ostuma	2.3	2.8	1.5	2.5	9.1	8
Tapalhuca	2.7	1.5	2.3	2.5	9.0	9
Cojutepeque	2.0	2.0	2..2	2.5	8.7	13
Candelaria	2.3	2.0	2.4	3.0	9.7	6
El Carmen	1.7	2.8	2.5	3.0	10.0	4
San Cristobal	2.3	3.0	2.5	3.0	10.8	1
San Pedro Perulapan	1.7	1.8	1.9	1.5	6.9	26
San Rafael Cedros	2.3	1.5	2.4	2.5	8.7	13
San Ramon	2.7	2.3	2.5	2.5	10.0	4
Santa Cruz Analquito	2.3	2.5	2.2	2.0	9.0	9
Santa Cruz Michapa	1.3	2.3	2.4	1.0	7.0	25
Guadarupe	2.3	2.0	1.5	2.0	7.8	19
Santo Domingo	2.0	1.5	2.4	1.5	7.4	22
Verapaz	3.0	1.8	1.7	2.0	8.5	15
Ilopango	1.0	1.5	1.3	2.0	5.8	29
San Marcos	1.0	1.3	1.3	2.0	5.6	30
San Martin	1.0	1.5	1.9	2.0	6.4	28
Santiago Texacuangos	1.7	2.0	1.5	2.0	7.2	24
Santo Tomas	1.7	1.8	1.3	2.0	6.8	27

SUPPORTING REPORT[K]

PROJECT COST ESTIMATION/ IMPLEMENTION PLAN

ANNEX K: PROJECT COST ESTIMATION/IMPLEMENTION PLAN

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TABLE 8.2.2.1 BREAKDOWN OF OVERALL PROJECT COST ····· K-1

TABLE 8.2.2.2 BREAKDOWN OF MODEL PROJECT COST ····· K-3

TABLE 8.2.2.1 OVERALL PROJECT COST
(FACILITY CONSTRUCTION COST AND EQUIPMENT AND MATERIALS COST)(1/2)

unit:US$1,000

	PROJECTS		LOCAL CURRENCY	FOREIGN CURRENCY	TOTAL
	PROJECT COST	FACILITY CONSTRUCTION COST	360,560	34,777	395,337
		EQUIPMENT & MATERIALS COST	2,847	7,209	10,056
		TOTAL	363,407	41,986	405,393
1)	BASIN CONSERVATION PLAN	FACILITY CONSTRUCTION COST	245,049	20,689	265,738
		EQUIPMENT & MATERIALS COST	987	4,572	5,559
		TOTAL	246,036	25,261	271,297
	(1) RIVER IMPROVEMENT PLAN	FACILITY CONSTRUCTION COST	240,945	19,655	260,600
		EQUIPMENT & MATERIALS COST	435	1,155	1,590
		TOTAL	241,380	20,810	262,190
	(2) FLOOD CONTROL FACILITIES PLAN	FACILITY CONSTRUCTION COST	883	221	1,104
		EQUIPMENT & MATERIALS COST			
		TOTAL	883	221	1,104
	(3) AFFORESTATION TECHNOLOGY DEVELOPMENT PLAN	FACILITY CONSTRUCTION COST	1,979	495	2,474
		EQUIPMENT & MATERIALS COST	177	883	1,060
		TOTAL	2,156	1,378	3,534
	(4) AFFORESTATION TECHNOLOGY EXTENSION PLAN	FACILITY CONSTRUCTION COST			
		EQUIPMENT & MATERIALS COST	159		159
		TOTAL	159		159
	(5) SOIL CONSERVATION TECHNOLOGY DEVELOPMENT PLAN	FACILITY CONSTRUCTION COST	141	36	177
		EQUIPMENT & MATERIALS COST	50	38	88
		TOTAL	191	74	265
	(6) SOIL CONSERVATION TECHNOLOGY EXTENSION PLAN	FACILITY CONSTRUCTION COST	107	27	134
		EQUIPMENT & MATERIALS COST	78		78
		TOTAL	185	27	212
	(7) SABO DAM CONSTRUCTION PLAN	FACILITY CONSTRUCTION COST	240	60	300
		EQUIPMENT & MATERIALS COST			
		TOTAL	240	60	300
	(8) METEOROLOGICAL & HYDROLOGICAL OBSERVATION SYSTEM IMPROVEMENT PLAN	FACILITY CONSTRUCTION COST	754	195	949
		EQUIPMENT & MATERIALS COST	88	2,496	2,584
		TOTAL	842	2,691	3,533
2)	AGRICULTURAL DEVELOPMENT PLAN	FACILITY CONSTRUCTION COST	111,688	13,132	124,820
		EQUIPMENT & MATERIALS COST	107	26	133
		TOTAL	111,795	13,158	124,953
	(1) SWINE FARMING PLAN	FACILITY CONSTRUCTION COST	32	8	40
		EQUIPMENT & MATERIALS COST	22		22
		TOTAL	54	8	62
	(2) POULTRY FARMING PLAN	FACILITY CONSTRUCTION COST	28	7	35
		EQUIPMENT & MATERIALS COST	27	8	35
		TOTAL	55	15	70
	(3) ANIMAL HEALTH SERVICES IMPROVEMENT PLAN	FACILITY CONSTRUCTION COST	76	19	95
		EQUIPMENT & MATERIALS COST	54	18	72
		TOTAL	130	37	167
	(4) INLAND FISHERIES PLAN	FACILITY CONSTRUCTION COST	81	21	102
		EQUIPMENT & MATERIALS COST	4		4
		TOTAL	85	21	106
	(5) SLOPE FARMING PLAN	FACILITY CONSTRUCTION COST	636	159	795
		EQUIPMENT & MATERIALS COST			
		TOTAL	636	159	795

TABLE 8.2.2.1 OVERALL PROJECT COST
(FACILITY CONSTRUCTION COST AND EQUIPMENT AND MATERIALS COST)(2/2)

Unit:US$1,000

	PROJECTS		LOCAL CURRENCY	FOREIGN CURRENCY	TOTAL
	(6) GROUNDWATER DEVELOPMENT PLAN (IRRIGATION USE)	FACILITY CONSTRUCTION COST	16,670	1,351	18,021
		EQUIPMENT & MATERIALS COST			
		TOTAL	16,670	1,351	18,021
	(7) FARM DRAINAGE IMPROVEMENT PLAN	FACILITY CONSTRUCTION COST	1,484	159	1,643
		EQUIPMENT & MATERIALS COST			
		TOTAL	1,484	159	1,643
	(8) FARM ROAD IMPROVEMENT PLAN	FACILITY CONSTRUCTION COST	1,095	274	1,369
		EQUIPMENT & MATERIALS COST			
		TOTAL	1,095	274	1,369
	(9) MULTIPURPOSE BUILDING CONSTRUCTION PLAN	FACILITY CONSTRUCTION COST	544	136	680
		EQUIPMENT & MATERIALS COST			
		TOTAL	544	136	680
	(10) RURAL WATER SUPPLY FACILITIES PLAN	FACILITY CONSTRUCTION COST	5,936	1,484	7,420
		EQUIPMENT & MATERIALS COST			
		TOTAL	5,936	1,484	7,420
	(11) RURAL SANITATION PLAN (LAVATORY CONSTRUCTION)	FACILITY CONSTRUCTION COST	424	106	530
		EQUIPMENT & MATERIALS COST			
		TOTAL	424	106	530
	(12) RURAL ROAD IMPROVEMENT PLAN	FACILITY CONSTRUCTION COST	84,682	9,408	94,090
		EQUIPMENT & MATERIALS COST			
		TOTAL	84,682	9,408	94,090
3)	AGRICULTURAL SUPPORT GROUP &	FACILITY CONSTRUCTION COST	3,823	956	4,779
	FARMERS' ORGANIZATION PLAN	EQUIPMENT & MATERIALS COST	1,753	2,611	4,364
		TOTAL	5,576	3,567	9,143
	(1) AGRICULTURAL EXTENSION OFFICES REINFORCEMENT PLAN	FACILITY CONSTRUCTION COST	3,272	818	4,090
		EQUIPMENT & MATERIALS COST	1,305	1,495	2,800
		TOTAL	4,577	2,313	6,890
	(2) PROJECT PROMOTION AND EXTENSION	FACILITY CONSTRUCTION COST	35	9	44
		EQUIPMENT & MATERIALS COST	273	867	1,140
		TOTAL	308	876	1,184
	(3) AGRICULTURAL DISTRIBUTION SYSTEM IMPROVEMENT PLAN	FACILITY CONSTRUCTION COST	516	129	645
		EQUIPMENT & MATERIALS COST	175	249	424
		TOTAL	691	378	1,069

TABLE 8.2.2.2 BREAKDOWN OF MODEL PROJECT COST (FACILITY CONSTRUCTION COST AND EQUIPMENT AND MATERIALS COST)

unit:US$1,000

	MODEL PROJECTS		LOCAL CURRENCY	FOREIGN CURRENCY	TOTAL
	MODEL PROJECT COST	FACILITY CONSTRUCTION COST	5,765	1,311	7,076
		EQUIPMENT & MATERIALS COST	1,166	4,751	5,917
		TOTAL	6,931	6,062	12,993
1)	BASIN CONSERVATION MODEL PROJECT	FACILITY CONSTRUCTION COST	2,828	708	3,536
		EQUIPMENT & MATERIALS COST	520	3,417	3,937
		TOTAL	3,348	4,125	7,473
	(1) AFFORESTATION TECHNOLOGY DEVELOPMENT MODEL PROJECT	FACILITY CONSTRUCTION COST	1,979	495	2,474
		EQUIPMENT & MATERIALS COST	177	883	1,060
		TOTAL	2,156	1,378	3,534
	(2) AFFORESTATION TECHNOLOGY EXTENSION MODEL PROJECT	FACILITY CONSTRUCTION COST			
		EQUIPMENT & MATERIALS COST	159		159
		TOTAL	159		159
	(3) SOIL CONSERVATION TECHNOLOGY DEVELOPMENT MODEL PROJECT	FACILITY CONSTRUCTION COST	141	36	177
		EQUIPMENT & MATERIALS COST	50	38	88
		TOTAL	191	74	265
	(4) SOIL CONSERVATION TECHNOLOGY EXTENSION MODEL PROJECT	FACILITY CONSTRUCTION COST	107	27	134
		EQUIPMENT & MATERIALS COST	78		78
		TOTAL	185	27	212
	(5) METEOROLOGICAL & HYDROLOGICAL OBSERVATION SYSTEM IMPROVEMENT MODEL PROJECT	FACILITY CONSTRUCTION COST	601	150	751
		EQUIPMENT & MATERIALS COST	56	2,496	2,552
		TOTAL	657	2,646	3,303
2)	AGRICULTURAL DEVELOPMENT MODEL PROJECT	FACILITY CONSTRUCTION COST	1,807	320	2,127
		EQUIPMENT & MATERIALS COST	107	26	133
		TOTAL	1,914	346	2,260
	(1) SWINE FARMING MODEL PROJECT	FACILITY CONSTRUCTION COST	32	8	40
		EQUIPMENT & MATERIALS COST	22		22
		TOTAL	54	8	62
	(2) POULTRY FARMING MODEL PROJECT	FACILITY CONSTRUCTION COST	28	7	35
		EQUIPMENT & MATERIALS COST	27	8	35
		TOTAL	55	15	70
	(3) ANIMAL HEALTH SERVICES IMPROVEMENT MODEL PROJECT	FACILITY CONSTRUCTION COST	76	19	95
		EQUIPMENT & MATERIALS COST	54	18	72
		TOTAL	130	37	167
	(4) INLAND FISHERIES MODEL PROJECT	FACILITY CONSTRUCTION COST	81	21	102
		EQUIPMENT & MATERIALS COST	4		4
		TOTAL	85	21	106
	(5) SLOPE FARMING MODEL PROJECT	FACILITY CONSTRUCTION COST	636	159	795
		EQUIPMENT & MATERIALS COST			
		TOTAL	636	159	795
	(6) GROUNDWATER DEVELOPMENT MODEL PROJECT (IRRIGATION USE)	FACILITY CONSTRUCTION COST	954	106	1,060
		EQUIPMENT & MATERIALS COST			
		TOTAL	954	106	1,060
3)	AGRICULTURAL SUPPORT GROUP & FARMERS' ORGANIZATION MODEL PROJECT	FACILITY CONSTRUCTION COST	1,130	283	1,413
		EQUIPMENT & MATERIALS COST	539	1,308	1,847
		TOTAL	1,669	1,591	3,260
	(1) AGRICULTURAL EXTENSION OFFICES REINFORCEMENT MODEL PROJECT	FACILITY CONSTRUCTION COST	1,095	274	1,369
		EQUIPMENT & MATERIALS COST	266	441	707
		TOTAL	1,361	715	2,076
	(2) PROJECT PROMOTION AND EXTENSION MODEL PROJECT	FACILITY CONSTRUCTION COST	35	9	44
		EQUIPMENT & MATERIALS COST	273	867	1,140
		TOTAL	308	876	1,184