Cuadro 6.2.13 (1/2) Detalles de Costos Directos para Conservación del Medio Ambiente (1/2)

(a) Green Belt Formation for Waterfront Conservation

(i) Personnel Expenditure

man*day

Work Item	engineer A	engineer B	engineer C	Surveyor	Surveyor assist.	Labor	Driver
1 Preparatory Work							
- Survey	1		1	5	10		1
- Detailed Design	1	2	4				
- Selection of Constructor	1	1	1				
2 Construction							
- Seedling carry		3				9	3
- Land preparation			1	3	6	10	1
- Planting		1	5			90	3
- Fence collocation			2			20	2
TOTAL	3	7	14	8	16	129	10

(ii) Seedling of Bamboo and Shade Tree

- production cost of each bamboo or tree = RD$10.
- number of seedlings required = bamboo 3600 nos.
  = shade tree 50nos.

RD$10 x (3600+50) = RD$36,500.

(iii) Fertilizer

- quantity of fertilizer required = 5 oz. per seedling
- fertilizer = RD$200/cwt.(1600 oz).

(3600+50) x 5oz / 1600oz x RD$200 = RD$2,281.

(iv) Other Facilities

-Construction of the maintenance road (gravel)

1200m long * 3 m wide*RD$125/m2 = RD$450,000

-Construction of step (2 places, concrete)

3 m height * 2 m wide

construction cost: RD$14,000/place * 2=RD$28,000

- Bench (20)

A steel bench: RD$2,500 * 20 =RD$50,000

Cuadro 6.2.13 (2/2) Detalles de Costos Directos para Conservación del Medio Ambiente (2/2)

(b) Environmental Monitoring Program in Rincon Lagoon

(i) Personnel Expenditure (Unit: man*day)

Work Item	Specialist	engineer A	engineer B	engineer C	Surveyor	Surveyor assist.	Labor	Driver
1 Preparatory Work								
- Assembly meeting	2	16						
- Committee meeting	2	16						
2 General Study (3 times)								
- Survey for natural condition	24		48	48				
- Topological survey		3	9		30	60		21
- Water quality and quantity			6	6			24	12
- Analysis and reporting	3	3	12	24				
- Committee meeting	3	21						
3 Periodical Study (55 times)								
- Survey for natural condition			440	440				
- Topological survey				55	55	55		55
- Water quality and quantity			55	55			220	110
- Analysis and reporting	55	55	110	110				
4 Periodical committee meeting	10	80						
5 Analysis and evaluation	5	20	18	28				
TOTAL	104	214	698	766	85	115	244	198

(ii) Water Quality Analysis (Unit ; RD$)

Item	Cost unit	No. sampling place	sampling frequency (times)	cost
pH	50	5	58	14,500
EC	70	5	58	20,300
COD	210	5	58	60,900
DO	210	5	58	60,900
NH4-N	210	5	55	57,750
NH3-N	210	5	55	57,750
Total Phosphate	210	5	55	57,750
No. Colon Bacillus	150	5	55	41,250
TOTAL	-	-	-	371,100

(iii) Equipment (unit: US$)

Equipment	Cost unit	Quantity	Cost
Boat with motor	2,700	2	5,400
4 wheeled vehicle	20,000	2	40,000
Motor bike (off road)	7,000	5	35,000
Power telescope	1,000	2	2,000
Binoculars	300	5	1,500
Computer	3,700	2	7,400
Survey equipment (transit)	4,000	2	8,000
TOTAL	-	-	99,300

Note; Cost for the personnel expenditure and the water quality analysis (DR$ 1,762,540 in total) in the Monitoring Program are consumed through 10 years. A half of the cost consumed in construction is considered as the project direct cost and the rest is as O&M cost.

Cuadro 6.2.14 Programación Anual de Desembolsos

(Unit : RD$1000)

Items	Total Cost			Disbursement									
				Year 1		Year 2		Year 3		Year 4		Year 5	
	F/C	L/C	Total	FC	LC	FC	LC	FC	LC	FC	LC	FC	LC
(1) Agriculture and Agricultural Support Services Plan													
- Project for Strengthening Research and Extension Servic	2,206	23,163	25,370			1,015	3,237	543	8,953	465	8,685	184	2,288
- Project for Strengthening Credit Services	1,015	18,411	19,426	819	3,645	49	3,738	49	3,645	49	3,645	49	3,738
- Agricultural Cooperative Model Project and Market Information System Project	3,334	7,035	10,370	853	834	98	755	98	693	2,189	3,999	98	755
Sub-total of direct cost	6,556	48,610	55,165	1,672	4,479	1,161	7,730	690	13,291	2,703	16,329	330	6,781
Indirect Cost (including Price Contingency)	2,390	38,391	40,781	535	1,433	399	3,865	254	9,397	1,063	15,432	138	8,265
Total of (1)	8,946	87,001	95,947	2,206	5,912	1,561	11,595	944	22,688	3,766	31,760	469	15,046
(2) Overall Water Management Plan													
- Yaque del Sur River Water Management Center Project													
Sub-total of direct cost	160,444	40,111	200,555	1,978	494	37,574	9,393	50,699	12,675	43,018	10,755	27,176	6,794
Indirect Cost (including Price Contingency)	32,925	23,214	56,139	307	77	6,613	2,935	10,009	6,257	9,433	7,549	6,564	6,396
Total of (2)	193,369	63,325	256,694	2,284	571	44,187	12,329	60,707	18,931	52,451	18,303	33,740	13,190
(3) Irrigation Development and Water Management in the Field Improvement Plan													
- Villarpando HW	11,472	4,389	15,861	3,442	1,317	8,030	3,072						
- Preparatory Works	17,972	6,610	24,582	8,986	3,305			8,986	3,305				
- Main Canal System (canal work)	62,731	24,410	87,141	2,738	2,220	6,389	5,179	16,081	5,103	18,761	5,954	18,761	5,954
- Main Canal structures	17,427	5,791	23,218	399	141	1,597	564	3,086	1,017	6,172	2,034	6,172	2,034
- Regulation Ponds	53,374	12,886	66,260	4,154	948			19,688	4,775	19,688	4,775	9,844	2,388
- Lateral Canal	174,077	65,026	239,103	8,195	2,555	19,121	5,961	44,028	16,953	58,704	22,604	44,028	16,953
- Siphon	24,400	12,395	36,795					12,200	6,198	12,200	6,198		
- Santana Headworks	11,607	6,655	18,262	3,482	1,997	8,125	4,659						
- Drainage	4,348	665	5,013							2,174	333	2,174	333
Sub-total of direct cost	377,408	138,827	516,235	31,396	12,481	43,262	19,435	104,070	37,352	117,700	41,898	80,980	27,662
- Land Acquisition and Compensation		18,249	18,249		9,124		9,124						
Indirect Cost (including Price Contingency)	144,570	118,281	262,851	10,047	4,906	14,882	11,998	38,348	26,408	46,309	39,596	34,985	35,373
Total of (3)	521,978	275,357	797,335	41,442	26,512	58,144	40,558	142,417	63,759	164,009	81,493	115,965	63,034
(4) Rural Infrastructure Improvement Plan													
- Rural water supply	9,189	5,730	14,919							5,909	3,630	3,280	2,100
- Project for community center	8,832	2,208	11,040							6,144	1,536	2,688	672
Sub-total of direct cost	18,021	7,938	25,959							12,053	5,166	5,968	2,772
Indirect Cost (including Price Contingency)	7,242	8,261	15,503							4,742	4,882	2,500	3,379
Total of (4)	25,263	16,199	41,462							16,795	10,048	8,468	6,151
(5) Environmental Conservation Plan													
- Greenbelt formation project for waterfront conservation		609	609								609		
- Environmental monitoring program in Rincon Lagoon	1,390	881	2,271	1,390	176		176		176		176		176
Sub-total of direct cost	1,390	1,490	2,880	1,390	176		176		176		785		176
Indirect Cost (including Price Contingency)	445	1,225	1,670	445	56		88		124		742		215
Total (5)	1,835	2,715	4,550	1,835	233		264		300		1,527		391
Total of (1)+(2)+(3)+(4)+(5)	751,392	444,596	1,195,987	47,768	33,228	103,892	64,746	204,069	105,678	237,022	143,132	158,641	97,811

Cuadro 6.3.1 Costos de Operación y Mantenimiento

[unit: DRS 1000]

	Administration cost	Maintenance of facilities	total
1 Overall water management plan	2,484	4,439	6,923
2 Irrigation development and water management in the field improvement plan			
- improvement project of Villarpando Intake weir		16	16
- improvement project for irrigation facilities including Santana intake weir	5,227	1,429	6,656
- Project of strengthening water user's organization			
4 Rural infrastructure improvement plan	605	108	713
- Rural water supply project			
- Project for community center development			
5 Environmental conservation plan			
- Greenbelt formation project for waterfront conservation			
- Environmental monitoring program in Rincon Lagoon	176		176
Total	8,492	5,993	14,484

Note; The amount mention above are at full operation stage.

Cuadro 6.4.1 Costos de Reposición

[unit: DR$1000]

Description	Useful life [year]	Metal works	Equipment	total
1 Overall water management plan				
- outside of house	10		20,000	20,000
- outdoor	25		25,000	25,000
2 Irrigation development and water management in the field improvement plan				
- improvement project of Villarpando Intake weir (gate)	20	6226		6,226
- improvement project for irrigation facilities including Santana intake weir (gate & pump)	20	11,525	880	12,405
- Project of strengthening water user's organization				
4 Rural infrastructure improvement plan				
- pump etc	20		2,393	2,393
- gate	20	209		209
Total		17960	48273	66232

Cuadro 7.1.1 Factor de Conversión Estándar

Year	Official Exchange Rate 1	Imports Value 2	Imports Value 3	Exports Value 4	Exports Value 5	Import Tax 6	Export Tax 7	Average Import Tax (6/3) 8	Average Export Tax (7/5) 9	Standard Conversion Factor 10
	(RD$/1 US$)	US$ MILLION	RD$ MILLION	US$ MILLION	RD$ MILLION	RD$ MILLION	RD$ MILLION			
1990	8.43	1,792.80	15,113.30	734.50	6,191.84	2,442.90	5.20	0.16	0.00084	0.90
1991	12.42	1,728.80	21,471.70	658.30	8,176.09	3,879.20	3.10	0.18	0.00038	0.88
1992	12.50	2,174.60	27,182.50	562.40	7,030.00	6,386.10	2.20	0.23	0.00031	0.84
1993	12.50	2,118.40	26,480.00	511.00	6,387.50	6,695.20	1.20	0.25	0.00019	0.83
1994	12.62	2,283.80	28,821.56	644.00	8,127.28	6,062.60	1.00	0.21	0.00012	0.86
1995	12.87	2,588.00	33,307.56	766.70	9,867.43	6,504.80	3.90	0.20	0.00040	0.87
1996	12.90	3,561.40	45,942.06	933.00	12,035.70	6,942.00	4.40	0.15	0.00037	0.89
1997	14.01	4,134.80	57,928.55	996.90	13,966.57	9,006.90	2.00	0.16	0.00014	0.89
AVE	12.28	2,547.83	32,030.90	725.85	8,972.80	5,989.96	2.88	0.19	0.00034	0.87

Cuadro 7.1.2 Presupuesto de Cultivos para Condiciones Con y Sin Proyecto

(unit:DR$/ha)

	Without Project Condition			With Project Condition		
	Gross Income	Production Cost	Net Income	Gross Income	Production Cost	Net Income
Economic Crop Budget						
Plantain	62,730	9,800	52,930	82,246	13,790	68,456
Tomato	68,150	14,910	53,240	97,359	17,090	80,269
Sweet Potato	49,040	9,860	39,180	69,480	11,210	58,270
Cassava	31,600	9,950	21,650	58,340	11,570	46,770
Rice	19,360	16,680	2,680	39,600	20,340	19,260
Bean	13,050	8,710	4,340	21,750	11,710	10,040
Pigeon Peas	13,640	5,960	7,680	27,280	6,450	20,830
Eggplant	69,830	12,250	57,580	93,100	14,010	79,090
Corn	7,870	4,820	3,050	12,240	6,990	5,250
Melon	79,200	24,180	55,020	105,600	28,210	77,390
Sweet Pepper	78,650	13,400	65,250	108,900	15,990	92,910
Papaya	131,795	15,485	116,310	156,900	16,800	140,100
Banana	27,770	9,980	17,790	40,724	14,192	26,532

Cuadro 7.1.3 Beneficios del Riego en la Etapa de Completo Desarrollo

(unit:DR$/ha)

	Without Project Condition			With Project Condition			
	Net income per ha	Cultivated area (ha)	Total net income (RD$)	Net income per ha	Cultivated area (ha)	Total net income (RD$)	Irrigation benefit (DR$)
Plantain	52,930	3,430	181,549,900	68,456	4,550	311,474,800	
Tomato	53,240	120	6,388,800	80,260	250	20,065,000	
Sweet Potato	39,180	20	783,600	58,270	450	26,221,500	
Cassava	21,650	160	3,464,000	46,770	220	10,289,400	
Rice	2,680	20	53,600	19,260	40	770,400	
Bean	4,340	50	217,000	10,040	60	602,400	
Pigeon Peas	7,680	10	76,800	20,830	140	2,916,200	
Eggplant	57,580	15	863,700	79,090	30	2,372,700	
Corn	3,050	70	213,500	5,250	100	525,000	
Melon	55,020	115	6,327,300	77,390	200	15,478,000	
Sweet Pepper	65,250	140	9,135,000	92,910	190	17,652,900	
Papaya	116,310	110	12,794,100	140,100	240	33,624,000	
Banana	17,790	170	3,024,300	26,532	170	4,510,440	
Total		4,430	224,891,600		6,640	446,502,740	221,611,140

Cuadro 7.1.4 Beneficios del Suministro de Agua Potable

Year	Population			Family				Benefit
	Bombita	Los Robres	Altagracia	Bombita	Los Robres	Altagracia	Total	(RD$/lit.)
1	1,133	358	876	263	83	204	550	
2	1,167	362	902	271	84	210	565	
3	1,202	367	929	280	85	216	581	
4	1,238	372	957	288	86	222	597	
5	1,275	377	985	297	88	229	613	3,736,666
6	1,313	381	1,015	305	89	236	630	5,934,564
7	1,353	386	1,045	315	90	243	648	6,098,400
8	1,393	391	1,077	324	91	250	665	6,266,966
9	1,435	397	1,109	334	92	258	684	6,440,402
10	1,478	402	1,142	344	93	266	703	6,618,852
11	1,523	407	1,177	354	95	274	722	6,802,463
12	1,568	412	1,212	365	96	282	742	6,991,388
13	1,615	418	1,248	376	97	290	763	7,185,785
14	1,664	423	1,286	387	98	299	784	7,385,813
15	1,714	428	1,324	399	100	308	806	7,591,640
16	1,765	434	1,364	411	101	317	829	7,803,438
17	1,818	440	1,405	423	102	327	852	8,021,382
18	1,873	445	1,447	436	104	337	876	8,245,654
19	1,929	451	1,490	449	105	347	900	8,476,442
20	1,987	457	1,535	462	106	357	925	8,713,937
21	2,046	463	1,581	476	108	368	951	8,713,937
22	2,108	469	1,629	490	109	379	978	8,713,937
23	2,171	475	1,678	505	110	390	1,005	8,713,937
24	2,236	481	1,728	520	112	402	1,034	8,713,937
25	2,303	488	1,780	536	113	414	1,063	8,713,937
26	2,372	494	1,833	552	115	426	1,093	8,713,937
27	2,443	500	1,888	568	116	439	1,124	8,713,937
28	2,517	507	1,945	585	118	452	1,155	8,713,937
29	2,592	513	2,003	603	119	466	1,188	8,713,937
30	2,670	520	2,063	621	121	480	1,222	8,713,937
31	2,750	527	2,125	640	123	494	1,256	8,713,937
32	2,833	534	2,189	659	124	509	1,292	8,713,937
33	2,918	541	2,254	679	126	524	1,329	8,713,937
34	3,005	548	2,322	699	127	540	1,366	8,713,937
35	3,095	555	2,392	720	129	556	1,405	8,713,937
36	3,188	562	2,464	741	131	573	1,445	8,713,937
37	3,284	569	2,537	764	132	590	1,486	8,713,937
38	3,382	577	2,614	787	134	608	1,528	8,713,937
39	3,484	584	2,692	810	136	626	1,572	8,713,937
40	3,588	592	2,773	834	138	645	1,617	8,713,937
41	3,696	599	2,856	860	139	664	1,663	8,713,937
42	3,807	607	2,942	885	141	684	1,711	8,713,937
43	3,921	615	3,030	912	143	705	1,760	8,713,937
44	4,039	623	3,121	939	145	726	1,810	8,713,937
45	4,160	631	3,214	967	147	748	1,862	8,713,937
46	4,285	639	3,311	996	149	770	1,915	8,713,937
47	4,413	648	3,410	1,026	151	793	1,970	8,713,937
48	4,545	656	3,512	1,057	153	817	2,027	8,713,937
49	4,682	665	3,618	1,089	155	841	2,085	8,713,937
50	4,822	673	3,726	1,121	157	867	2,145	8,713,937

Cuadro 7.1.5 Flujo de Costos y Beneficios

year	Capital Cost			O&M Cost			Replacement Cost			Total Cost	Benefit		Net Cash Flow
	Yaque del sur Water Managemnet Center Project	Irrigation Project	Rural Water Supply Project	Yaque del sur Water Managemnet Center Project	Irrigation Project	Rural Water Supply Project	Yaque del sur Water Managemnet Center Project	Irrigation Project	Rural Water Supply Project		Irrigation	Rural Water Supply Project	
1	422	47,094								47,516			-47,516
2	8,025	57,278								65,303			-65,303
3	10,828	155,477		88	309					166,702			-166,702
4	9,188	178,002	20,233	383	1,337					209,143	12,797		-196,346
5	5,804	123,907	10,198	677	2,366	262				143,214	58,076	3,737	-81,401
6				866	3,027	404				4,297	111,344	5,775	112,822
7				866	3,027	409				4,302	157,144	5,935	158,777
8				866	3,027	414				4,307	180,072	6,098	181,863
9				866	3,027	419				4,312	196,370	6,267	198,325
10				866	3,027	425				4,318	215,038	6,440	217,160
11				866	3,027	431				4,324	221,611	6,619	223,906
12				866	3,027	436				4,329	221,611	6,802	224,084
13				866	3,027	442				4,335	221,611	6,991	224,267
14				866	3,027	448				4,341	221,611	7,186	224,456
15				866	3,027	455	2,830			7,178	221,611	7,385	221,818
16				866	3,027	461				4,354	221,611	7,592	224,849
17				866	3,027	468				4,361	221,611	7,803	225,053
18				866	3,027	475				4,368	221,611	8,021	225,264
19				866	3,027	482				4,375	221,611	8,246	225,482
20				866	3,027	489				4,382	221,611	8,476	225,705
21				866	3,027	489				4,382	221,611	8,714	225,943
22				866	3,027	489				4,382	221,611	8,714	225,943
23				866	3,027	489				4,382	221,611	8,714	225,943
24				866	3,027	489				4,382	221,611	8,714	225,943
25				866	3,027	489	2,830	3,423	2,575	13,210	221,611	8,714	217,115
26				866	3,027	489				4,382	221,611	8,714	225,943
27				866	3,027	489				4,382	221,611	8,714	225,943
28				866	3,027	489				4,382	221,611	8,714	225,943
29				866	3,027	489				4,382	221,611	8,714	225,943
30				866	3,027	489	3,538			7,920	221,611	8,714	222,405
31				866	3,027	489				4,382	221,611	8,714	225,943
32				866	3,027	489	3,538			7,920	221,611	8,714	222,405
33				866	3,027	489				4,382	221,611	8,714	225,943
34				866	3,027	489				4,382	221,611	8,714	225,943
35				866	3,027	489	2,830			7,212	221,611	8,714	223,113
36				866	3,027	489				4,382	221,611	8,714	225,943
37				866	3,027	489				4,382	221,611	8,714	225,943
38				866	3,027	489				4,382	221,611	8,714	225,943
39				866	3,027	489				4,382	221,611	8,714	225,943
40				866	3,027	489				4,382	221,611	8,714	225,943
41				866	3,027	489				4,382	221,611	8,714	225,943
42				866	3,027	489				4,382	221,611	8,714	225,943
43				866	3,027	489				4,382	221,611	8,714	225,943
44				866	3,027	489				4,382	221,611	8,714	225,943
45				866	3,027	489	2,830			7,212	221,611	8,714	223,113
46				866	3,027	489				4,382	221,611	8,714	225,943
47				866	3,027	489				4,382	221,611	8,714	225,943
48				866	3,027	489				4,382	221,611	8,714	225,943
49				866	3,027	489				4,382	221,611	8,714	225,943
50				866	3,027	489		3,423	2,575	10,380	221,611	8,714	219,945

IRR: 23.0%

Cuadro 7.1.6 Presupuestos de Familias de Agricultores según Tres Grupos de Tamaño de Parcelas En el Area del Proyecto

Item	Farm Size (Unit)	Small		Medium		Large	
(1) Family Size	No.	5		5		4	
(2) Range of Farm Size (1)	(ha)	0.3 to 1.0		1.1 to 2.0		More than 2.0	
(3) Average Farm Size (1)	(ha)	0.61		1.3		4.3	
(4) Average Crop Production (2)	(ton)						
1 Plantain		9.39		20.02		66.21	
2 Tomato		2.76		5.89		19.48	
3 Sweet potato		0.96		2.06		6.80	
4 Melon		1.71		3.64		12.04	
5 Pepper		0.59		1.26		4.18	
6 Papaya		1.30		2.77		9.17	
7 Cassava		0.27		0.58		1.91	
8 Banana		0.53		1.13		3.73	
9 Pigeon pea		0.04		0.09		0.31	
10 Corn		0.03		0.06		0.20	
11 Bean		0.01		0.02		0.06	
12 Eggplant		0.24		0.52		1.72	
13 Rice		0.02		0.04		0.14	
(5) Agricultural Income	(RD $)	64,013		136,422		451,243	
1 Plantain		35,035		74,666		246,971	
2 Tomato		8,967		19,110		63,209	
3 Sweet potato		3,942		8,400		27,785	
4 Melon		4,509		9,610		31,786	
5 Pepper		3,587		7,645		25,287	
6 Papaya		4,081		8,697		28,768	
7 Cassava		1,317		2,806		9,283	
8 Banana		612		1,303		4,311	
9 Pigeon pea		399		851		2,815	
10 Corn		127		271		895	
11 Bean		133		283		935	
12 Eggplant		1,136		2,421		8,007	
13 Rice		169		360		1,192	
(6) Non-Agricultural Income (3)	(RD $)	11,500		11,500		0	
(7) Total Income (5)+(6)	(RD $)	75,513		147,922		451,243	
(8) Production Costs	(RD $)	8,997		25,147		96,030	
Farm Materials		7,650		16,400		53,910	
Paid Labor		0		5,916	30%	32,612	50%
Other costs		1347		2,831		9,512	
			(%)		(%)		(%)
(9) Living Expenditure (4)	(RD $)	44,616	100	74,035	100	145,275	100
Food		24,960	55.9	34,450	46.5	55,640	38.3
Alcohol Beverages		2,275	5.1	4,940	6.7	10,400	7.2
Water supply		260	0.6	390	0.5	780	0.5
Housing		3,900	8.7	7,800	10.5	16,380	11.3
Clothing		2,340	5.2	3,900	5.3	8,840	6.1
Health care/Medicine		2,925	6.6	8,060	10.9	17,160	11.8
Education		1,950	4.4	2,860	3.9	5,200	3.6
Electricity		1,183	2.7	1,560	2.1	2,340	1.6
Cooking Gas		1,118	2.5	1,235	1.7	1,235	0.9
Transportation		1,105	2.5	3,250	4.4	13,000	8.9
Gifts		1,300	2.9	2,340	3.2	6,500	4.5
Others		1,300	2.9	3,250	4.4	7,800	5.4
(10) Total Expenditure (8+9)	(RD $)	53,613		99,182		241,305	
(11) Balance (7-10)	(RD $/year)	21,900		48,740		209,940	

Notes: (1) Based on INDRHI's data, the percentage distribution of farm size in the Project Area is estimated at about 51.6 % small farms, 35.8 % medium farms, and 12.6 % large farms

(2) Target Yield With Project Condition.

(3) Non-agricultural Income With Project is assumed same as Without Project conditions

(4) Living Expenditure under With Project Condition was estimated by Increasing Living Expenditure under Present condition by 30 % (1.3 times)

Cuadro 7.3.1 (1/2) Resultados de la Evaluación de Impacto Ambiental (1/2)

Project Name	Result of EIA
Irrigation Water Management Improvement Project	As the result of the study showing in (3) 7.3.3, the set up of the WUO will bring the change of the social characteristics and structure, and this social change will bring a positive impact for farmer's lifestyle and society. The water use condition will be better as a result of the set up of the WUO. Few negative impacts are foreseen.
Irrigation Facilities Improvement Project	Agricultural production will increase as a result of better water supply and the increase of the harvesting area from 4,430 ha to 7,805 ha. It will make the rural economy and farmer's activities more active. Concerning soil salinization, since the whole project area is already irrigated, drastic increase of salinization area by the project implementation will not occur. It is possible that in some areas, for example in Canoa area, salinization problems would decrease as a result of better water supply to the land. In the southern part of the project area, where the altitude is low, collocation of gates to prevent backwater from sea is necessary. Turbidity of river water occurs during the construction work at Santana Headworks, but it is a temporary and small impact. Countermeasures for expected impacts concerning water born diseases, and land use change are shown in (2) 7.3.3.
Villarpando Headworks Improvement Project	Water use condition will become better as a result of better management of water distribution. The water volume to distribute for Azua area will not change. Agricultural production will increase as a result of better water supply. It will make the rural economy and farmer's activities more active. Turbidity of river water occurs during the construction work at the Headworks, but it is a temporary and small impact.
River Water Management Reinforcement Project	Water use condition will become better as a result of better management of water distribution. The irrigation efficiency will change from about 30% to about 48%. Agricultural production will increase as a result of better water supply. It will make the rural economy and farmer's activity more active.
Project of Overall Water Management in Yaque del Sur River Basin	Water use condition will become better as a result of better management of water distribution. Agricultural production will increase as a result better water supply. It will make the rural economy and farmer's activity more active. Change in vegetation and land use will occur by the construction of the water management center at Canoa, Villarpando. But the center occupies a small area and the impact will be reduced by creation of wooded area around the center.
Project for Strengthening Agriculture Support Service	As the result of the research and extension project, the volume of pesticide use per hector in each crop and the total volume used in whole project area will reduce. The volume of fertilizer use per hector in each crop will increase for the purpose of increasing the production. But the efficiency of agrochemical use will become higher as the result of the extension and research project. It is possible that eutrophication of river water will be brought as a result of the increase of fertilizer use.
Rural Water Supply Project	In the project area, lack of water supply is a critical problem. In the project area, the number of beneficial household by this project in the target year (2018) is 960. Some cases of water born diseases such as diarrhea will be reduced. This project will bring positive impacts for rural life. The carry of water is now a task for women and children. Their burden will be reduced. The local people now buy water. So household condition will be improved by the project implementation.

Cuadro 7.3.1 (2/2) Resultados de la Evaluación de Impacto Ambiental (2/2)

Project Name	Result of EIA
Community Hall Construction Project	The community hall supports social activities and social participation of the local people. The project will make social life and structure more active. Since the construction of the hall will cause land use change, appropriate compensation to the land owners is necessary.
Green Belt Formation for Waterfront Conservation	The creation of green area and recreation facility will make local people's life rich. While forest area will increase, agricultural lands along the river would reduce. In case that tree planting carries out in existing agricultural land, appropriate compensation to the land owners is necessary.
Environmental Monitoring Program in Rincon Lagoon	This is only environmental monitoring project, so it does not cause fiscal impact to the environment. The result of the monitoring will be useful for the conservation of wildlife and water environment in Rincon Lagoon.

Cuadro 7.3.2 Resultado del Estudio de Caso de Cambio Social del Proyecto de Organización de los Usuario del Agua de Riego

Study Item	Sun Juan (Junta de Regante Presa Sabaneta)	Azua (Junta de Regante YSURA)
Outline of WUO	Area: 13,045ha No. of user: 3,404 established in 1994	Area: 7,555ha No. of user: 4,683 established in 1987
Parentage of Water Charge Payment	95/96 96/97 97/98 46% 52% 60%	95/96 96/97 97/98 49% 58% 72%
Function of Organization 1) and Election	The Association works better than that of Azua to distribute water. Users pay charge for its administration. There is election in each 2 years in all level of organization.	In the level of the Irrigation committee and Association, there is a election in each 2 years. In the level of Committee and Nucleus, the election can be held every year.
Meeting	Members of Committee have a meeting in every 2 weeks. In the level of Association and Irrigation Committee, meeting is held in same frequency. In the meeting, they sometimes discuss about agricultural technique. Normally in drought season, meetings are held more frequently.	Normally in the level of Nucleus and Association, a meeting is held once a month. But in drought season, it is held once a week or more. Members of Irrigation Committee meet every morning in the office.
Water Management and Collaborated Work	The key of intake gates is kept by a water distributor of each nucleus. The gates are managed by him. Cleaning of canals and management roads is done by all users several times in a year.	The key of intake gates is kept by a water distributor of each nucleus. The gates are managed by him. For example, in the Lateral 2 there are 33 distributors in Nucleus level. Cleaning of canals and management roads is done by all users 2 times in a year.
System to Resolve Problems	Problems of water distribution in the tertiary canal level, they are resolved by discussion between nucleuses. If problem in lateral or main canal level, discussion in higher level, Committee or Association, is held.	Problems of water distribution in the tertiary canal level, they are resolved by discussion between nucleuses. If problem in lateral or main canal level, discussion in Irrigation Committee is normally held.
Comparison of Water Management Condition between Before and After Set up the WUO	- Before set up the WUO, water distribution was sometimes determined by not democratic way, using bribe and influenced by political power. After the set up, the distribution has been determined through discussion among users. The water distribution is done fairly not depending on economical and political power of users. - Before set up the WUO, problems of robbery of water, conflict with violence between users, and bribery were usually happened. Now no or less such problems happen. The rural society has become more stable. - Before set up the WUO, for example in the Lateral 2 of Azua, only a distributor from the INDRHY managed. After the set up, since 33 distributors of nucleus take care the intake gates, water management has been able to done more efficiently. - Claim to government, such as INDRHY, is done more powerful than before, as a consequence of the organization.	

Note: 1) The smallest unit of WUO is Nucleus which consist of 10 to 15 users, then Committee is formed of several nucleus. After that several committees form an Association. Finally several associations form Irrigation Committee (Junta Directiva).The field survey was conducted in the lateral 3 area in San Juan and in the lateral 2 area in Azua.

Gráficos

Gráfico 3.2.1 Distribución de Series y Asociaciones de Suelos en el Area del Proyecto

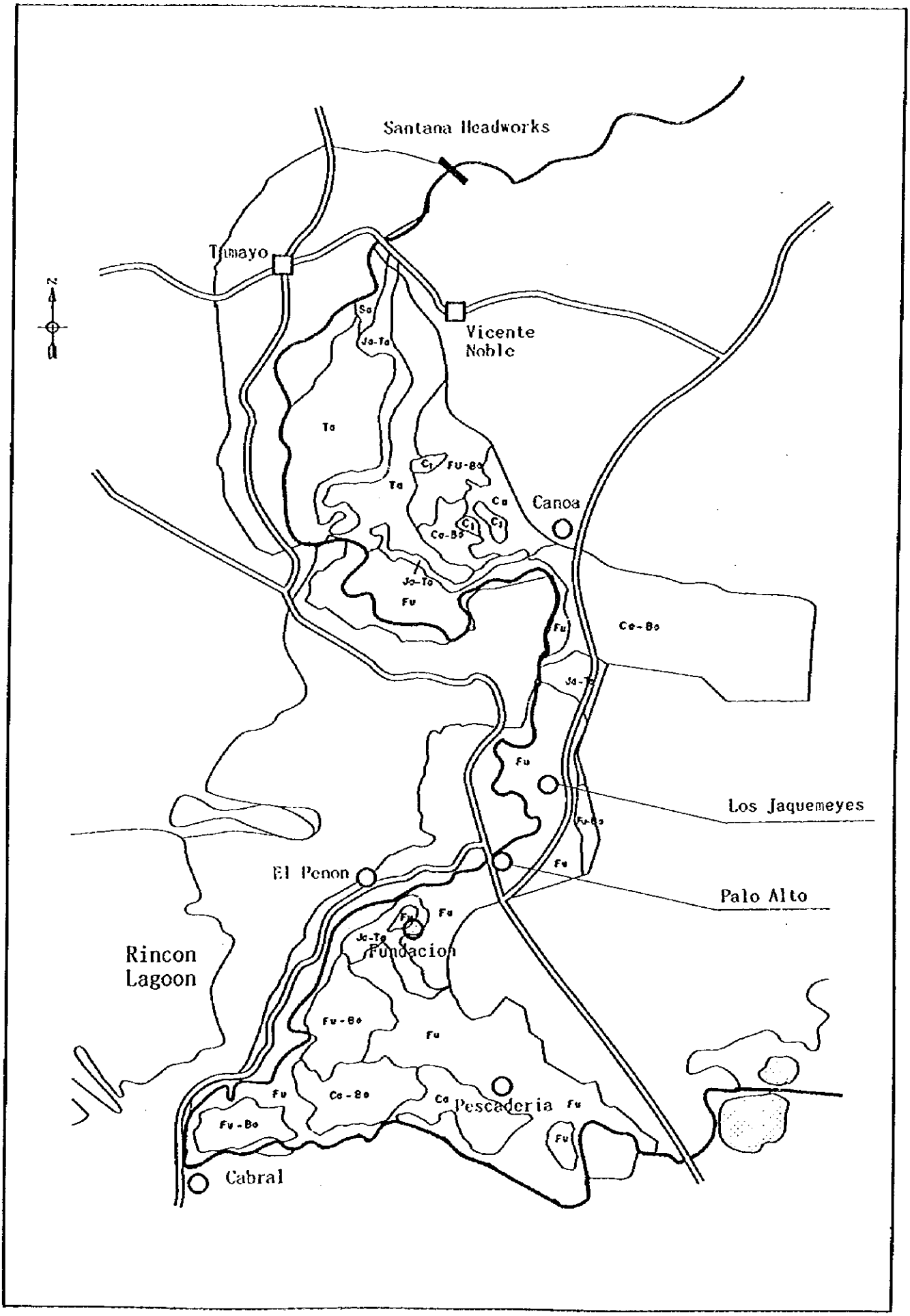


Gráfico 3.3.1 Uso Actual de la Tierra en el Area del Proyecto

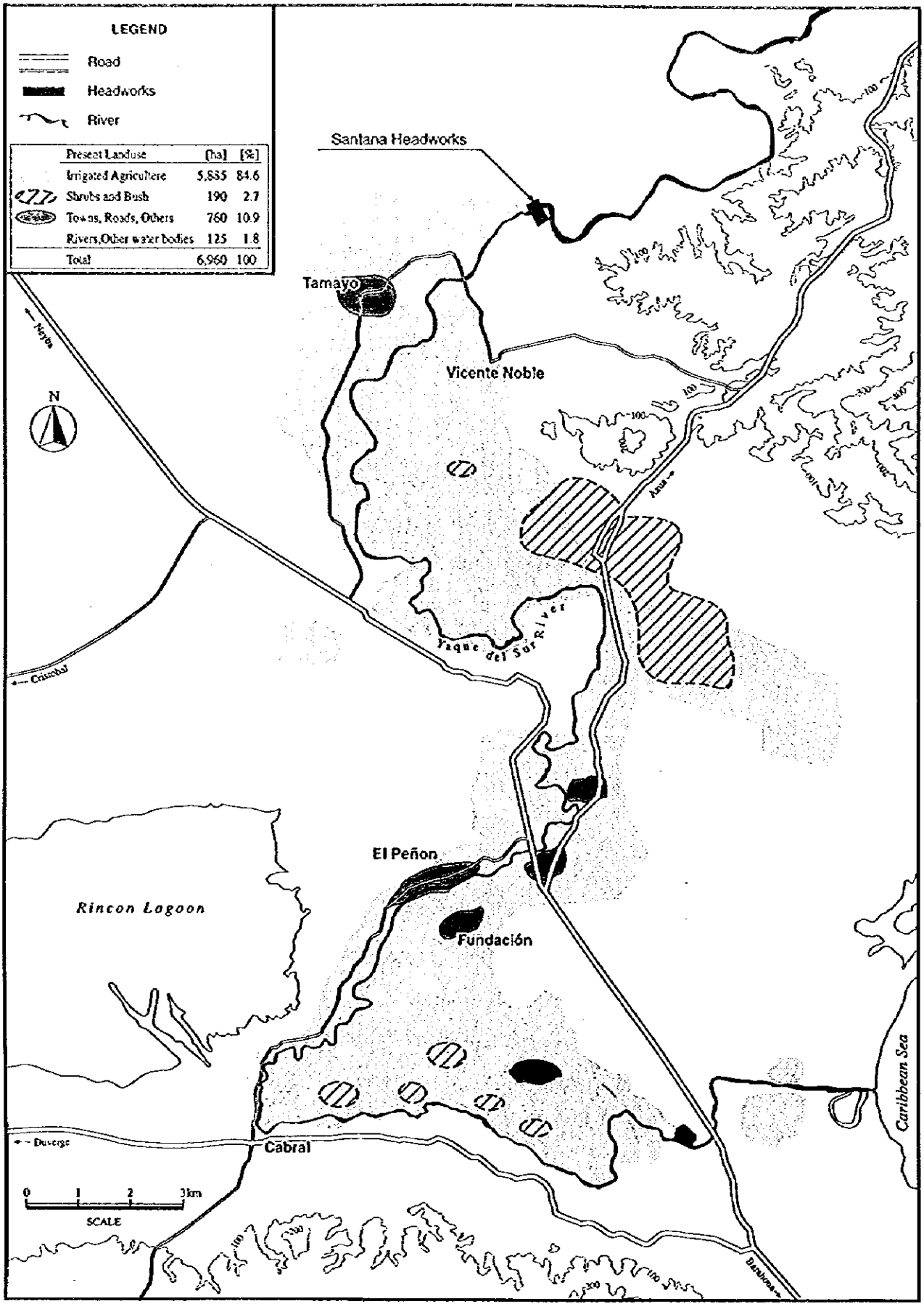
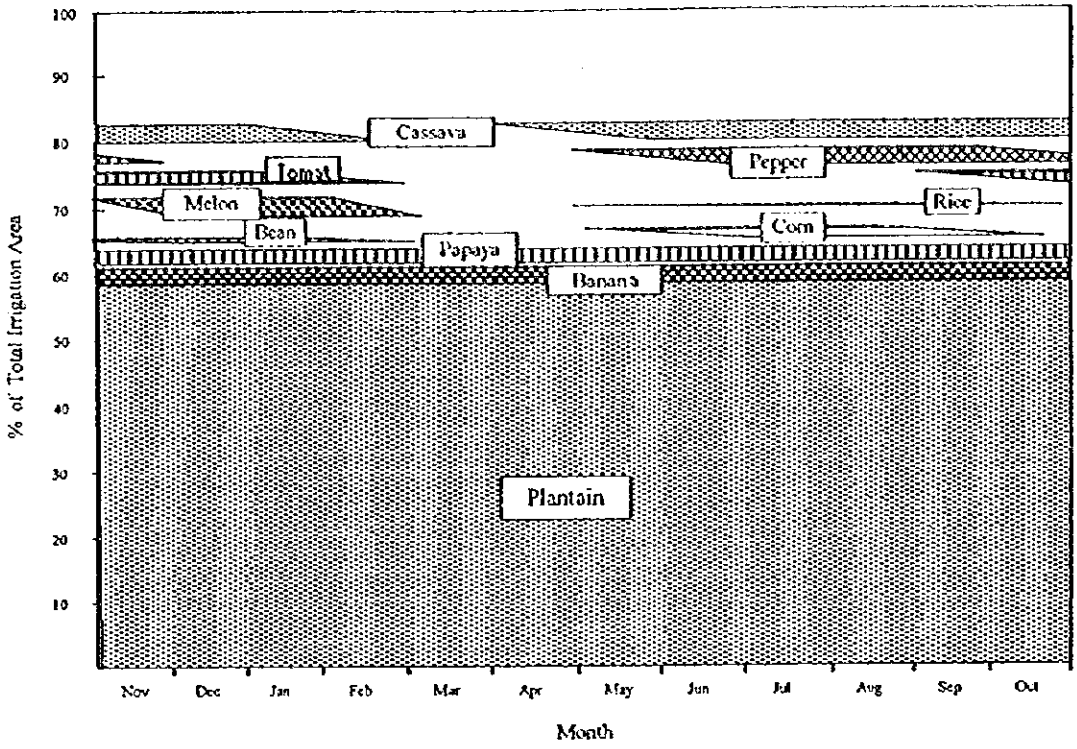


Gráfico 3.3.2 Patrón Actual de Cultivos en el Area del Proyecto



Present Cropping Pattern in the Project Area

Crop Name	Cropping Area (ha)	Planting Date		Planting Duration Days	Crop Duration Days
		Day	Month		
Plantain	3,430	1			365
Banana	180	1			365
Cassava	170	21	5	60	270
Pepper	150	1	5	60	150
Tomato	120	1	10	45	90
Melon	115	1	11	45	90
Papaya	110				365
Corn	80	1	5	60	120
Bean	50	1	11	45	90
Rice	25	1	5	60	150
Total	4,430				

Gráf 3.3.3 Diagrama de Problemas en La Produccion Agicola

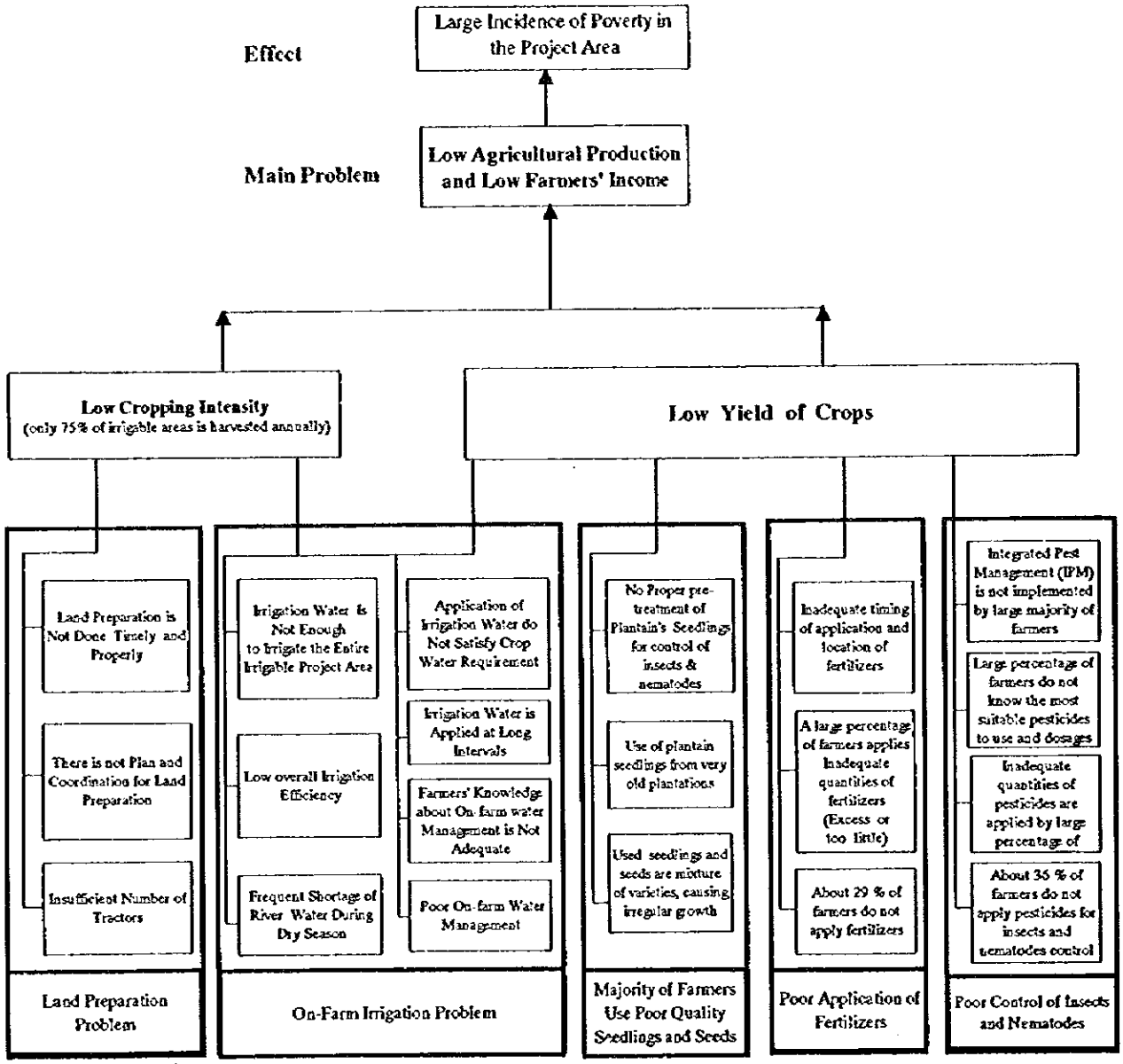
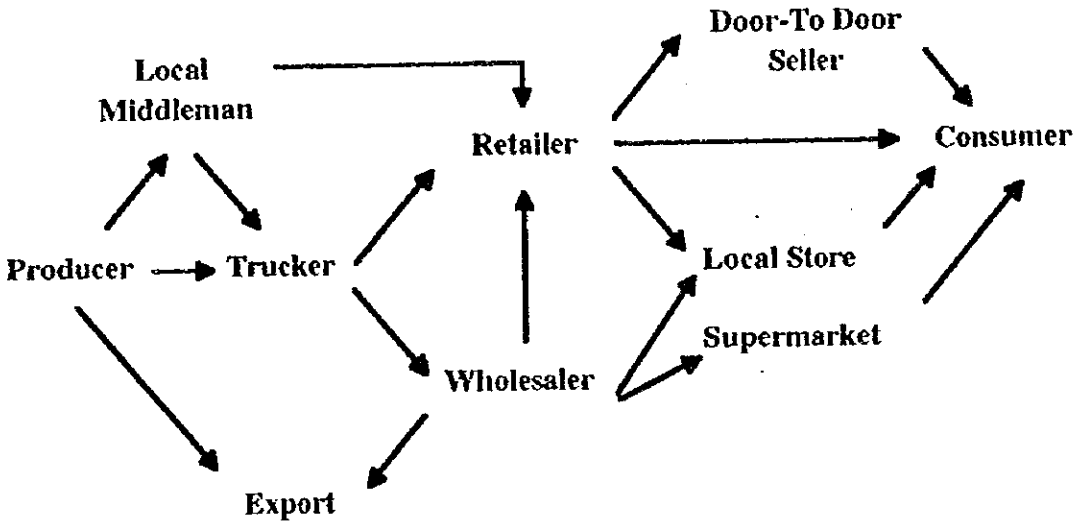
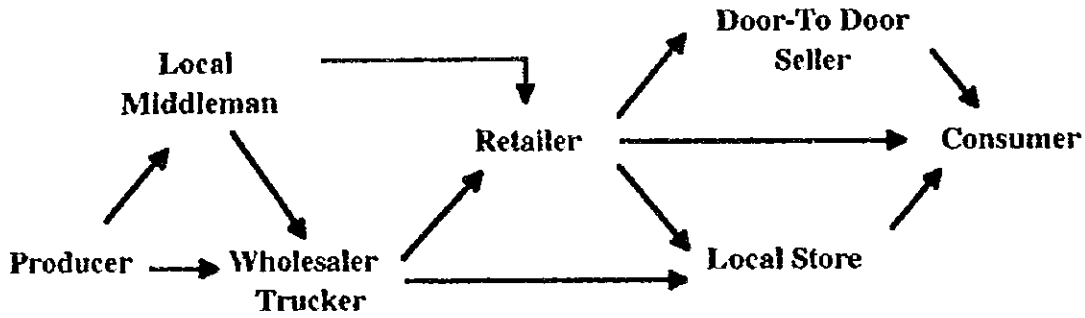


Gráfico 3.4.1 Sistema de Comercialización de Plátano en el Area de Estudio



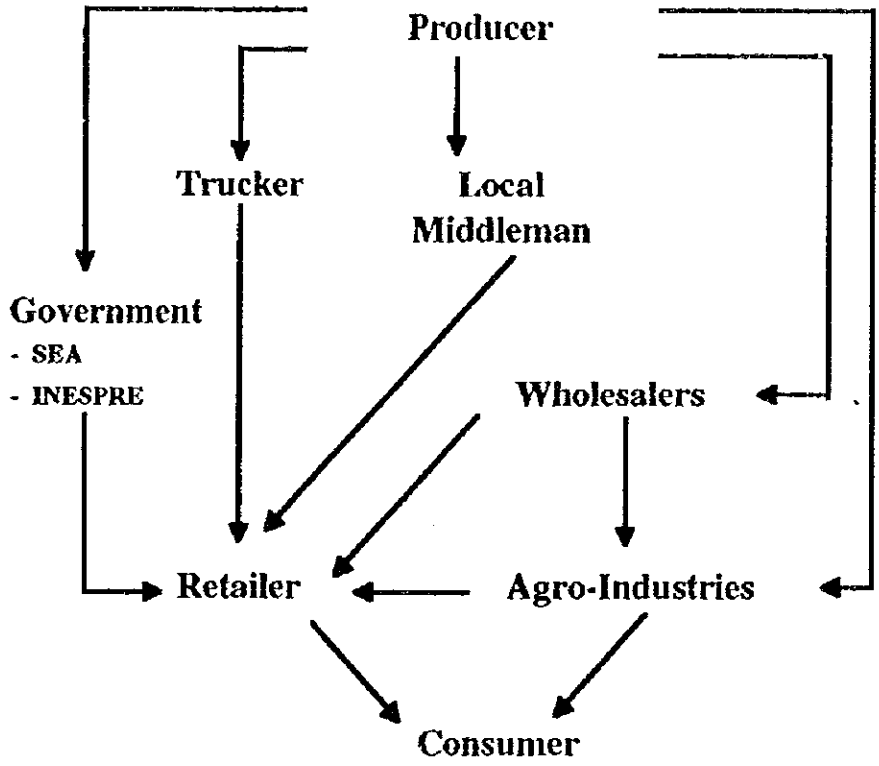
Source : Secretaría de Estado de Agricultura, Subsecretaría Técnica de Planificación Sectorial, 1977 validated by Jica Study Team, 1999.

Gráfico 3.4.2 Sistema de Comercialización de Guineo en el Area de Estudio



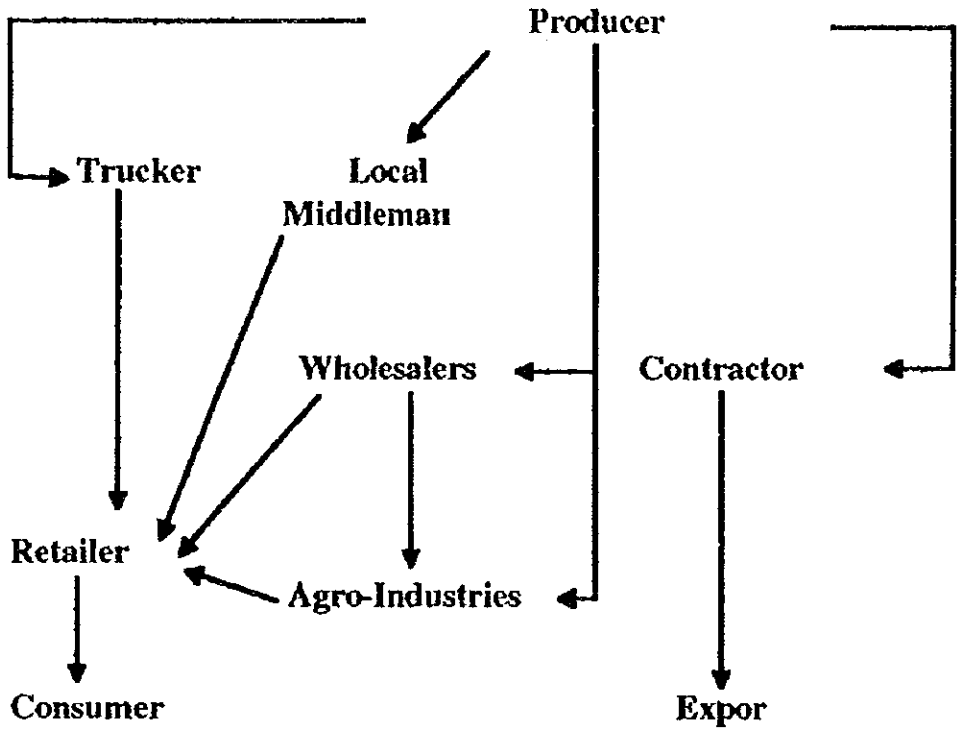
Source : Secretaría de Estado de Agricultura, Subsecretaría Técnica de Planificación Sectorial, 1977 validated by Jica Study Team, 1999.

Gráfico 3.4.3 Sistema de Comercialización de Habichuela y Maíz en el Area de Estudio



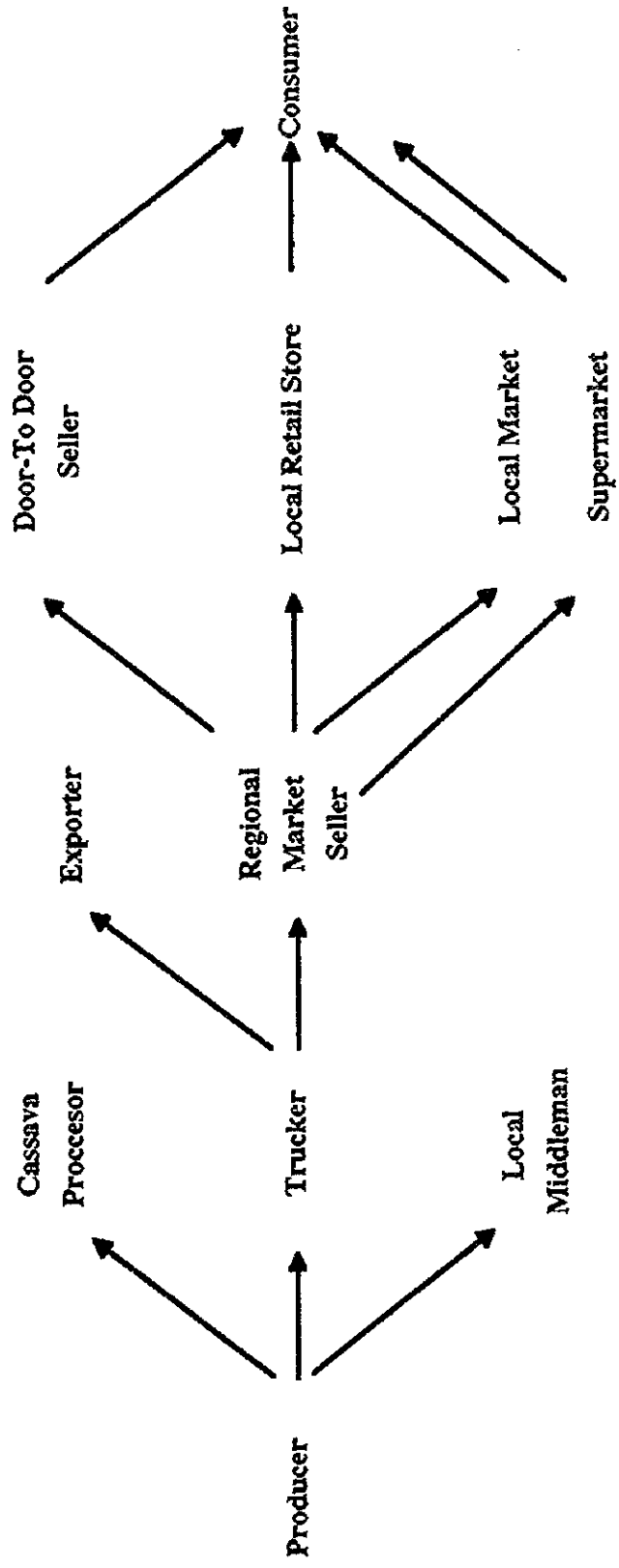
Source : Secretaría de Estado de Agricultura, Subsecretaría Técnica de Planificación Sectorial, 1977 validated by Jica Study Team, 1999.

Gráfico 3.4.4 Sistema de Comercialización de Lechosa y Melón en el Area de Estudio



Source: Secretaría de Estado de Agricultura, Subsecretaría Técnica de Planificación Sectorial, 1977 validated by Jica Study Team, 1999.

Gráfico 3.4.5 Sistema de Comercialización de Yuca en el Area de Estudio



Source : Secretaría de Estado de Agricultura, Subsecretaría Técnica de Planificación Sectorial, 1977 validated by Jica Study Team, 1999.

Gráfico 3.4.6 (1/3) Precios a Nivel de Finca de los Principales Cultivos en el Area de Estudio, 1996-1998 (1/3)

Farmgate Red Bean , 1996-1998			
RD$/MT			
	Farmgate	Farmgate	Farmgate
	1996	1997	1998
January	13,405	15,481	19,536
February	12,376	14,080	18,700
March	16,709	14,755	17,875
April	14,010	16,102	17,974
May	13,950	18,401	18,975
June	13,860	21,560	20,086
July	13,564	19,580	17,303
August	13,030	18,066	16,500
September	15,621	17,641	17,600
October	15,664	14,960	15,840
November	15,161	14,400	16,500
December	14,168	16,102	17,875

Farmgate Corn , 1996-1998			
RD$/MT			
	Farmgate	Farmgate	Farmgate
	1996	1997	1998
January	3352	3879	4774
February	3339	3743	4598
March	3683	3988	5368
April	3740	4048	5082
May	3906	4968	4813
June	3658	4647	6600
July	3540	4798	3465
August	3212	5032	3751
September	3502	4413	3080
October	3456	4223	4818
November	3375	3689	3751
December	3247	3860	3273

Source: Secretaría de Estado de Agricultura (SEA), Dirección Regional Agropecuaria, Zone Sur (1996 - 1998).

Gráfico 3.4.6 (2/3) Precios a Nivel de Finca de los Principales Cultivos en el Area de Estudio, 1996-1998 (2/3)

Farmgate Rice, 1996-1998				Farmgate Cassava , 1996-1998			
RD$/MT				RD$/MT			
Farmgate		Farmgate		Farmgate		Farmgate	
	1996	1997	1998		1996	1997	1998
January	7,522	8,208	11,550	January	2,343	2,750	4,857
February	8,164	9,507	10,400	February	2,353	3,101	5,903
March	7,995	10,393	9,350	March	2,583	3,422	5,355
April	8,624	8,371	9,630	April	2,508	4,200	5,390
May	7,700	8,177	9,900	May	2,772	4,415	5,390
June	6,545	8,960	9,625	June	2,794	4,490	4,704
July	8,450	7,949	10,450	July	3,080	4,580	4,434
August	6,529	9,203	8,800	August	2,668	4,469	3,384
September	8,951	9,066	11,000	September	2,730	4,867	3,069
October	8,149	9,313	11,000	October	2,863	4,469	2,640
November	8,143	9,059	11,000	November	2,625	4,127	3,520
December	9,291	8,670	8,800	December	2,840	3,894	3,586

Source: Secretaría de Estado de Agricultura (SEA), Dirección Regional Agropecuaria, Zone Sur (1996 - 1998).

Figure C. Farmgate Price for Rice, 1996-1998

Figure D. Farmgate Price for Cassava 1996-1998

Gráfico 3.4.6 (3/3) Precios a Nivel de Finca de los Principales Cultivos en el Area de Estudio, 1996-1998 (3/3)

Farmgate Plantain , 1996-1998

RD$/MILLAR

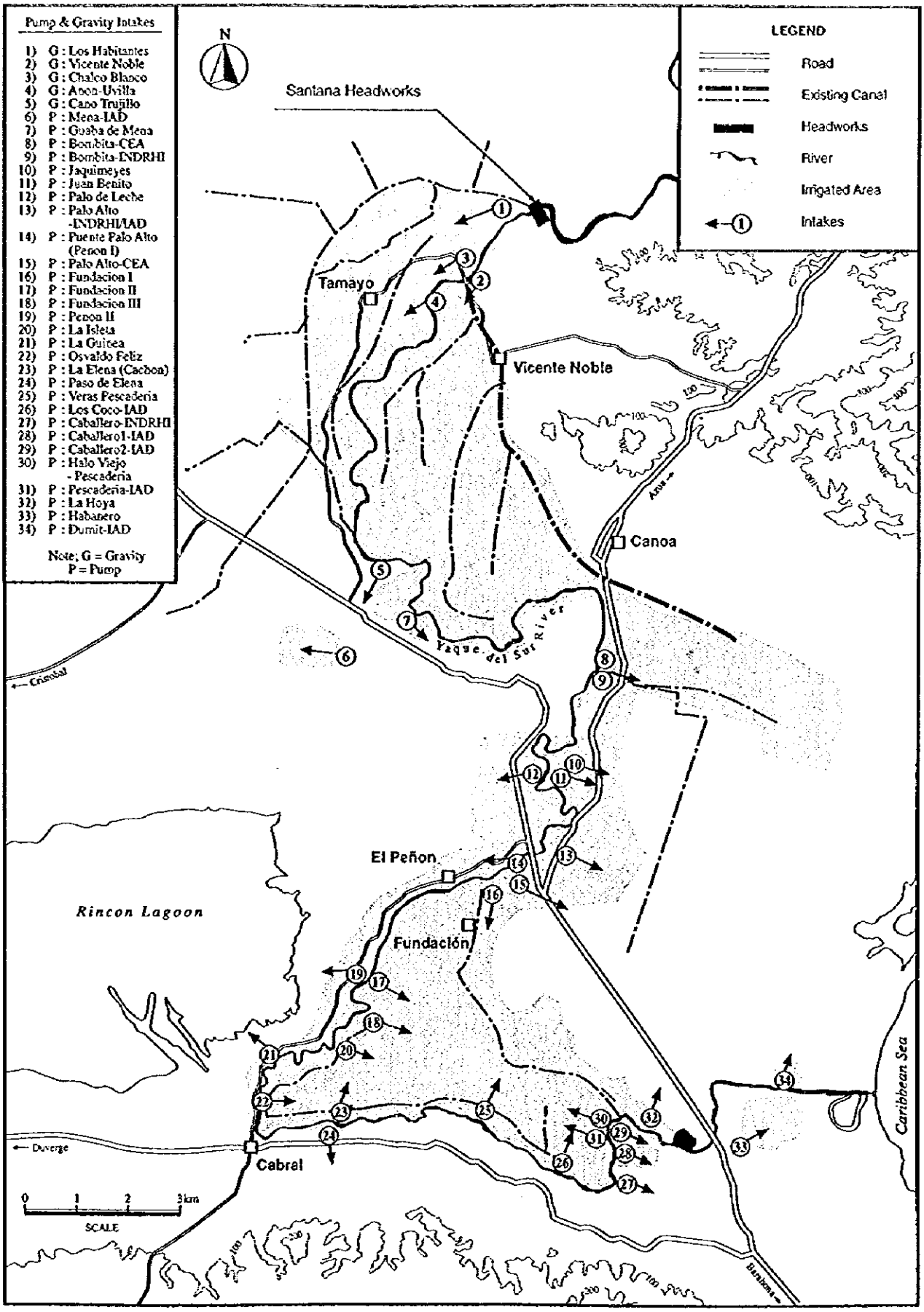
	Farmgate 1996	Farmgate 1997	Farmgate 1998
January	1045	746	1543
February	984	698	1393
March	703	549	1013
April	633	649	1122
May	667	737	1122
June	627	678	1089
July	608	1250	1151
August	579	1420	989
September	553	1351	910
October	547	1400	982
November	515	1467	1280
December	653	1264	3862

Farmgate Banana , 1996-1998

RD$/RACIMO

	Farmgate 1996	Farmgate 1997	Farmgate 1998
January	23	27	28
February	23	24	25
March	24	22	25
April	23	18	28
May	22	20	25
June	19	25	25
July	22	27	21
August	23	32	22
September	18	33	24
October	16	43	25
November	20	39	30
December	18	36	45

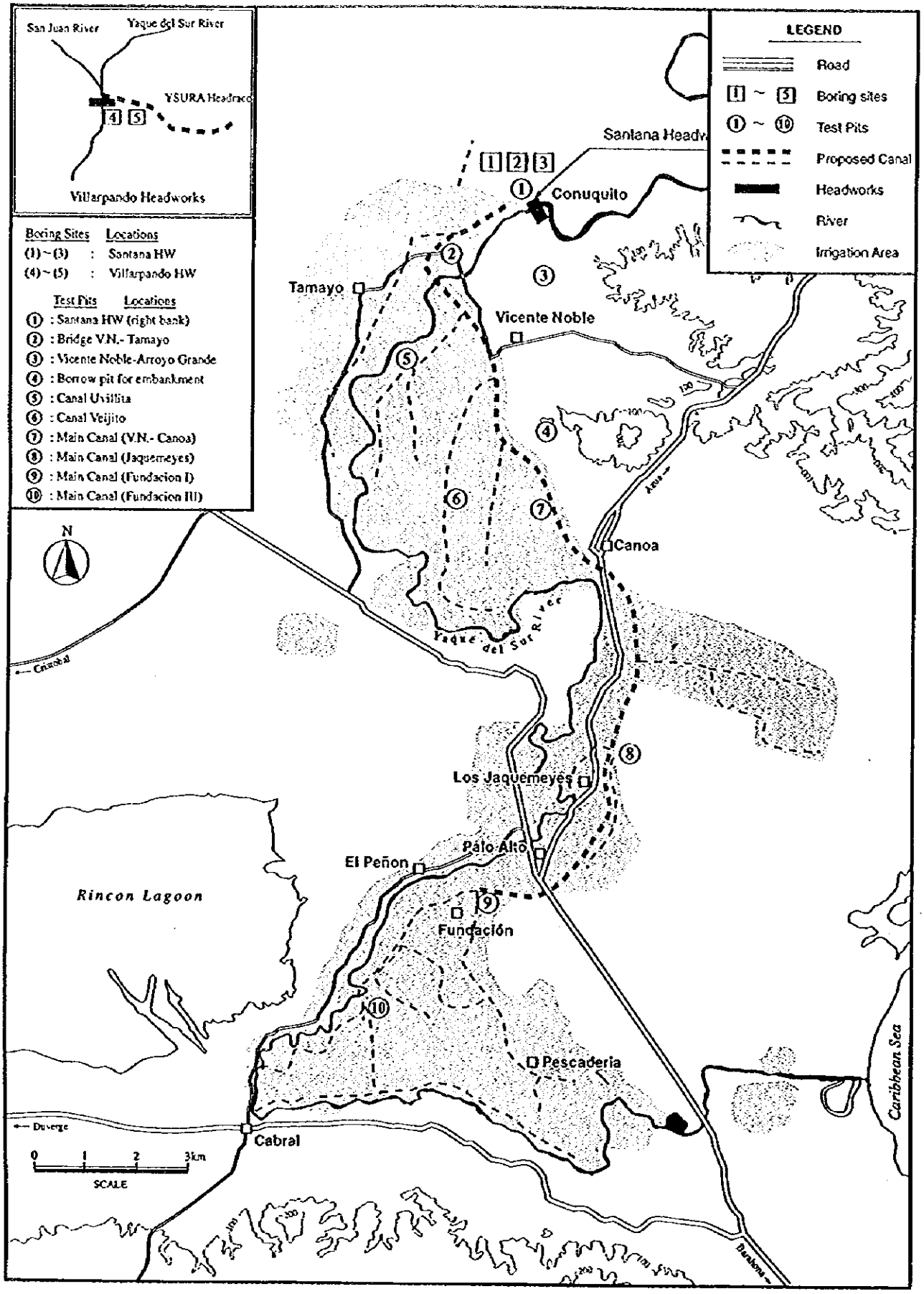
Source: Secretaria de Estado de Agricultura (SEA), Dirección Regional Agropecuaria, Zone Sur (1996 - 1998).


Pump & Gravity Intakes
1) G : Los Habitantes
2) G : Vicente Noble
3) G : Chalco Blanco
4) G : Anon-Uvilla
5) G : Cano Trujillo
6) P : Mena-IAD
7) P : Guaba de Mena
8) P : Bombita-CEA
9) P : Bombita-INDRHI
10) P : Jaquimeyes
11) P : Juan Benito
12) P : Palo de Leche
13) P : Palo Alto -INDRHI/IAD
14) P : Puente Palo Alto (Penon I)
15) P : Palo Alto-CEA
16) P : Fundacion I
17) P : Fundacion II
18) P : Fundacion III
19) P : Penon II
20) P : La Isleta
21) P : La Guinea
22) P : Osvaldo Feliz
23) P : La Elena (Cachon)
24) P : Paso de Elena
25) P : Veras Pescaderia
26) P : Los Coco-IAD
27) P : Caballero-INDRHI
28) P : Caballero1-IAD
29) P : Caballero2-IAD
30) P : Halo Viejo - Pescaderia
31) P : Pescaderia-IAD
32) P : La Hoya
33) P : Habanero
34) P : Dumit-IAD
Note; G = Gravity P = Pump
N
LEGEND
Road
Existing Canal
Headworks
River
Irrigated Area
Intakes
Santana Headworks
Tamayo
Vicente Noble
Canoa
Yaque del Sur River
El Peñon
Rincon Lagoon
Fundación
Cabral
Caribbean Sea
Cristobal
Duverge
Barahona
0 1 2 3km
SCALE

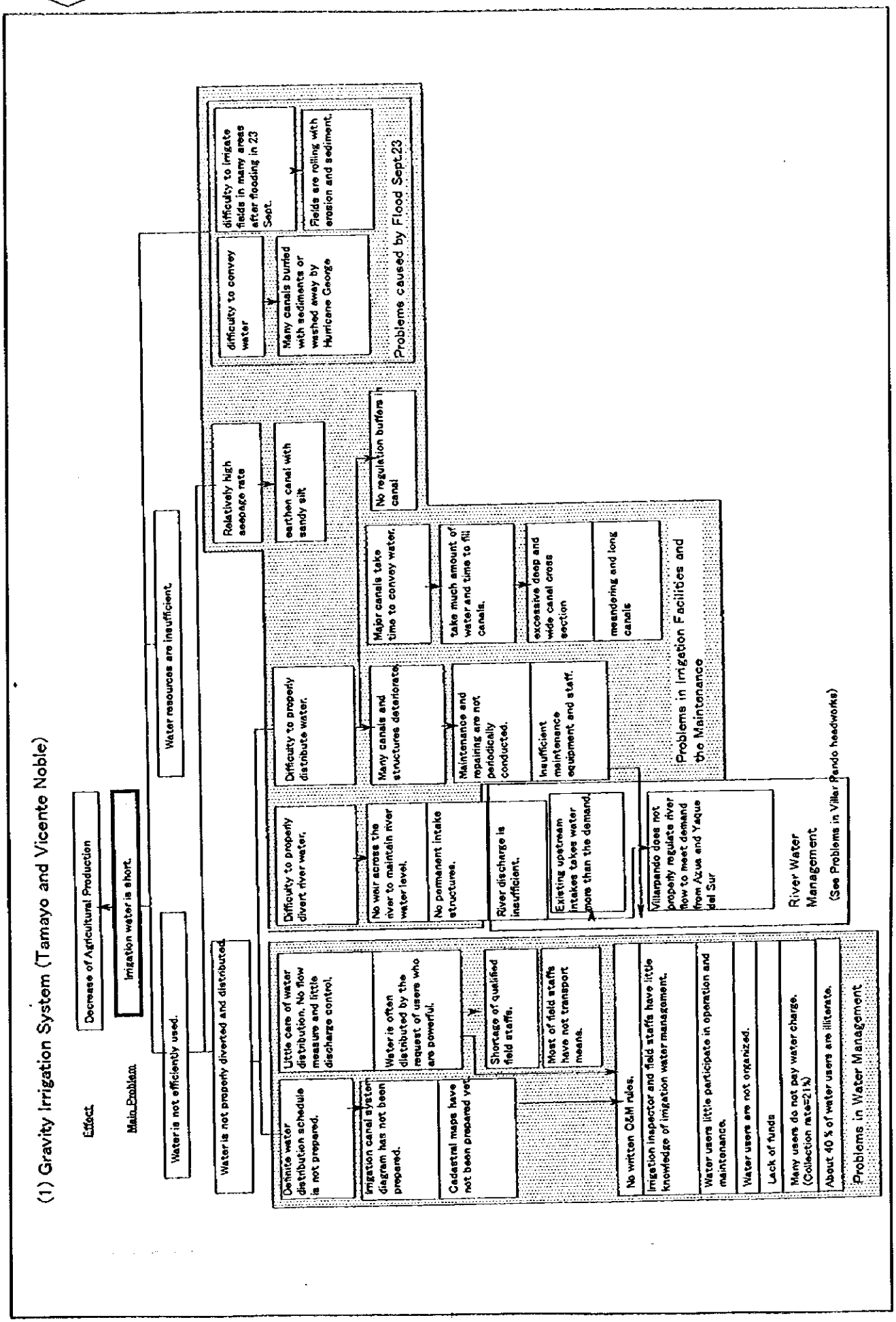
JICA

El Estudio del Proyecto de Desarrollo Rural Integrado de la Cuenca del Río Yaque del Sur en la República Dominicana

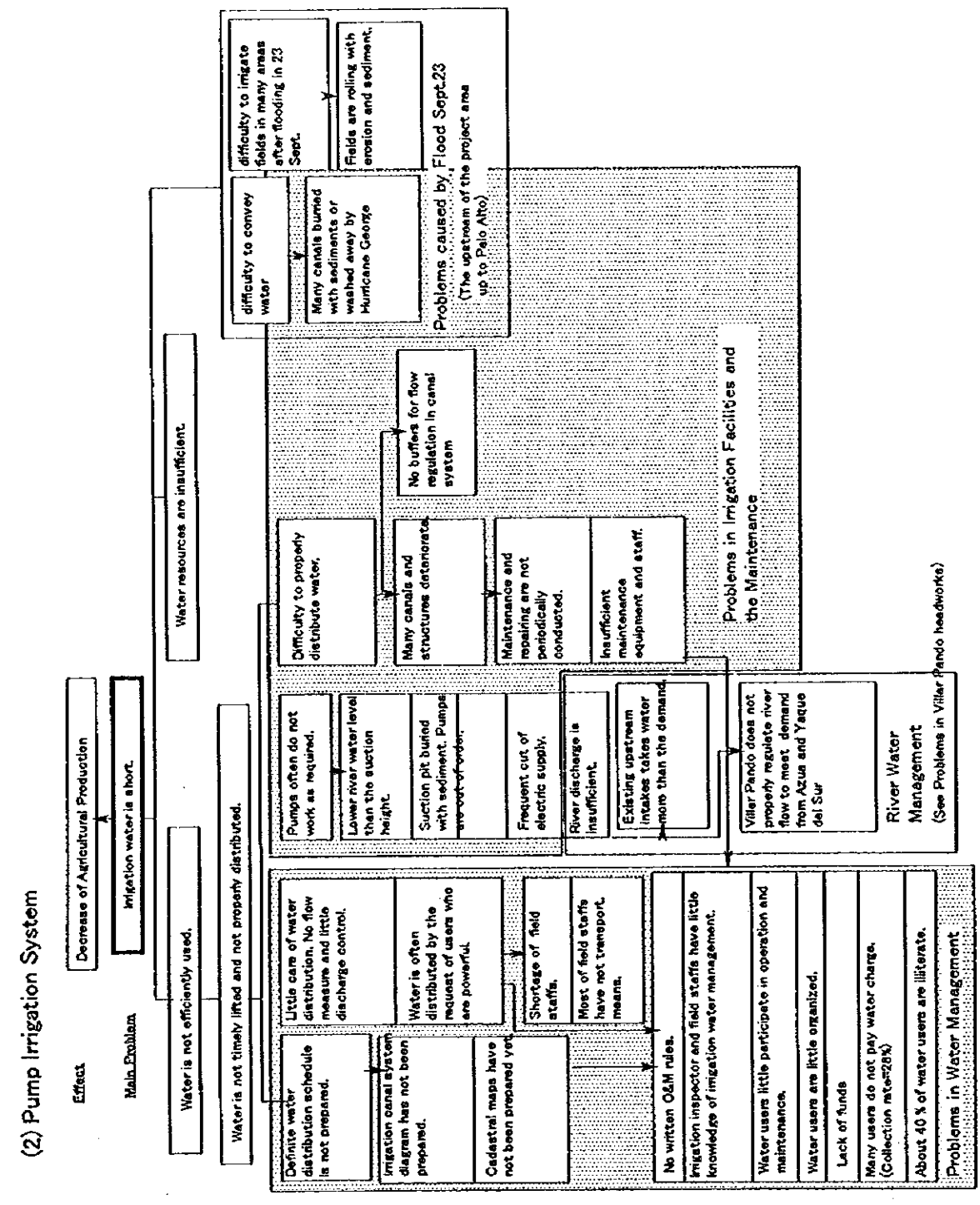
Gráfico 3.5.2 Ubicación de Puntos de Sondeos Geológico e Investigación de Mecánica de Suelo



Gráf 3.5.3 (1/3) Diagrama de los Problemas en Riego y Drenaje (1/3)



Gráf 3.5.3 (2/3) Diagrama de los Problemas en Riego y Drenaje (2/3)



Gráf 3.5.3 (3/3) Diagrama de los Problemas en Riego y Drenaje (3/3)

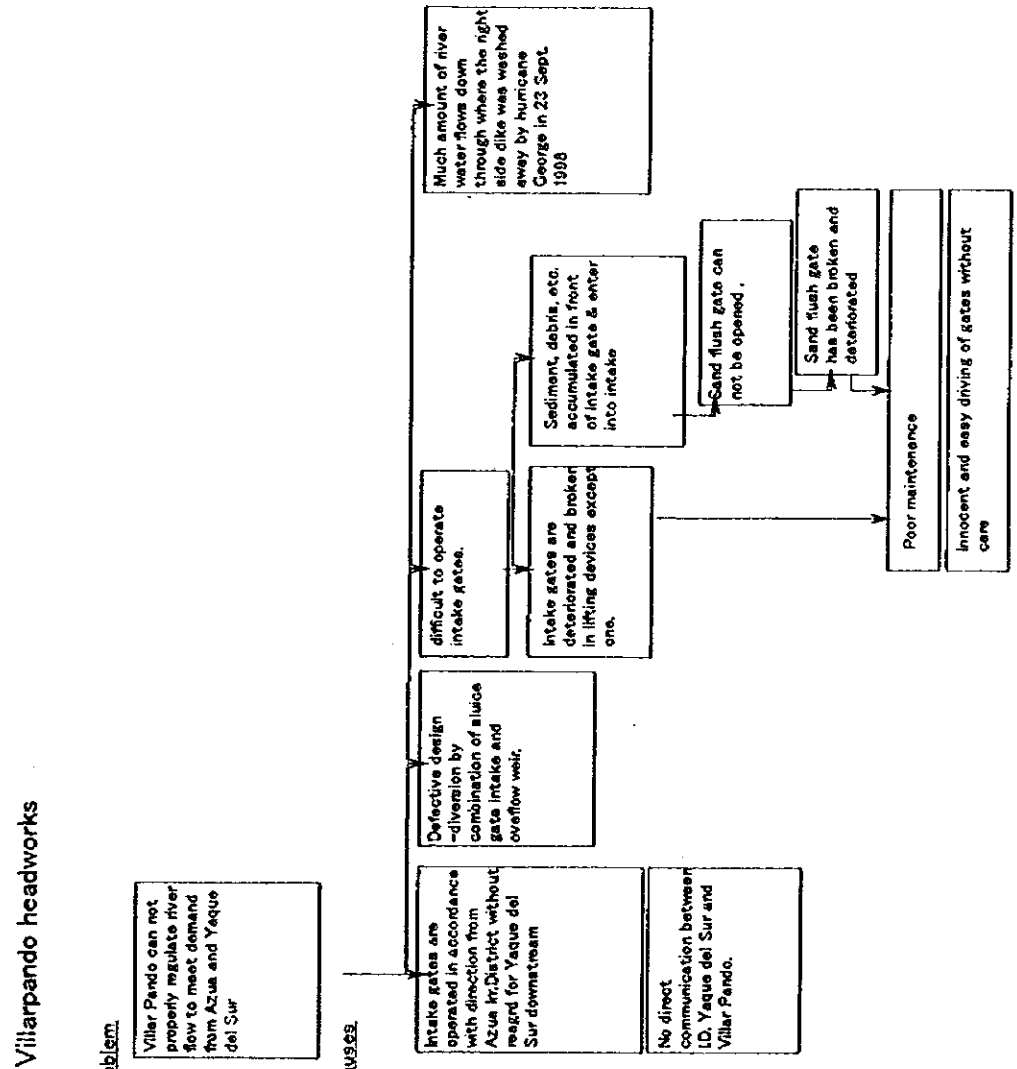


Gráfico 3.6.1 Arbol de Problemas para el Mejoramiento de la Infraestructura Rural

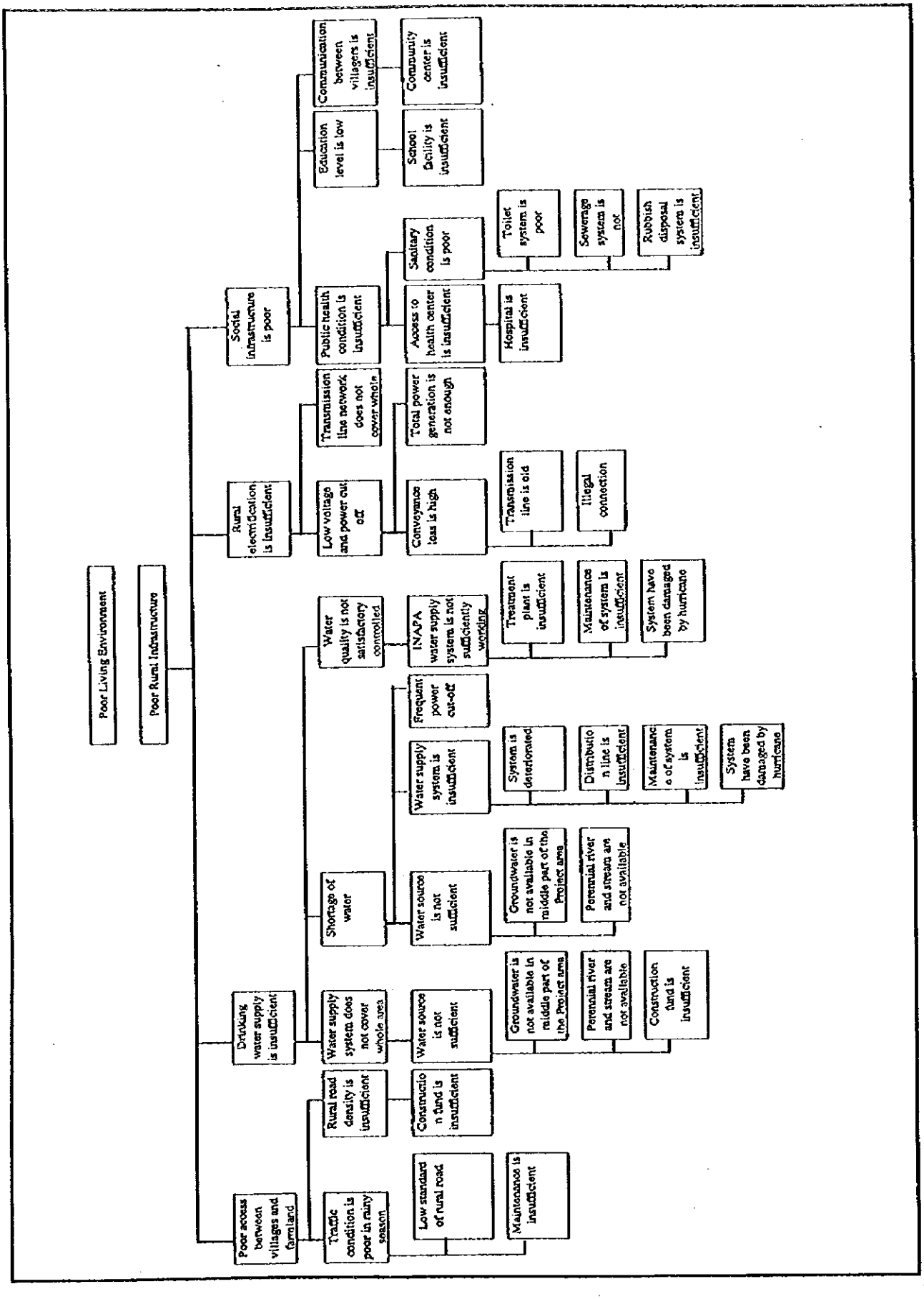


Gráfico 3.6.2 Mapa de Carreteras y Caminos

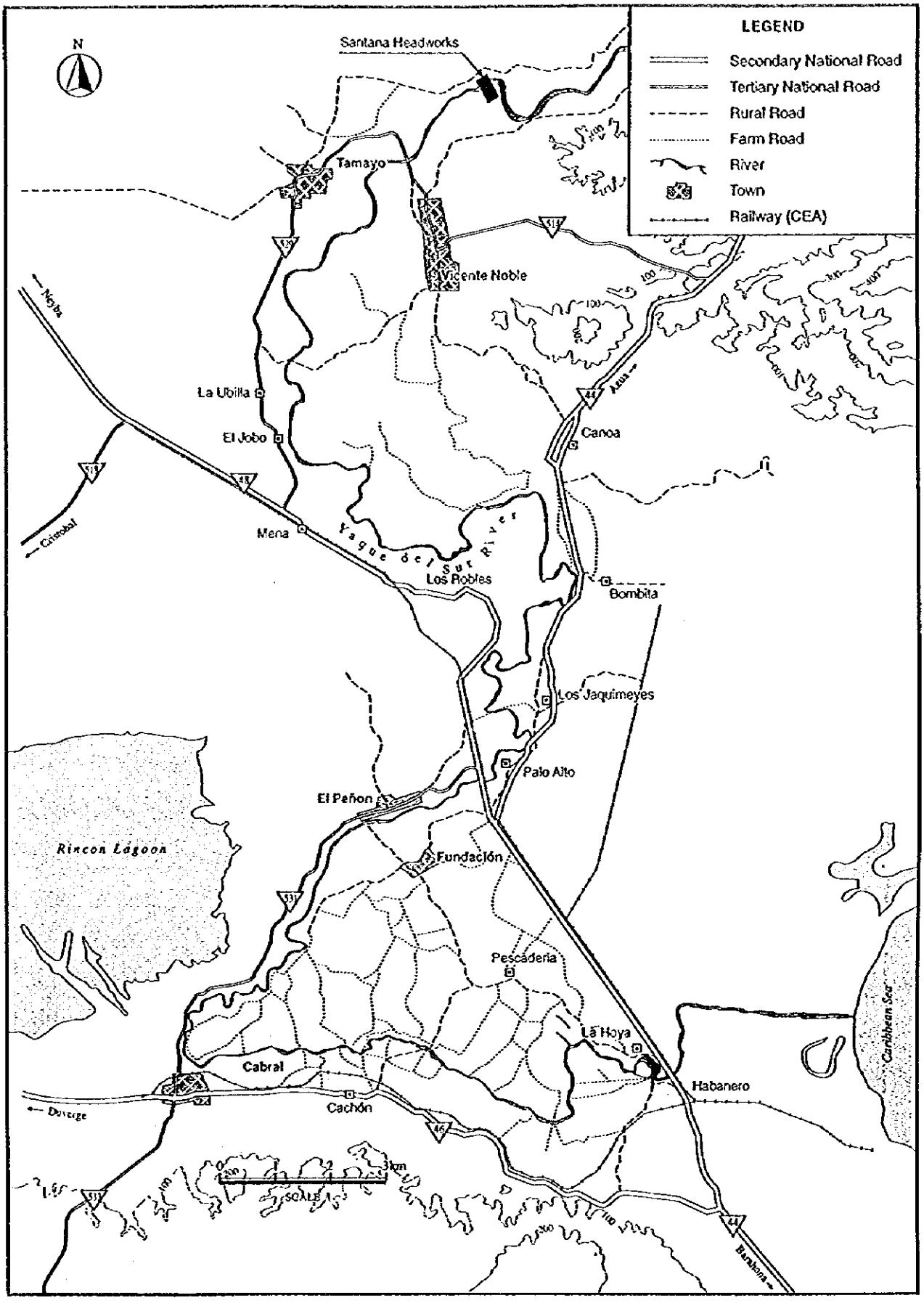


Gráfico 3.6.3 Condición de Suministro de Agua Potable en el Area del Proyecto

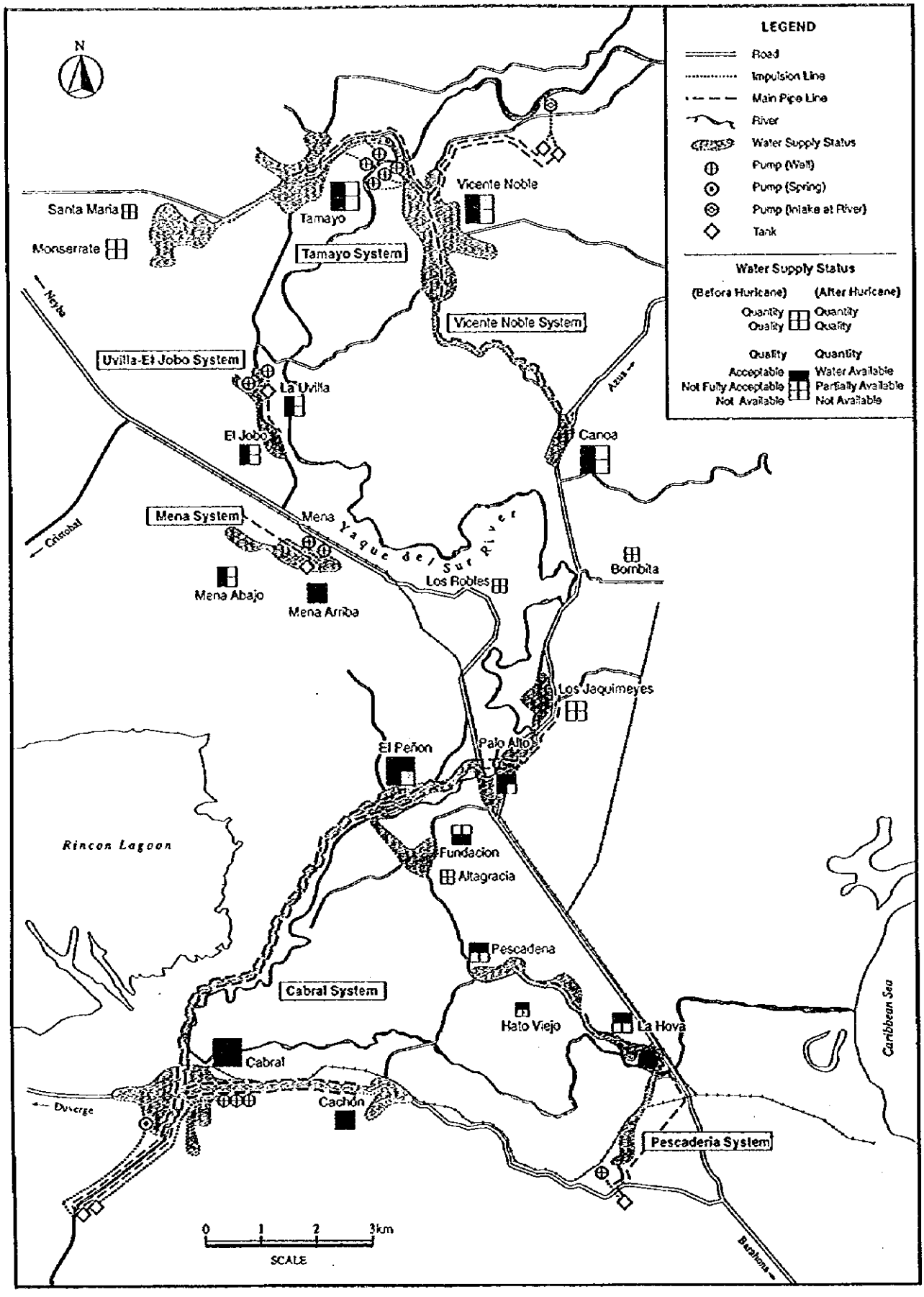


Gráfico 3.6.4 (1/2) Mapa de Localización del Sistema Nacional de Suministro de Electricidad (1/2)

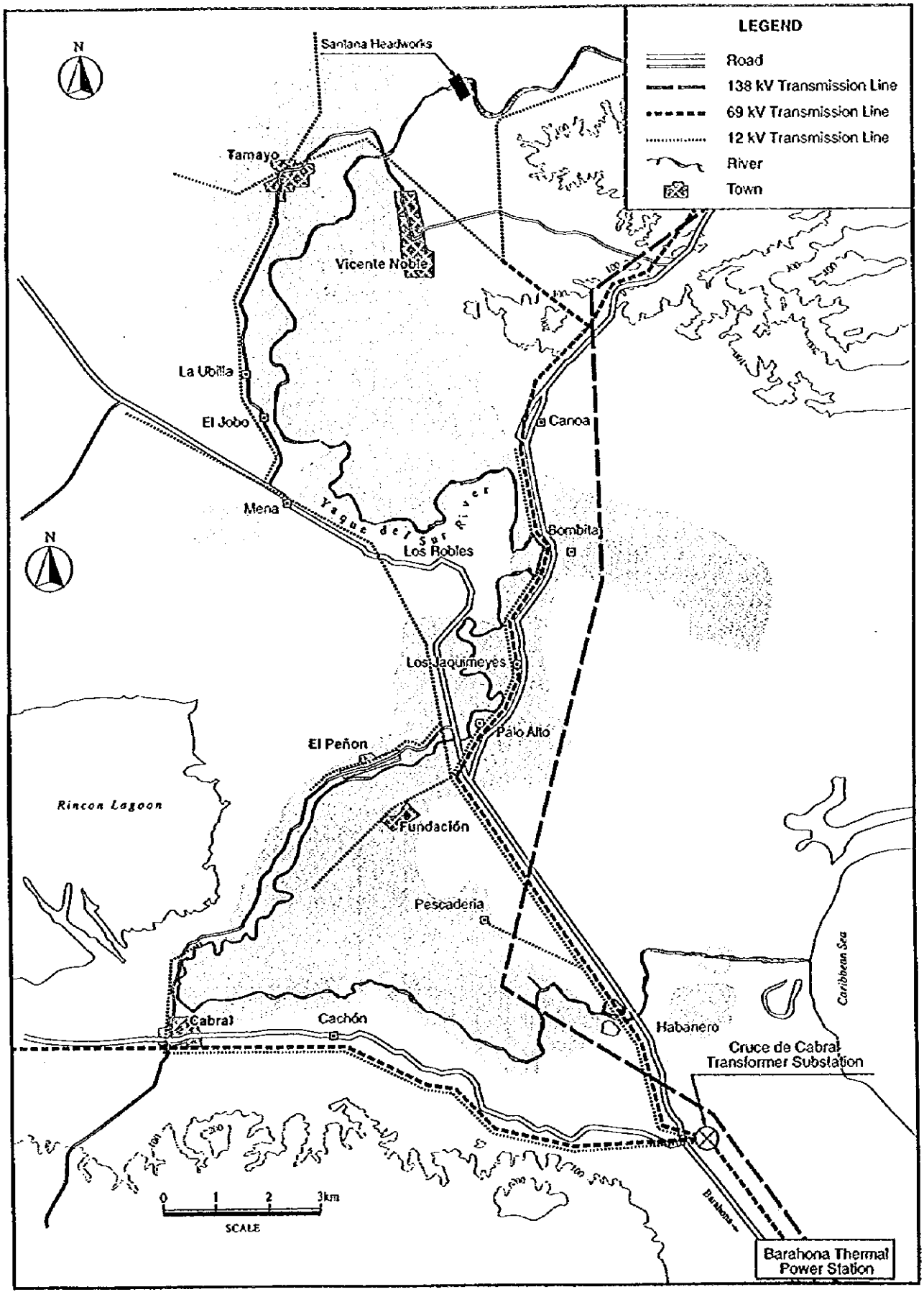


Gráfico 3.6.4 (2/2) Mapa de Localización del Sistema Nacional de Sumioistro de Electricidad (2/2)

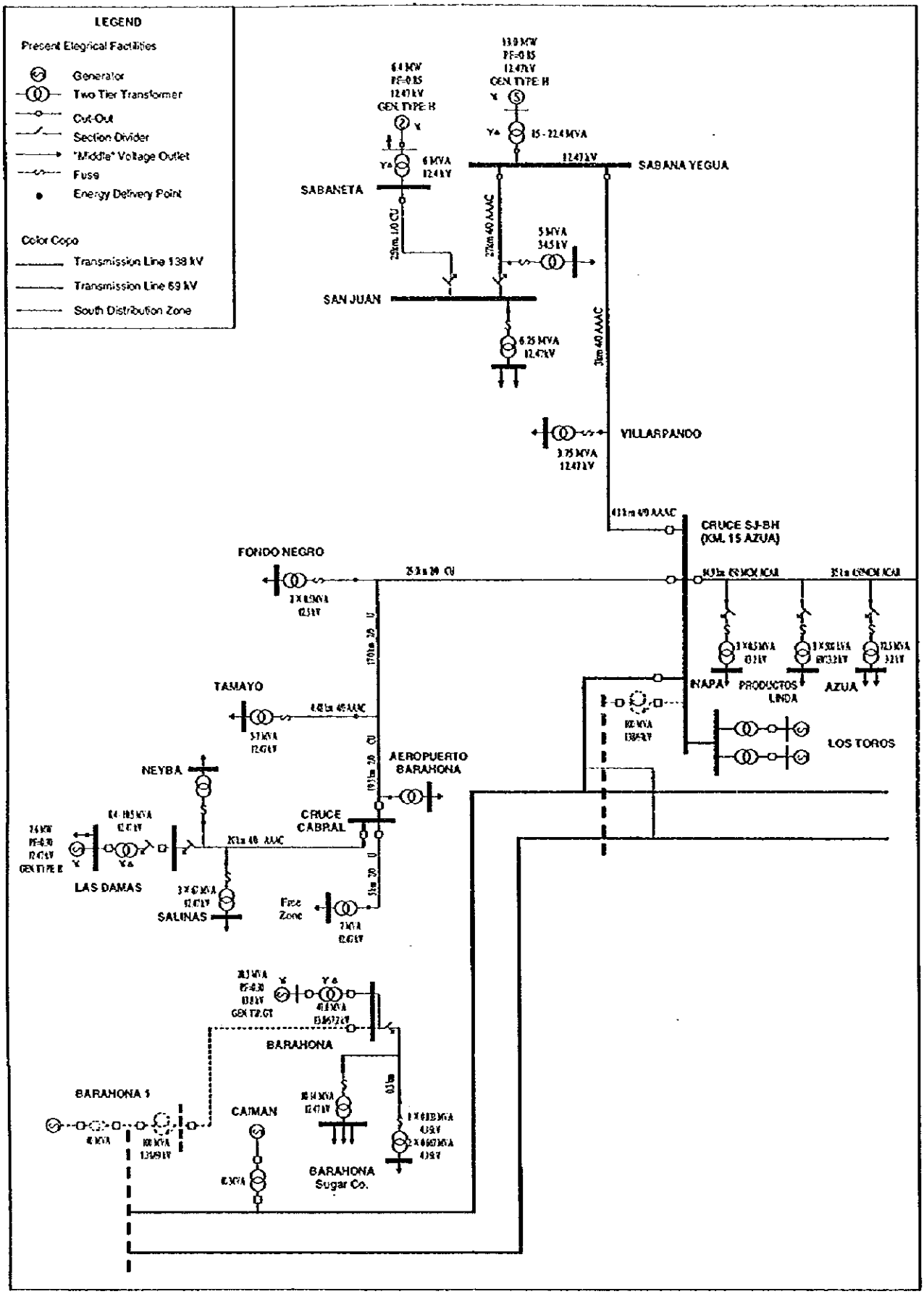
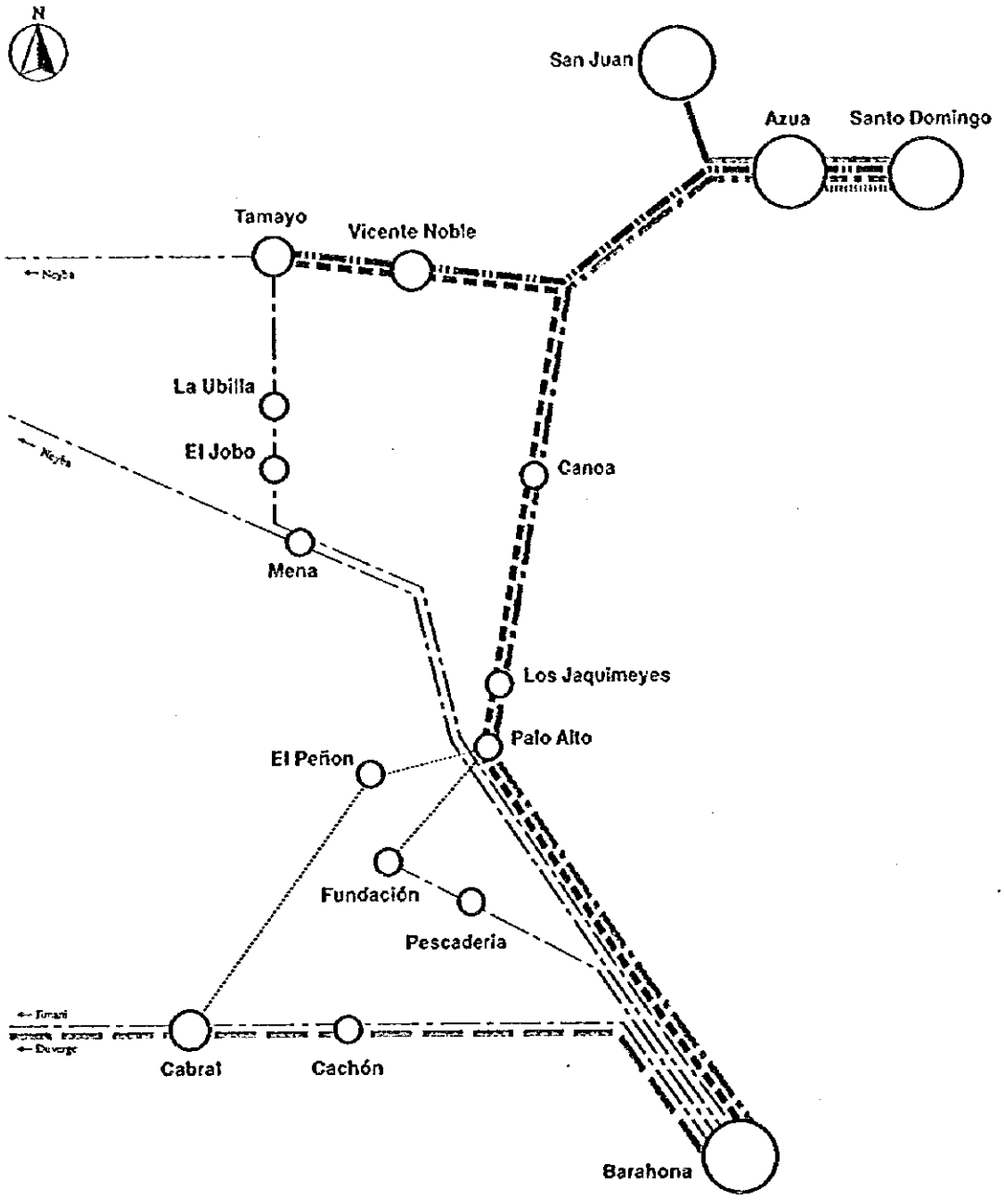


Gráfico 3.6.5 Mapa de Rutas del Transporte Público



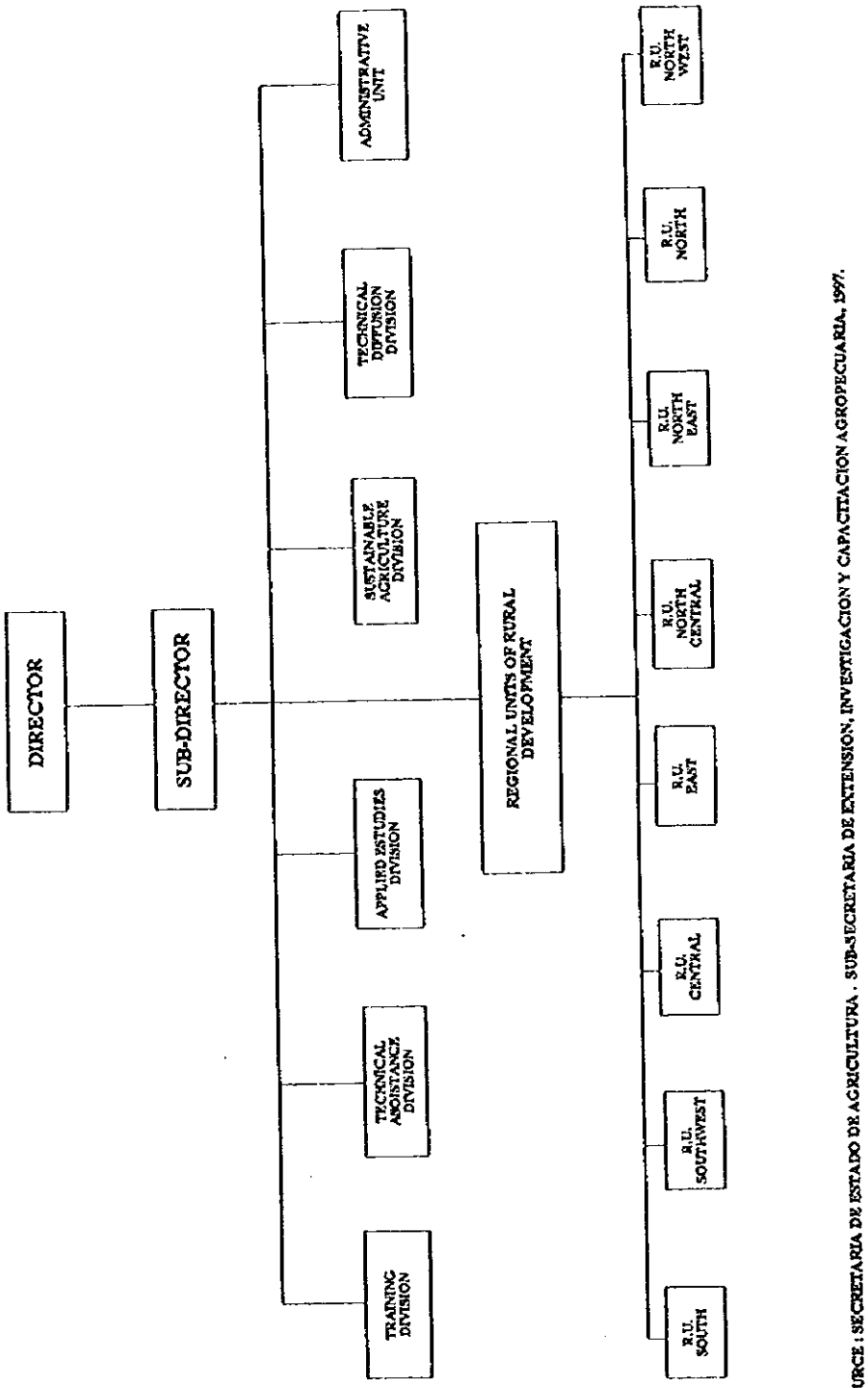
Registered Bus Route

	From	To	Type	Operators	Units
	Azua	San Juan	Micro-Mini Bus	Asochoduna (Azua Driver Association)	24
	Azua	Santo Domingo	Mini Bus	Asochodemas (Azua Mini Bus Driver Association)	53
	Duverge	Barahona	Micro Bus	Adochoduved (Duverge Driver Association)	6
	Barahona	Santo Domingo	Auto-Mini Bus	Sichomiba (Barahona Driver Association)	72
	Tamayo	Santo Domingo	Mini Bus	Asochoaba (Barahona Mini Bus Driver Union)	33
	Tamayo	Barahona	Micro Bus	Sichocamita (Tamayo Mini Bus and Van Driver Union)	17

Local Public Transportion

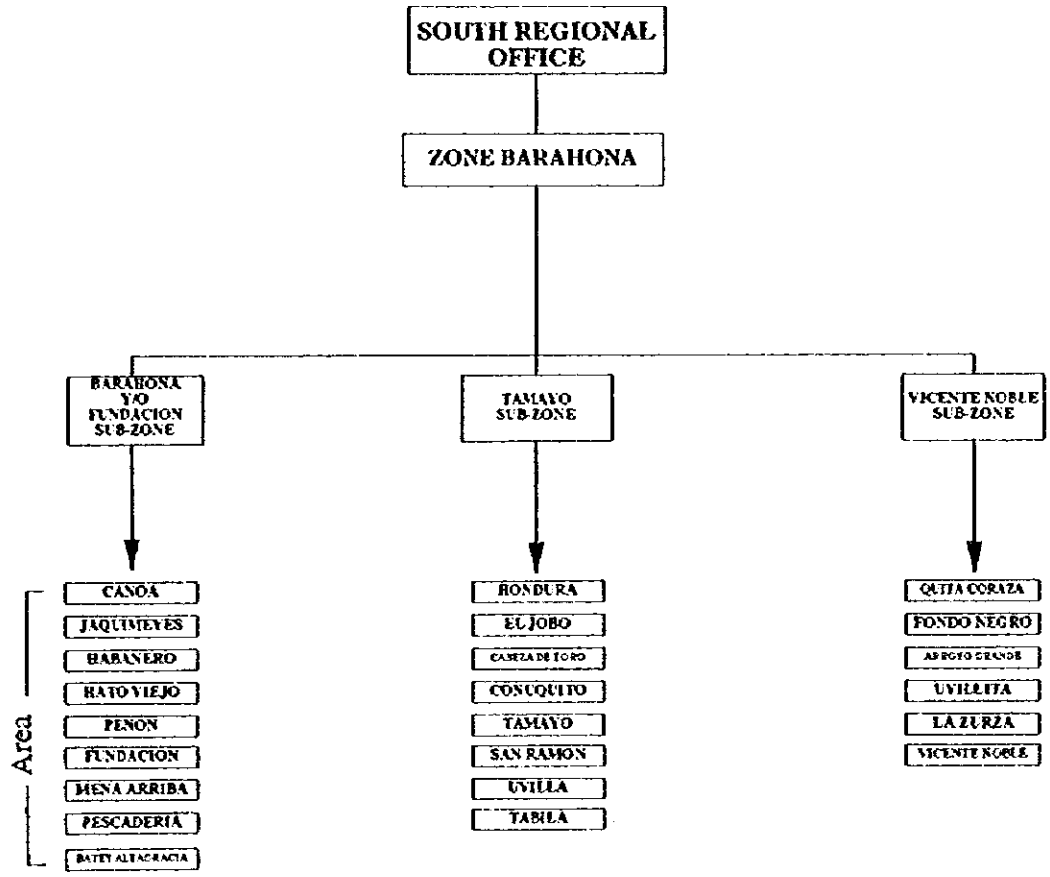
- Pick-up Truck Transportation (Auto Concho)
- Motor Bike Transportation (Moto Concho)

Gráfico 3.7.1 Organigrama del Departamento



SOURCE : SECRETARIA DE ESTADO DE AGRICULTURA . SUB-SECRETARIA DE EXTENSION, INVESTIGACION Y CAPACITACION AGROPECUARIA, 1997.

Gráfico 3.7.2 Sistema de Extensión en el Area de Estudio



SOURCE : SECRETARIA DE ESTADO DE AGRICULTURA . EXTENSION DEPARTMENT 1999.

Gráf 3.7.3 Arbol de Problema en el Servicio de Apoyo a la Agricultura

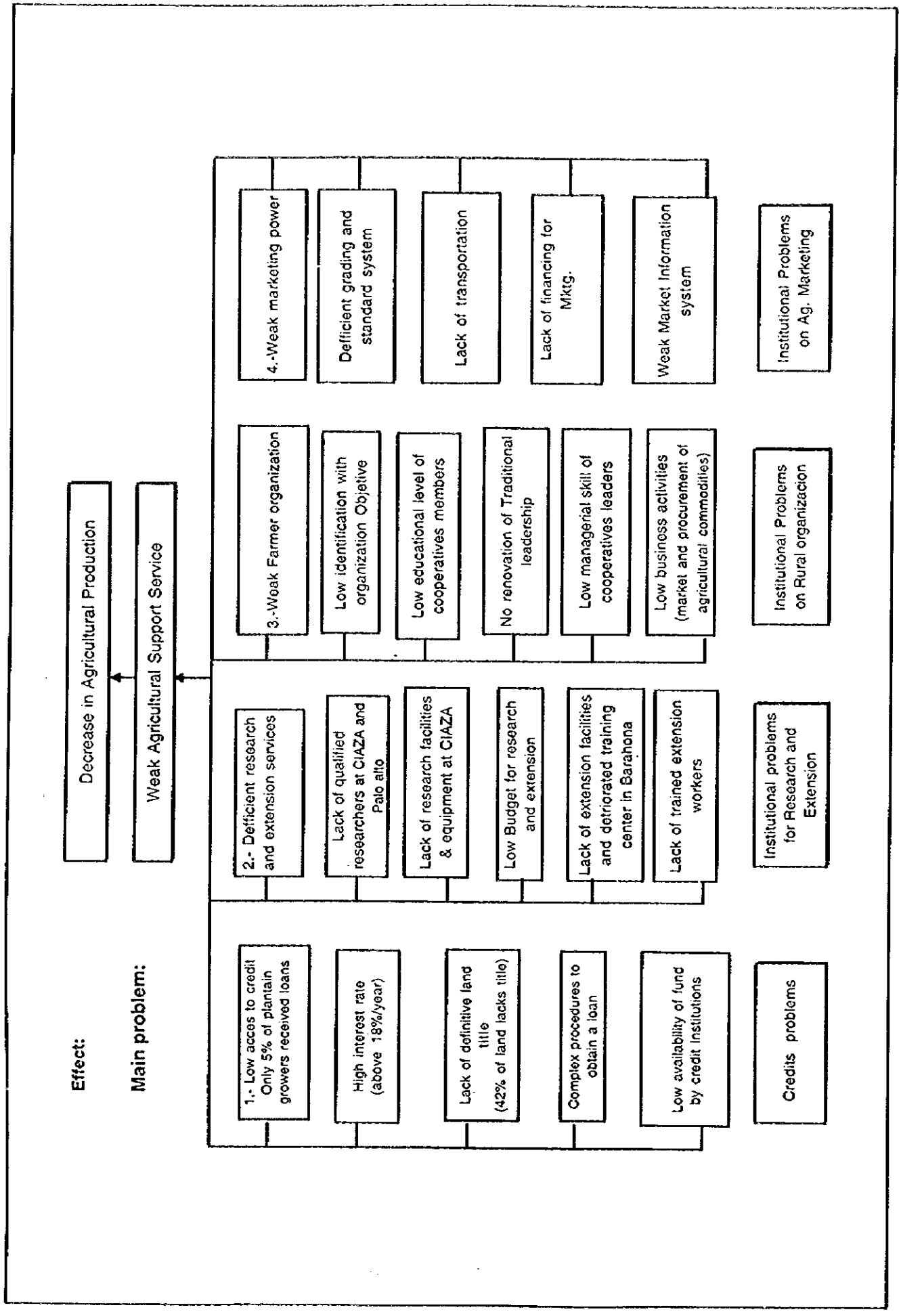


Gráfico 3.8.1 Distribución de Suelos Salinos

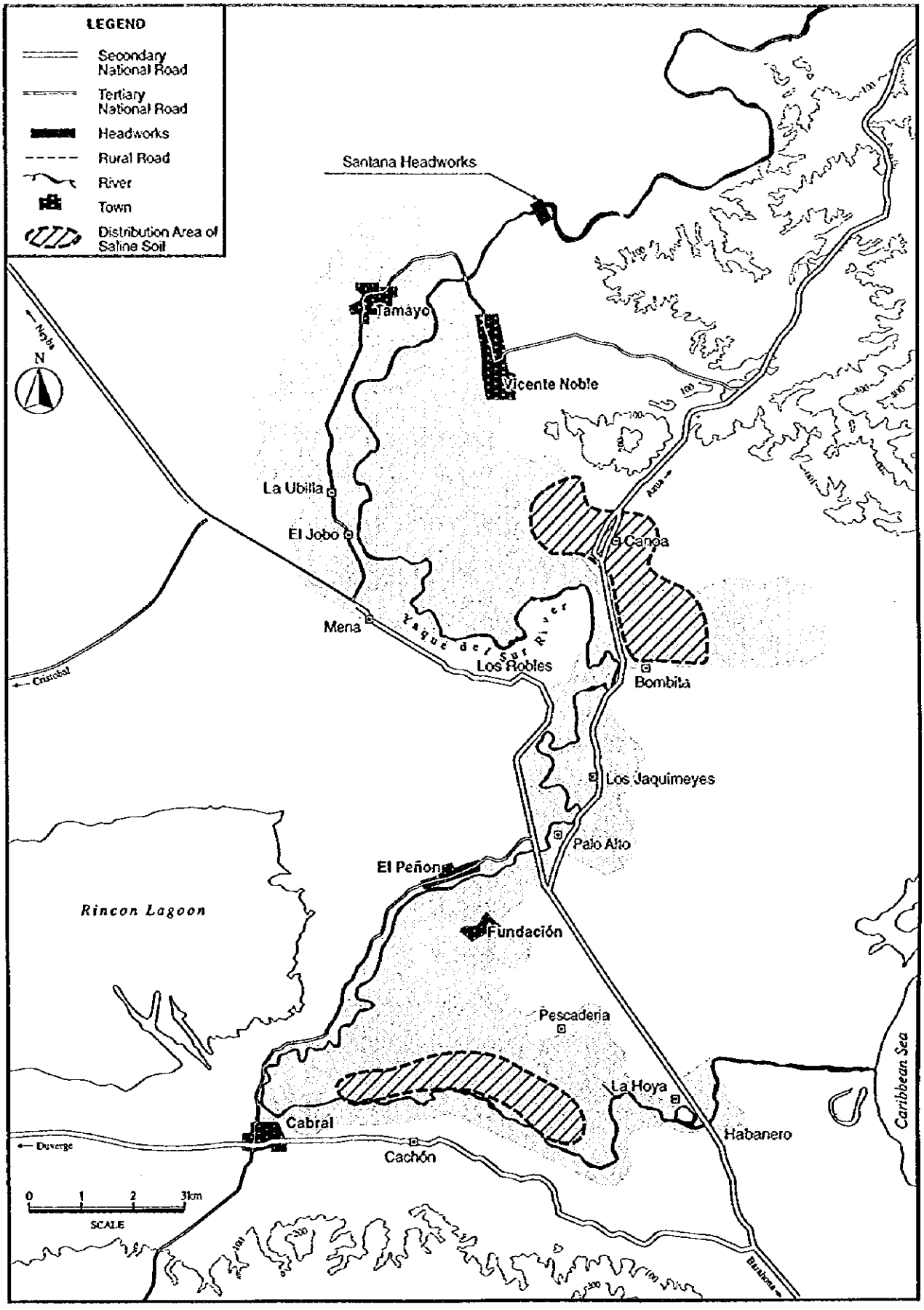


Gráfico 3.9.1 Ruta Seguida por el Huracán George

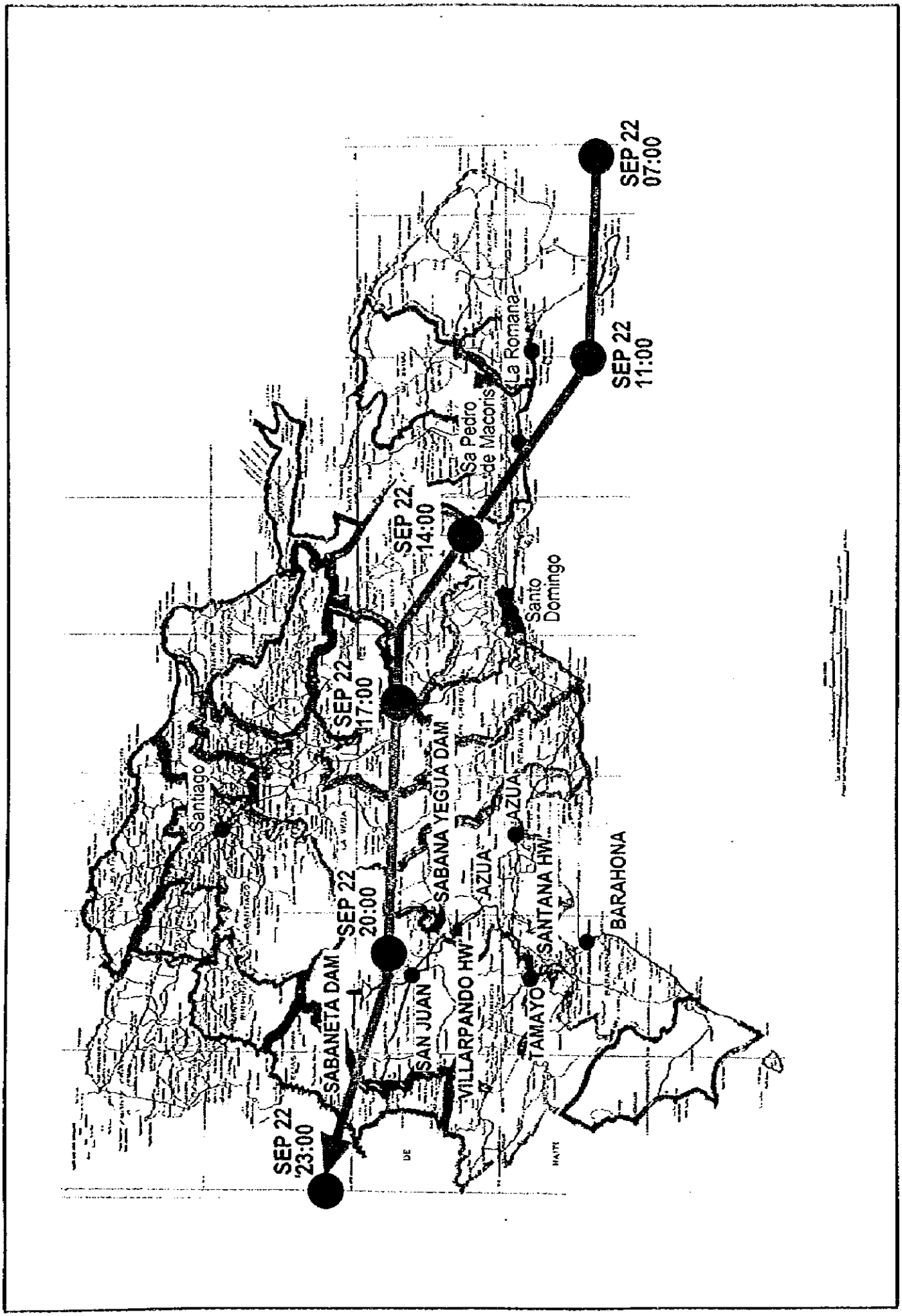


Gráfico 3.9.2 Hidrograma de la Avenida Durante el Huracán George (Presa Sabaneta)

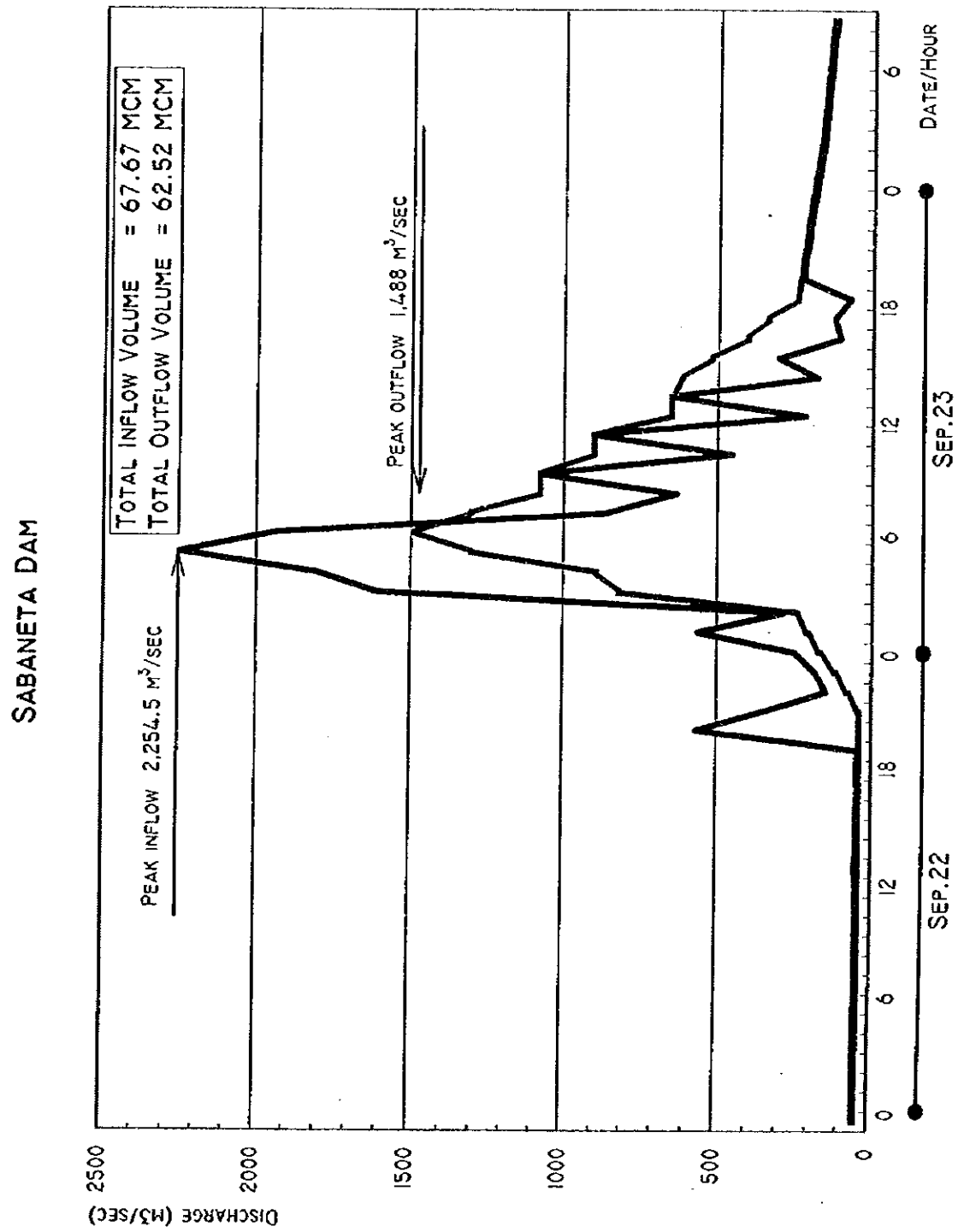


Gráfico 3.9.3 Hidrograma de la Avenida Durante el Huracán George (Presa Sabana Yegua)

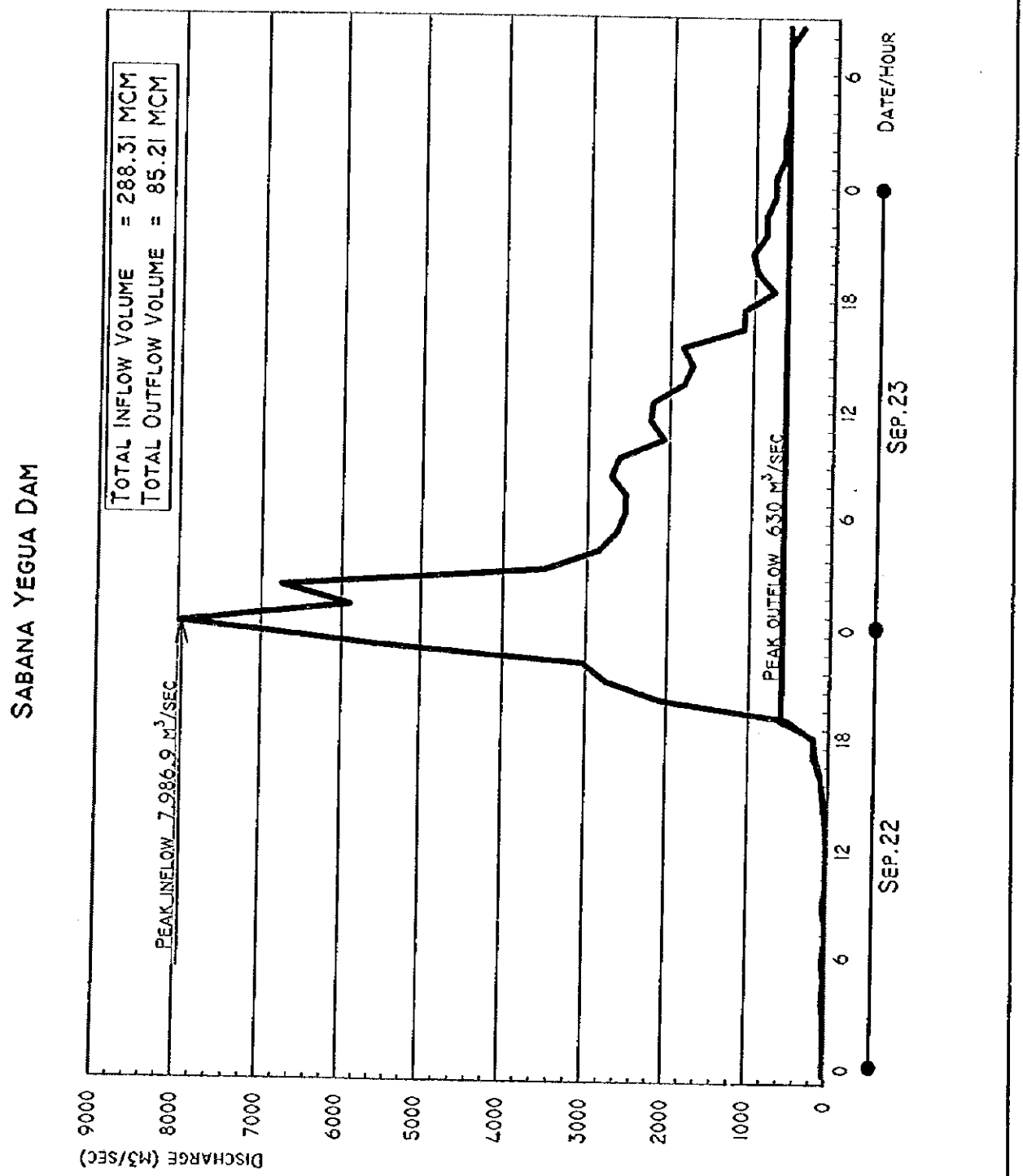
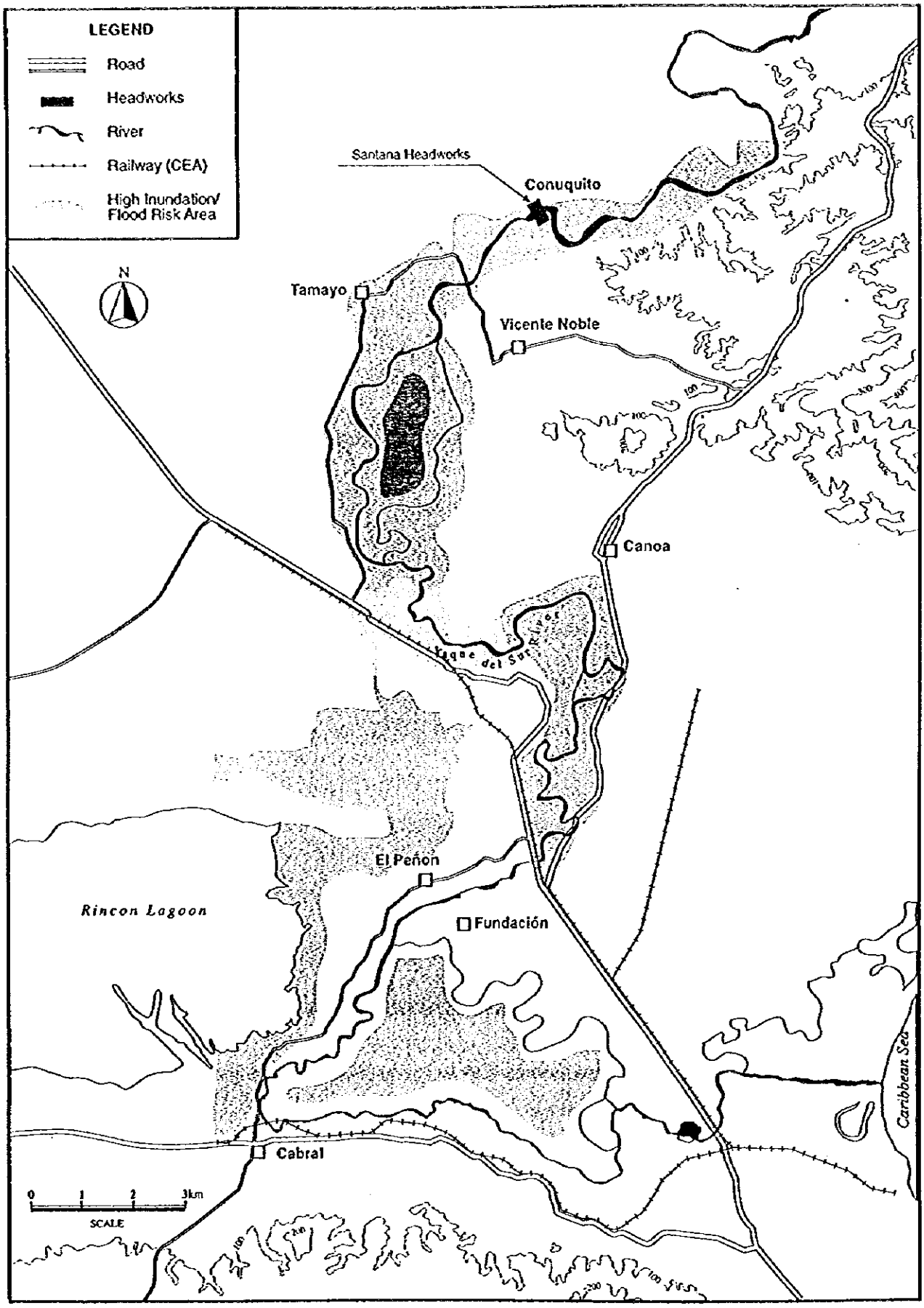
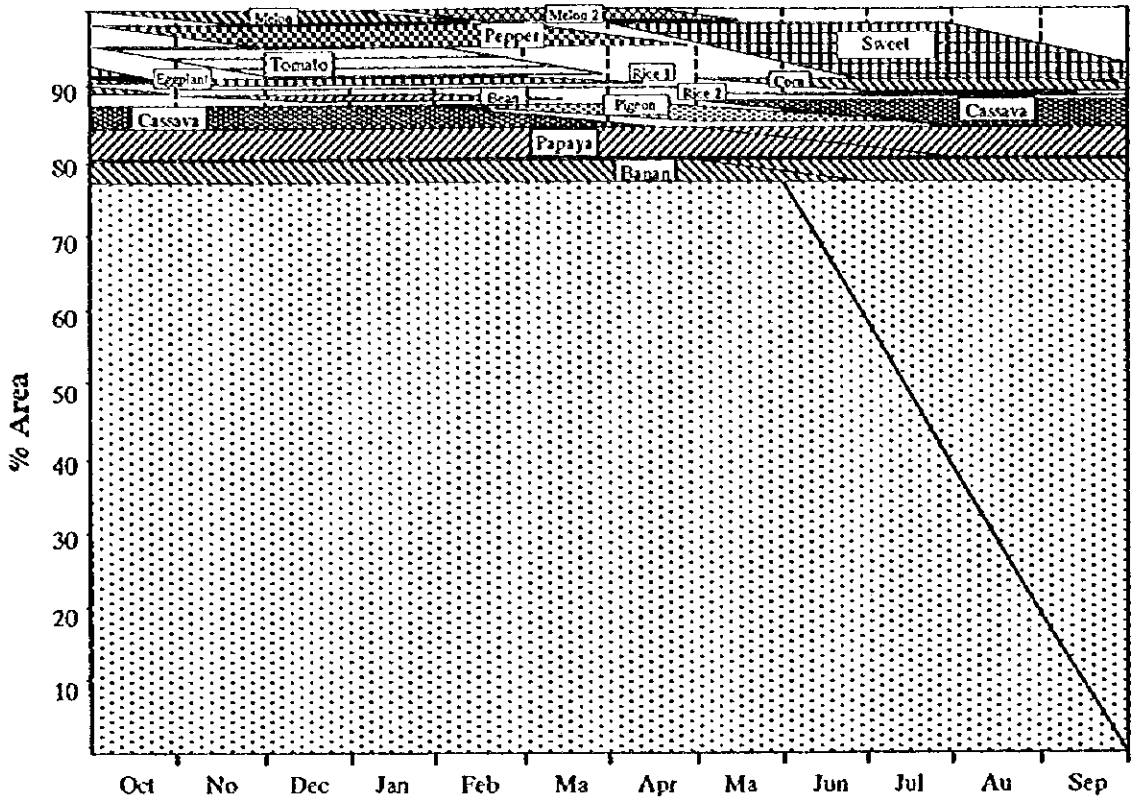
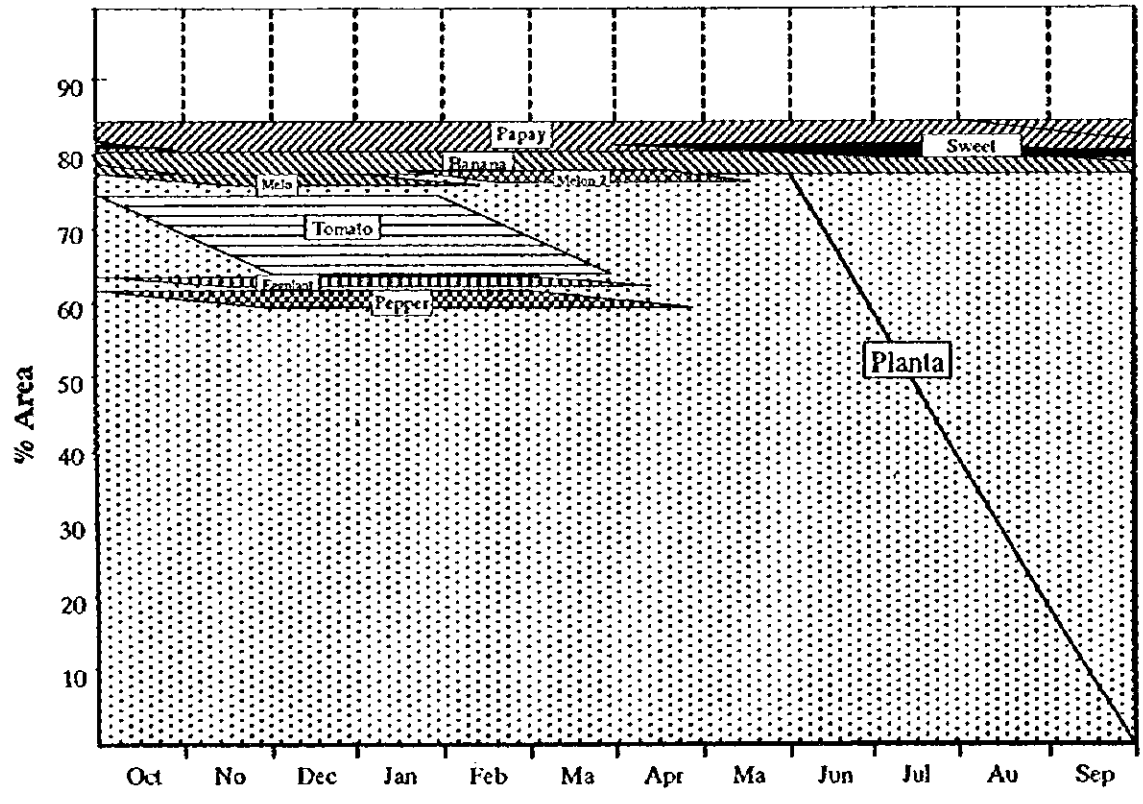


Gráfico 3.9.4 Areas Con Riesgo de Inundación



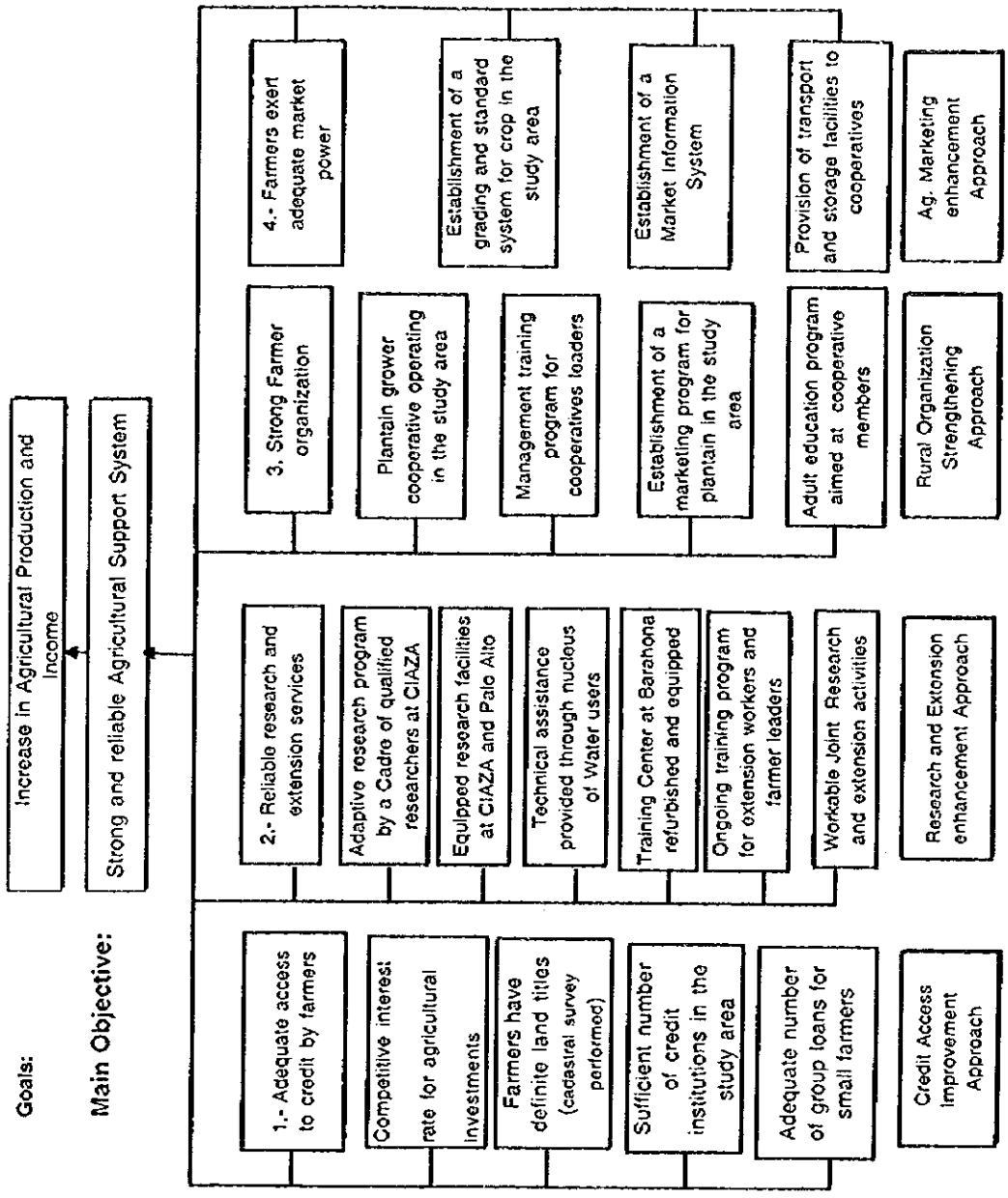


Proposed Cropping Pattern for the Project Area



Proposed Inter-Cropping Pattern with Plantain, Banana, and Papaya in

Gráf 4.3.1 Arbol de Objetivos en el Sistema de Servicios de Apoyo



Gráf. 4.3.2. Estructura Propuesta para los Servicios de Apoyo a la Agricultura en el Area del Proyecto

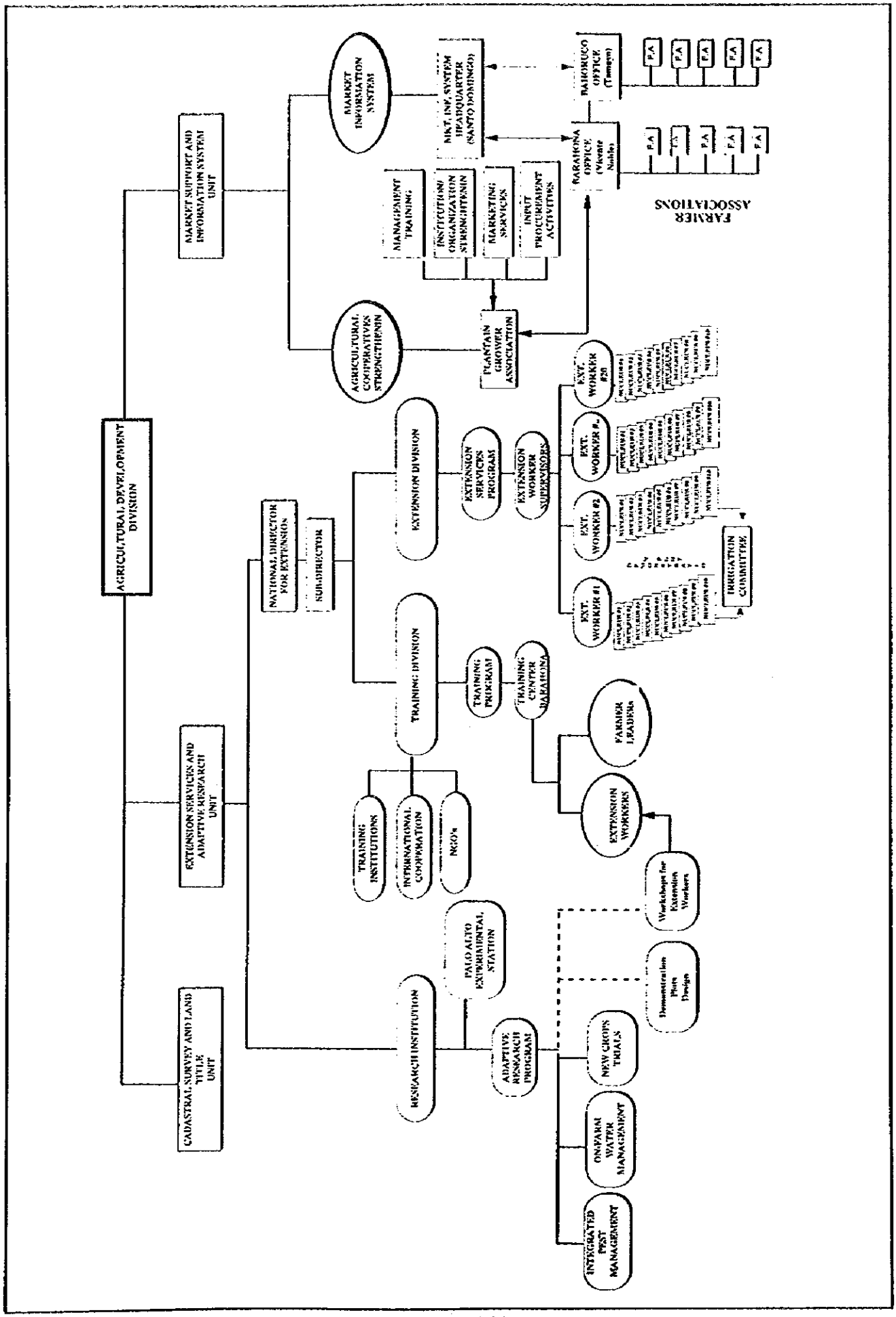
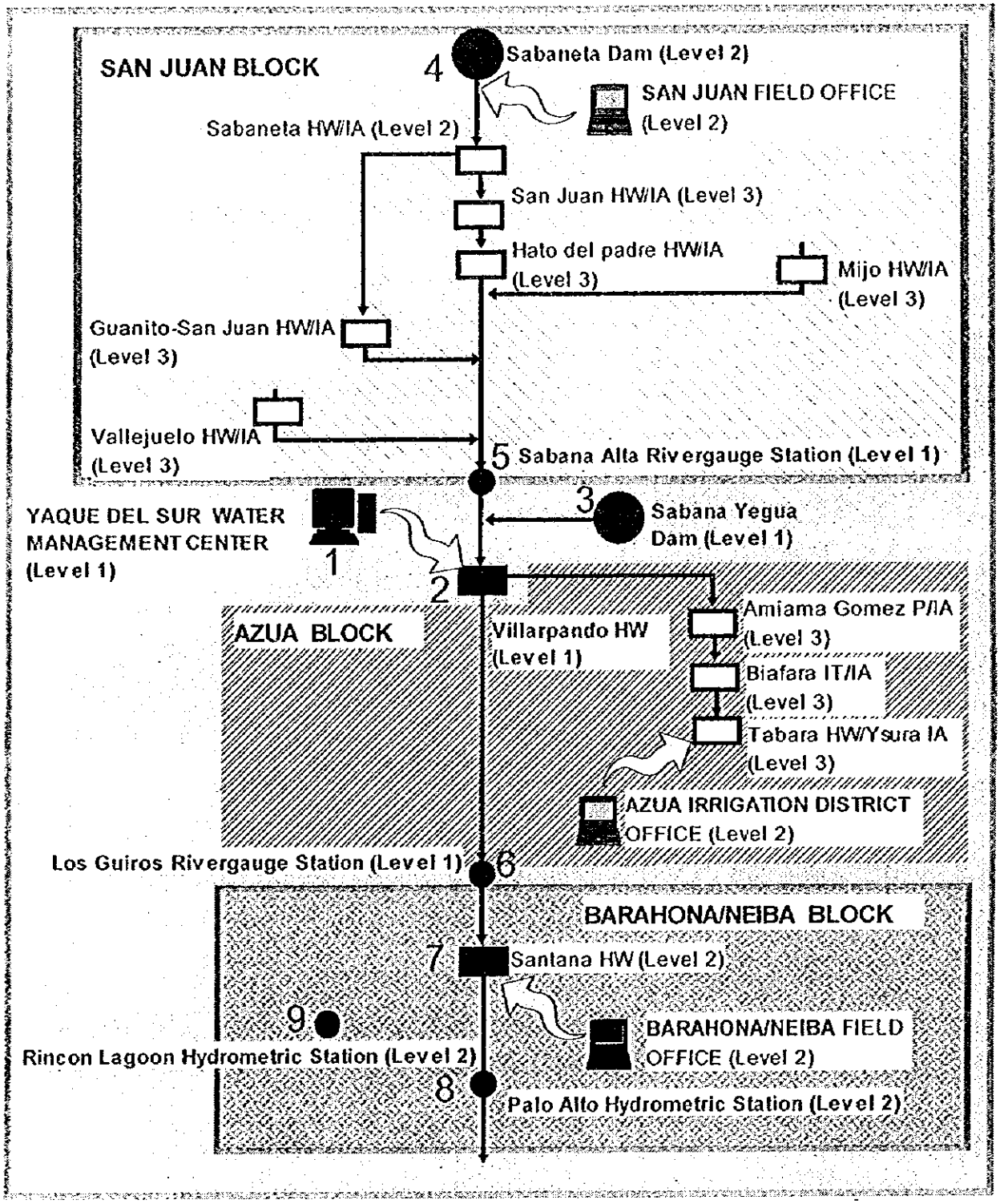


Gráfico 4.4.1 Sistema de Manejo General de Agua



LEGEND

Existing reservoir

Existing headworks

Facilities with telemetering/telecontrolling system

Note: HW; headworks
IA; irrigation area
IT; intake

Gráfico 4.4.2 Estaciones Telemétricas Propuestas

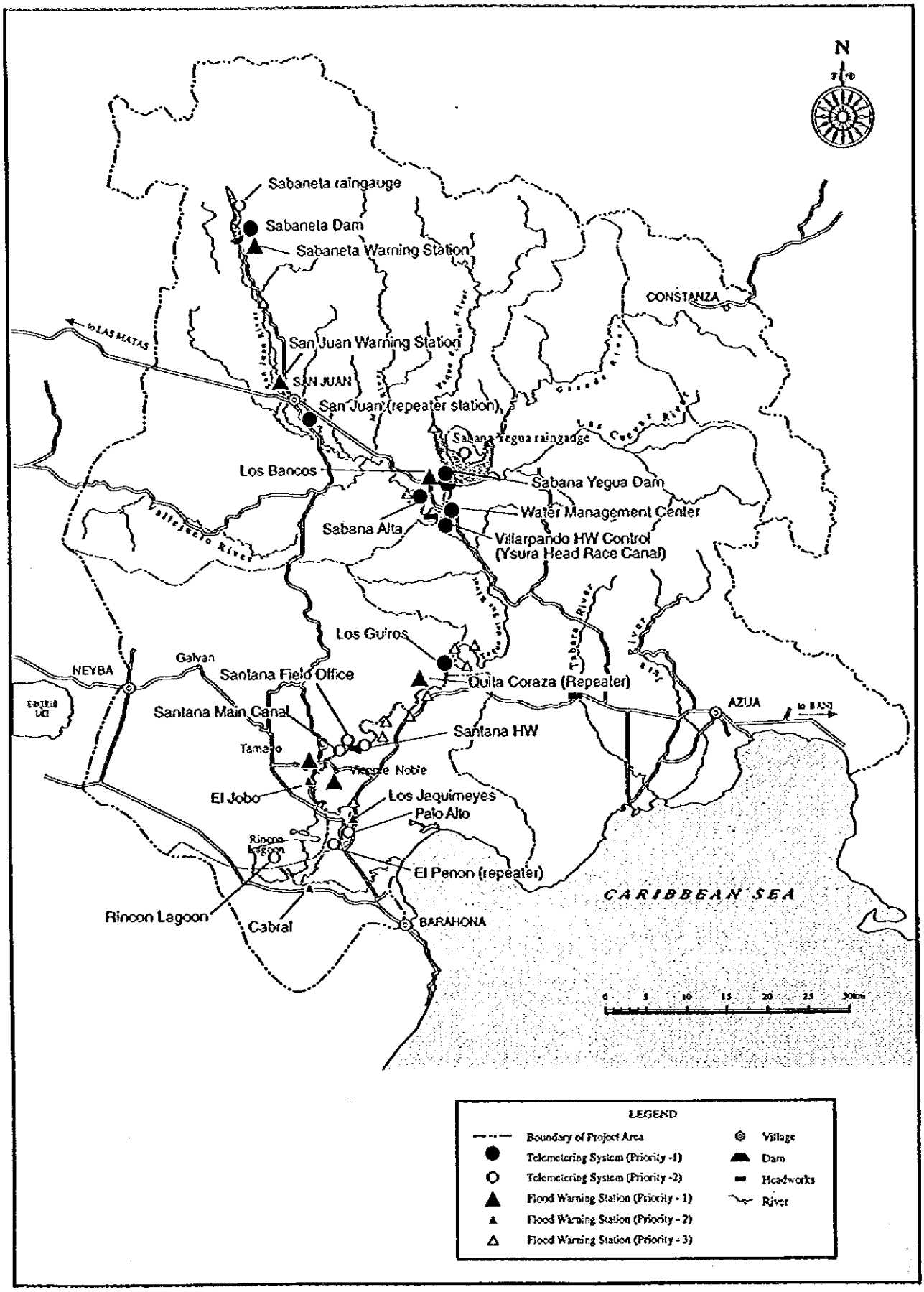


Gráfico 4.4.2 Estaciones Telemétricas Propuestas

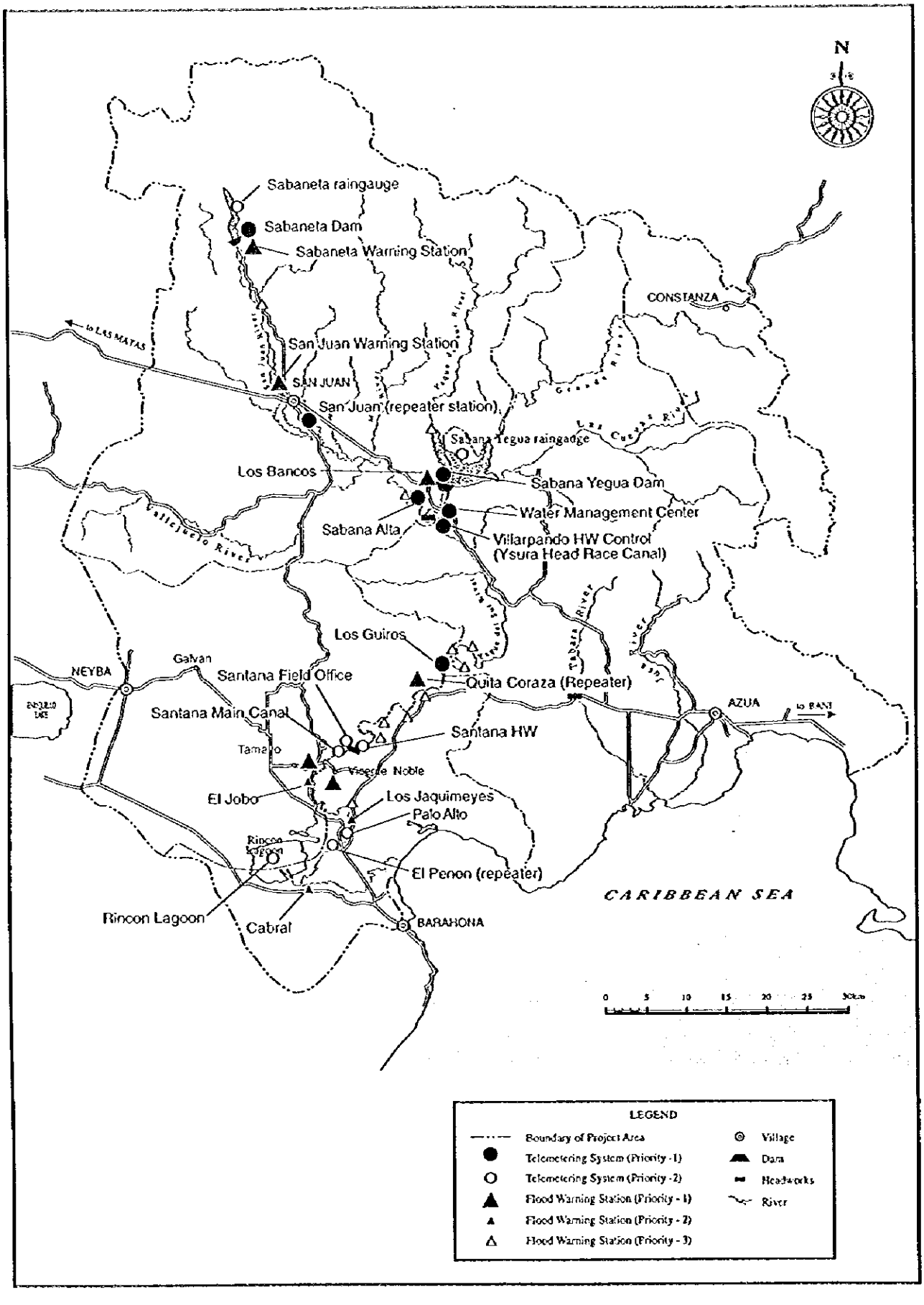


Gráfico 4.4.3 Organización para el Manejo de Agua

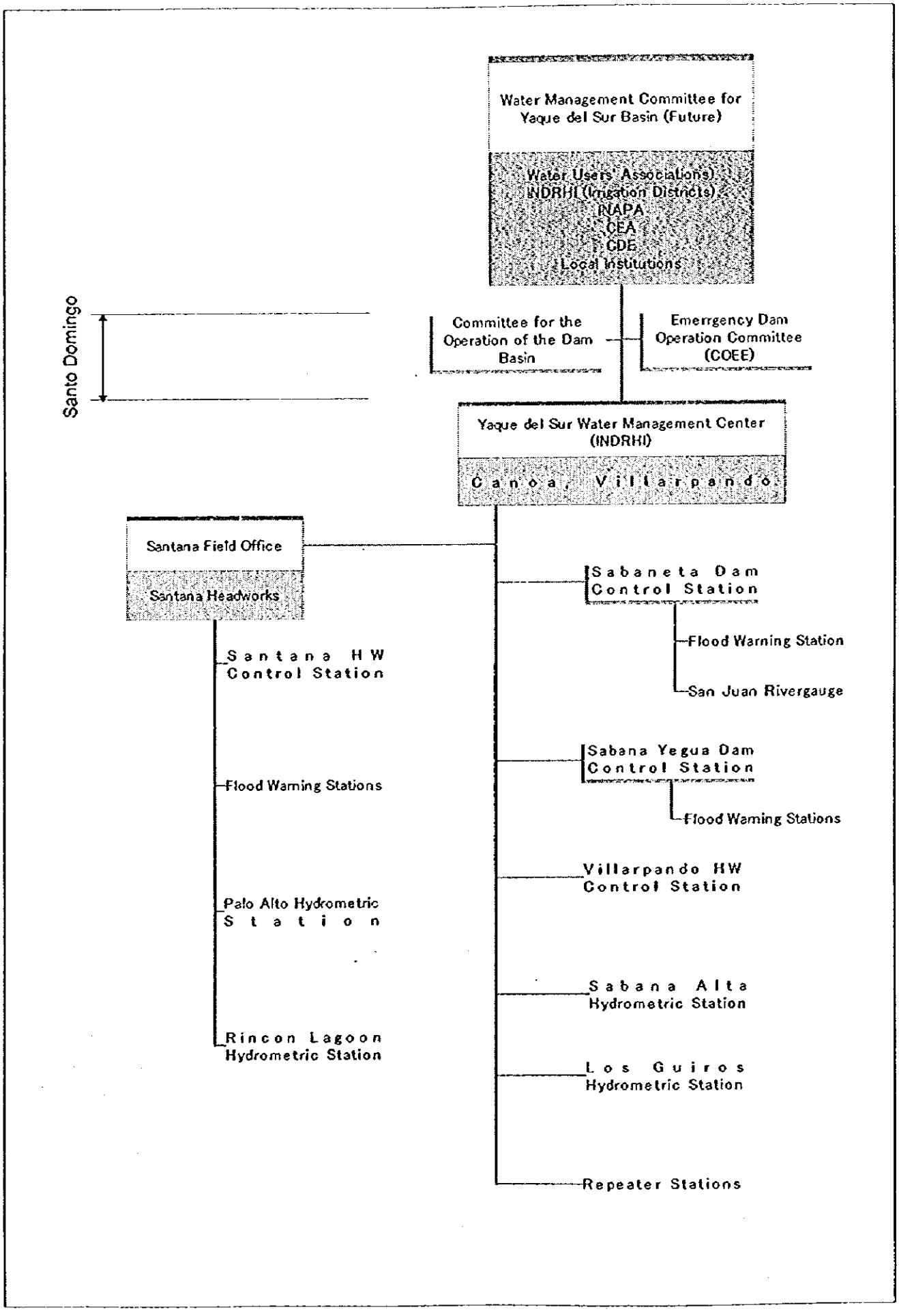


Gráfico 4.4.3 Organización para el Manejo de Agua

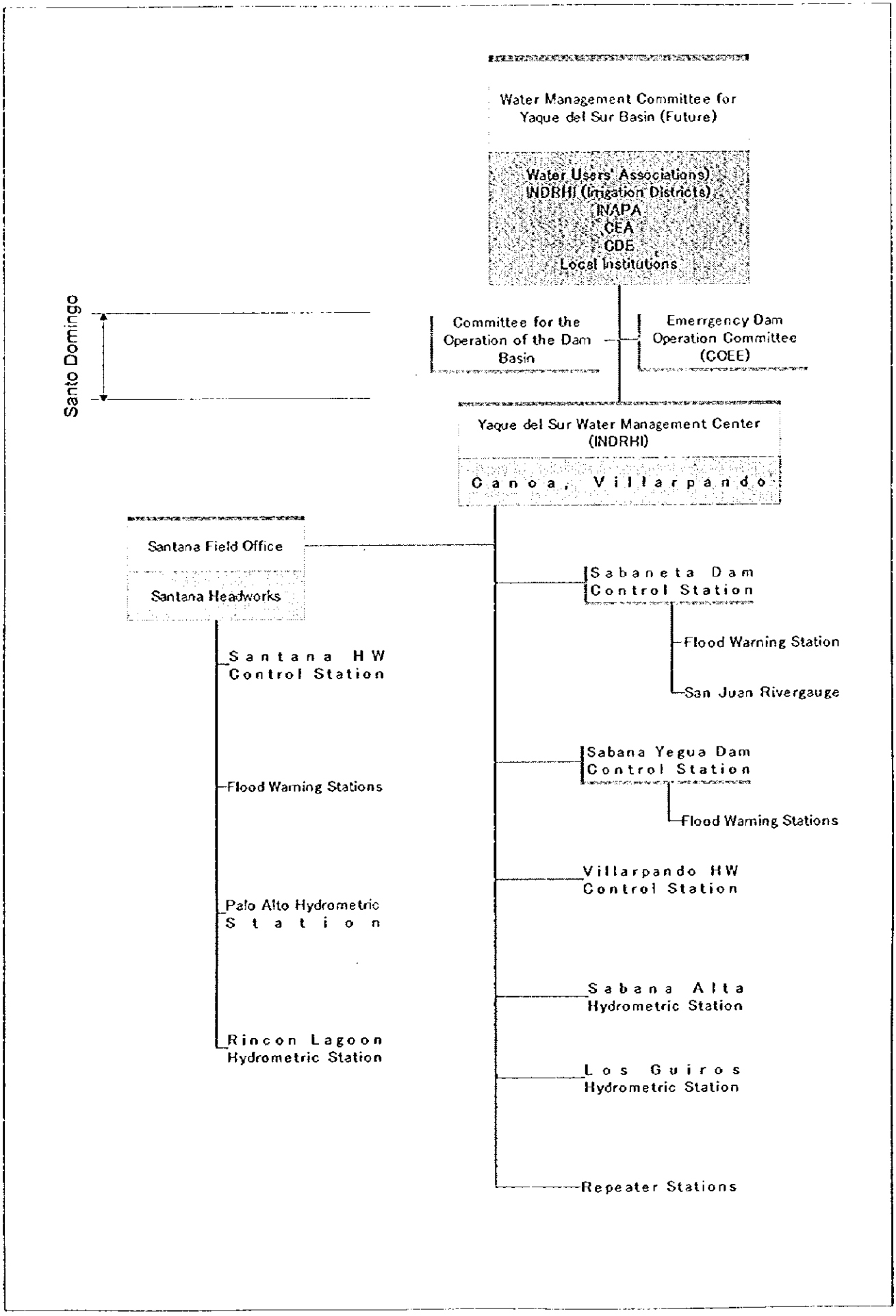


Gráfico 4.4.4 Centro de Manejo de Agua del Yaque del Sur

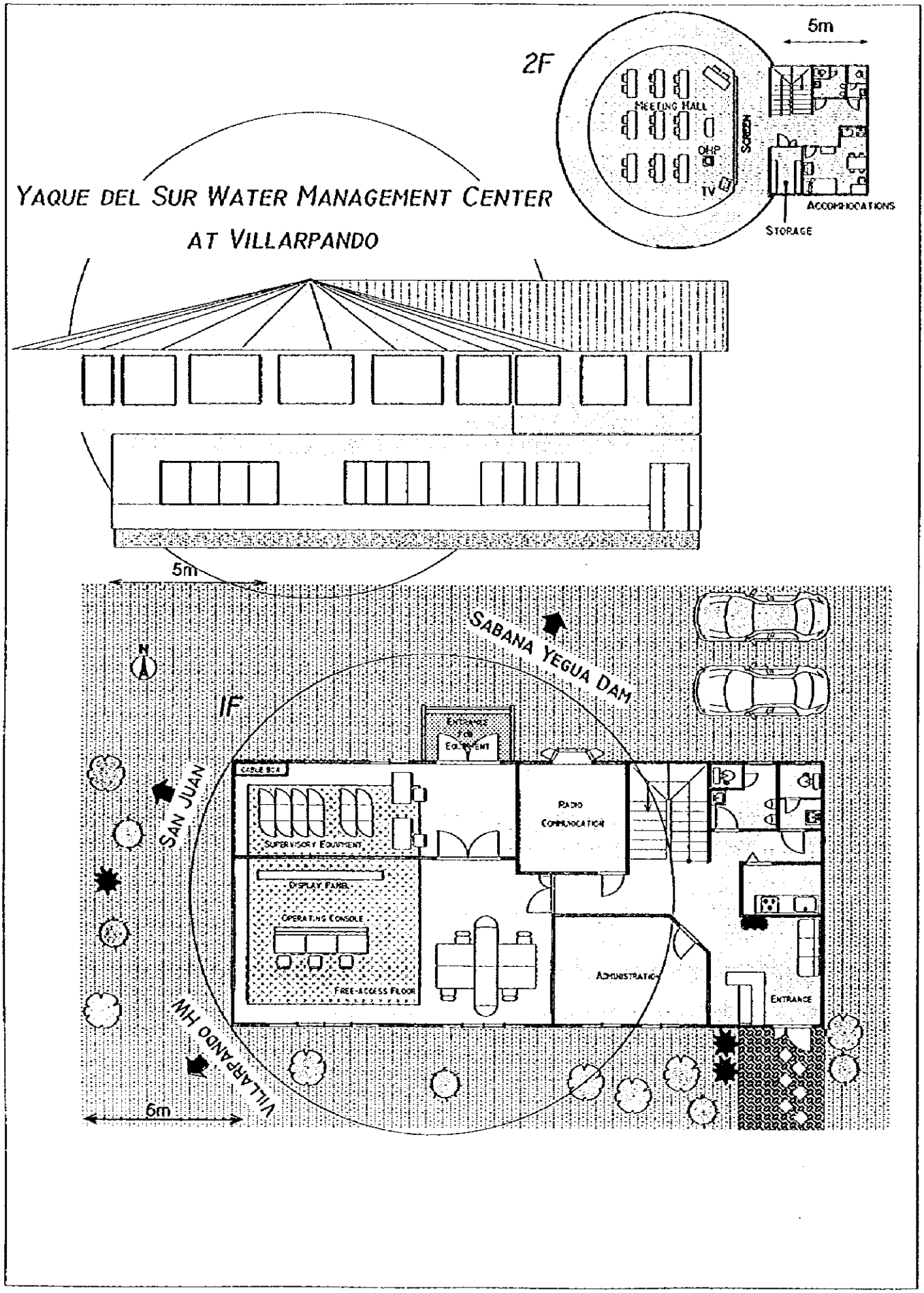
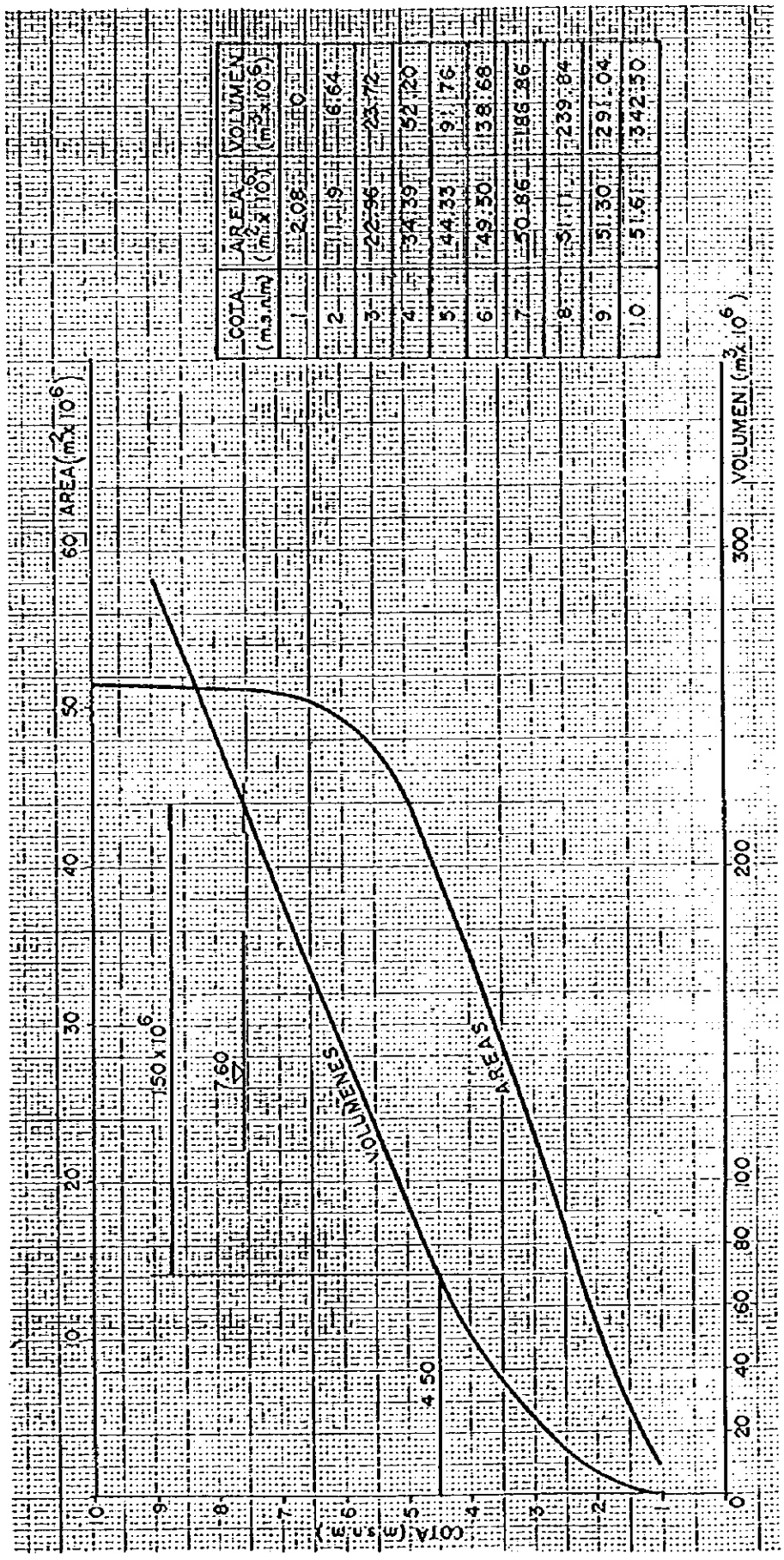


Gráfico 4.4.5 Curva de Almacenamiento de Agua de la Laguna de Rincón



Source: Informe Final, Proyecto Yaque Sur - Valle Neiba, Riego del Valle de Neiba,1974,(ITALCONSULT)

Gráfico 4.4.6 Resultados de las Investigaciones en la Laguna Rincón

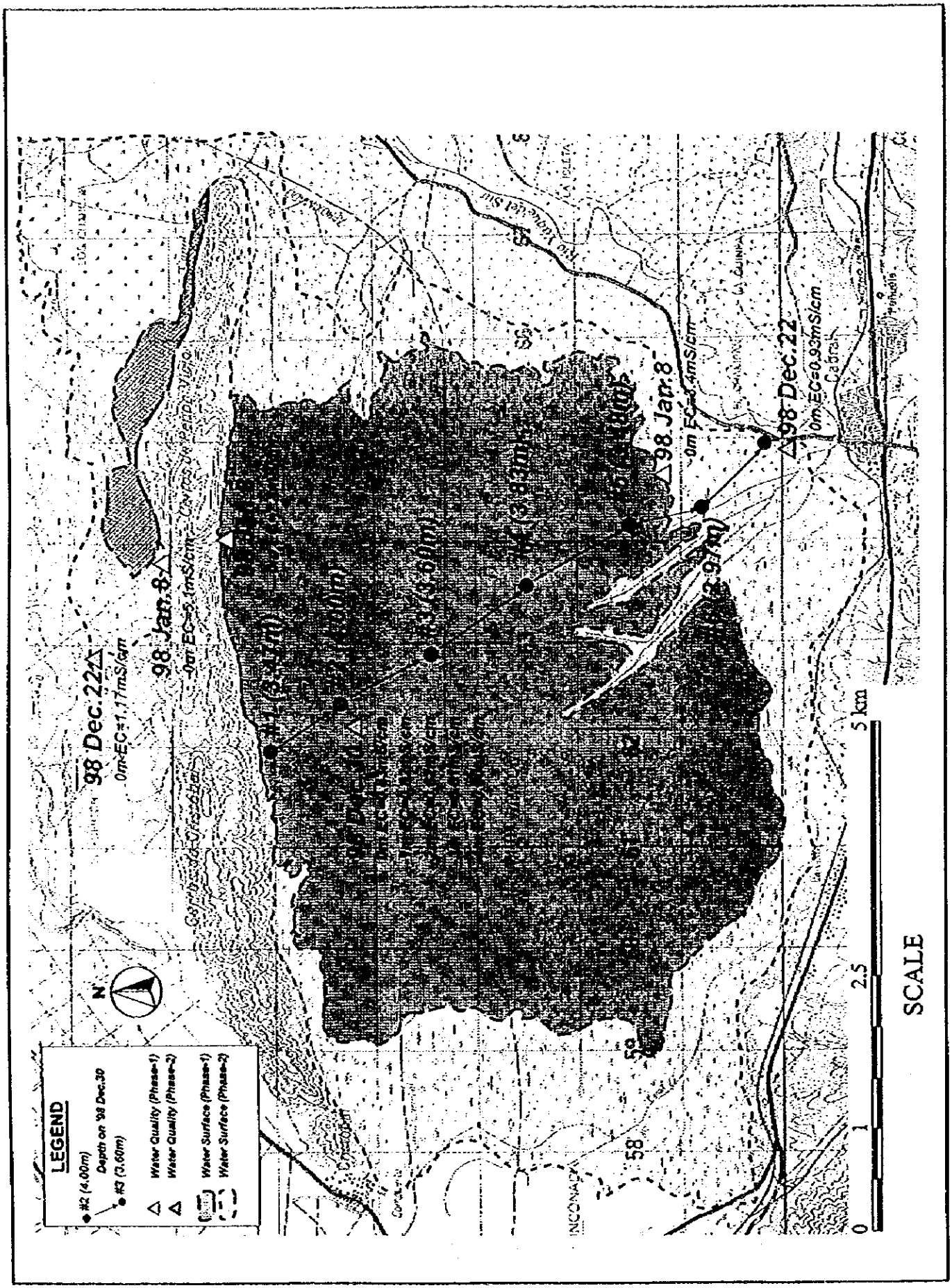


Gráfico 4.4.6 Resultados de las Investigaciones en la Laguna Rincón