Cuadro 3.5.6 Prueba de Campo para la Pérdida de Seepage en Canales Pequeños (1/2)

Site No.1 Site : Small field canal of Lateral H of Santana system in sugarcane field
Date : Jan. 14 1998

	Time				Seepage+ Evaporation Gauge reading (dial gauge)	Evaporation by dia. 28 cm pan		
			Lapse					
	(hour)	(min)	(min)	(min)	(mm)	(cc)	(cc)	(mm)
Ex.1	13	53	0	0	26.8	916		
	14	0	7	7	19.5			
	14	5	5	12	14.2			
	14	10	5	17	9			
	14	16	6	23	3.7			
	Result:	1.004	mm/min					
Ex.2	14	30	0	0	37.4			
	14	35	5	5	31.8			
	14	40	5	10	25.1			
	14	45	5	15	19.1			
	14	50	5	20	13.7			
	14	55	5	25	7.8			
	15	0	5	30	2.7	860	56	0.909
	Result:	1.157	mm/min					
Average :		1.081	mm/min					

Measurement of Canal Wetted Perimeter and Loss through Wetted Perimeter

Canal section	W.Surface Width, A	Water Depth	Wetted Perimeter, B	B/A	Loss through wetted perimeter	
	(m)	(m)	(m2/m)		(mm/min)	(litre/min.m2)
1	0.8	0.18	0.88	1.10	0.99	0.99
2	0.59	0.13	0.64	1.09	0.99	0.99
3	0.54	0.11	0.58	1.08	1.00	1.00
4	0.75	0.14	0.80	1.07	1.01	1.01
					Average	1.00

Note: No consideration of evaporation due to the small value compared with seepage.

Site No.2. Site : Small field canal of Lateral A of Santana system in sugarcane field
Date : Jan. 15 1998

	Time				Seepage+ Evaporation Gauge reading (dial gauge)	Evaporation by dia. 28 cm pan		
			Lapse					
	(hour)	(min)	(min)	(min)	(mm)	(cc)	(cc)	(mm)
Ex 2	13	0	0	0	41.5	500		
	13	5	5	5	38.7			
	13	10	5	10	35.0			
	13	15	5	15	33.0			
	13	25	10	25	30.4			
	13	35	10	35	27.2			
	13	45	10	45	24.5			
	13	55	10	55	21.8			
	14	5	10	65	19.5	474	26	0.42
	Average	0.274	mm/min					

Measurement of Canal Wetted Perimeter and Loss through Wetted Perimeter

Canal section	W.Surface Width, A	Water Depth	Wetted Perimeter, B	B/A	Loss through wetted perimeter	
	(m)	(m)	(m2/m)		(mm/min)	(litre/min.m2)
1	1.3	0.23	1.38	1.06	0.26	0.26
2	1.5	0.19	1.55	1.03	0.27	0.27
3	1.15	0.15	1.19	1.03	0.27	0.27
4	1.2	0.24	1.29	1.08	0.25	0.25
5	1.35	0.19	1.40	1.04	0.26	0.26
					Average	0.26

Note: Evaporation is neglected due to the small value compared with seepage.

Cuadro 3.5.6 Prueba de Campo para la Pérdida de Seepage en Canales Pequeños (2/2)

Site No.3 Site : Small field canal of Lateral D-1 of Santana system in sugarcane field Near Bomba de Agua town
Date: Jan. 26 1988

	Time		Lapse		Seepage+ Evaporation Gauge reading (dial gauge)	Evaporation by dia. 28 cm pan		
	(hour)	(min)	(min)	(min)	(mm)	(cc)	(cc)	(mm)
Ex.2	11	46	0	0	24.75	500		
	11	51	5	5	24.20			
	11	56	5	10	23.85			
	12	1	5	15	23.45			
	12	6	5	20	22.75			
	12	11	5	25	22.40			
	12	16	5	30	21.70			
	12	21	5	35	21.35			
	12	26	5	40	20.70			
	12	31	5	45	20.50			
	12	36	5	50	19.60			
	12	41	5	55	19.40			
	12	46	5	60	18.60			
	12	51	5	65	18.10			
	12	56	5	70	17.40			
	13	1	5	75	17.00	489	11	0.18
	Average	0.104 mm/min						

Measurement of Canal Wetted Perimeter and Loss through Wetted Perimeter

Canal section	W.Surface Width, A	Water Depth	Wetted Perimeter, B	B/A	Loss through wetted perimeter	
	(m)	(m)	(m2/m)		(mm/min)	litre/min.m2)
1	0.7	0.19	0.80	1.14	0.091	0.091
2	0.75	0.22	0.87	1.16	0.090	0.090
3	0.8	0.18	0.88	1.10	0.095	0.095
4	0.86	0.24	0.98	1.15	0.091	0.091
5	0.86	0.15	0.91	1.06	0.098	0.098
					Average	0.093

Note: Evaporation is neglected due to the small value compared with seepage.

Site No.4 Site : Small field canal of Lateral D-1 of Santana system in sugarcane field North, about 500 m from Santa Maria town
Date: Jan. 26 1988

	Time		Lapse		Seepage+ Evaporation Gauge reading (dial gauge)	Evaporation by dia. 28 cm pan		
	(hour)	(min)	(min)	(min)	(mm)	(cc)	(cc)	(mm)
Ex.2	14	33	0	0	29.50	489		
	14	38	5	5	28.50			
	14	43	5	10	27.00			
	14	48	5	15	25.30			
	14	53	5	20	23.95			
	14	58	5	25	22.70			
	15	3	5	30	21.10			
	15	8	5	35	19.80			
	15	13	5	40	18.40			
	15	18	5	45	17.30			
	15	23	5	50	15.80			
	15	28	5	55	14.30			
	15	33	5	60	12.65			
	15	38	5	65	11.47			
	15	43	5	70	9.60			
	15	48	5	75	8.70			
	15	53	5	80	7.30			
	15	58	5	85	5.85			
	16	3	5	90	4.40	474	15	0.24
	Average	0.281 mm/min						

Measurement of Canal Wetted Perimeter and Loss through Wetted Perimeter

Canal section	W Surface Width, A	Water Depth	Wetted Perimeter, B	B/A	Loss through wetted perimeter	
	(m)	(m)	(m2/m)		(mm/min)	(l/min.m2)
1	0.67	0.15	0.73	1.10	0.26	0.26
2	0.67	0.18	0.76	1.14	0.25	0.25
3	0.66	0.21	0.78	1.19	0.24	0.24
4	0.7	0.14	0.75	1.08	0.26	0.26
5	0.7	0.23	0.84	1.20	0.23	0.23
					Average	0.25

Note: Evaporation is neglected due to the small value compared with seepage.

Cuadro 3.5.7 Tasa de Toma Básica

Series of Soil	Basic Intake Rate (cm/hour)	Location
San Juan Zone		
J.J. Puello and San Juan Irrigation Area		
Unidad de Manejo 4	4.68	del Conjunto Canada Honda
Unidad de Manejo 5	4.65	del Conjunto Los Oroscos
Unidad de Manejo 5	3.31	del Conjunto Punta Cana
Unidad de Manejo 5	2.22	del Conjunto La Javilla
average	3.39	
Unidad de Manejo 6	2.77	del Conjunto Cana Seca
Unidad de Manejo 6	2.34	del Conjunto La Isla
Unidad de Manejo 6	3.17	del Conjunto Macasia
Unidad de Manejo 6	5.06	del Conjunto Carrera de la Ceiba
average	3.34	
Unidad de Manejo 7	9.91	del Conjunto Las Charcas, fase pedoregosa
Unidad de Manejo 8	0.28	del Conjunto Aeropuerto
Unidad de Manejo 8	0.08	del Conjunto La Higuera
average	0.18	
Unidad de Manejo 9	1.77	del Conjunto Yabano
Unidad de Manejo 9	1.50	del Conjunto La Pena
Unidad de Manejo 9	0.53	del Conjunto San Juan
Unidad de Manejo 9	0.70	del Conjunto Arroyo Loro
average	1.13	
Unidad de Manejo 10	0.77	del Conjunto La Pena
Unidad de Manejo 10	2.47	del Conjunto Yabano
Unidad de Manejo 10	0.35	del Conjunto Arroyo Loro
average	1.20	
Source: Estudio de Suelo Semi-Detellado de la Zona de San Juan de la Maguana		
Realizado por : Secretoria de Estado de Agricultura, Departomento Tieras Y Agua		
Azua Zone		
1	4.86	Rio Tabara-Rio Palmarejo
2	2.28	Rio Palmarejo-Rio Tabara
3	2.88	Cons.Pueblo Viejo
4	0.48	
5	2.46	Cons. Ansonia
6	0.84	Ansonia-Loa Jobillos
7	3.78	Cons. Ansonia
average	2.51	
Source: Estudio de Suelo Semi-Detellado de Azua		
Realizado por : Secretoria de Estado de Agricultura, Departomento Tieras y Agua		
Brahona-Neiba Zone		
De la Serie Fundacion	1.2	
De la Serie Canoa	1.1	
De la Serie Tamayo	0.4	
De la Serie Vicente Noble	0.8	
Average	0.88	
Source: Division de Agrologio del INDRHI, year1982		
Canal seepage loss experimented		
Field canal of Lateral H	6.00	near Mena along the Palo Alto-Neiba highway
Field canal of Lateral A	1.57	near Santana town
Field canal of Lateral D-1	0.56	near Bomba de Agua town
Field canal of Lateral D-1	1.48	North, about 500 m from Santa Maria town
Average	2.40	

Cuadro 3.6.1 Infraestructura Rural en el Censo de 1993

	Water Supply	Electricity Supply	Rabbish Disposal Service	Sanitary Service
	(%)	(%)	(%)	(%)
Azua (Whole Province)	(65)	(70)	(47)	(71)
Azua (Project Area)	**64**	**70**	**48**	**72**
1 Azua de Compostela	69	77	54	78
2 Guayabal	55	33	41	82
3 Las Charcas	69	81	41	73
4 Las Yayas de Biajama	47	54	41	62
5 Padre Las Casas	50	50	34	60
6 Peralta	59	69	54	67
7 Sabana Yegua	62	75	64	79
8 Tabara Arriba	76	80	51	65
9 Estebania	75	61	38	75
10 Pueblo Viejo	67	88	43	73
San Juan (Whole Province)	(56)	(56)	(34)	(66)
San Juan (Project Area)	**55**	**62**	**37**	**68**
1 San Juan De La Maguana	59	64	39	72
2 Bohechio	38	58	33	62
3 Juan De Herrera	42	60	27	56
4 Vallejuelo	52	49	42	52
Barahona (Whole Province)	(72)	(82)	(43)	(83)
Barahona (Project Area)	**76**	**90**	**53**	**84**
1 Santa Cruz de Barahona (Capital)	81	93	55	89
2 Cabral	80	86	51	72
3 Vicente Noble	47	84	47	77
4 El Penon	84	85	46	83
5 Fundacion	86	84	46	87
Bahoruco (Whole Province)	(57)	(66)	(29)	(67)
Bahoruco (Project Area)	**58**	**67**	**33**	**68**
1 Neyba	64	62	39	70
2 Galvan	34	61	21	57
3 Tamayo	64	72	43	80
4 Uvilla	57	80	18	56
La Vega (Project Area)	**57**	**73**	**49**	**83**
1 Constanza	57	73	49	83
Independencia (Project Area)	**59**	**65**	**56**	**44**
1 Mella	67	87	28	80
2 Cristobal	55	55	69	25
Total (Project Area)	**62**	**71**	**44**	**73**
National Average	**67**	**82**	**56**	**88**

Cuadro 3.6.2 Inventario de los Sistemas de Acueductos de INAPA

Projec	Treatment Plant	System	Population		Water Source	Intake	Discharge (ft/sec)	
			Actual	Future			Actual	Future
Azua								
Acueducto Multiple Las Lomas	Simple Chlorination	Gravity	3,168	5,069	Jabon River		9.9	15.8
Acueducto Sabana Yegua	Simple Chlorination	Gravity	13,543	15,432	Yaque Del Sur	Intake Weir		
Acueducto Multiple San Antocio	Simple Chlorination	Pump	4,434	7,094	Groundwater		9.62	15.39
Barrios Nuevos		Gravity	13,358	21,372				
Barreras	Simple Chlorination	Gravity / Pump	3,450	5,520			7.49	11.98
Acueducto Multiple Villapando	Filteration	Bombeo	3,240		Groundwater			
Las Charcas			5,375	8,600	Grande River	Caucasian Intake		
Acueducto Mult. De Asocia		Pump	10,265	13,325	Groundwater		43.38	59.95
Azua		Pump	60,814		Groundwater and Azua River			
Padre Las Casas		Gravity	5,998	9,597	Las Cuevas River			
Bohechio		Pump		3,583	Al Medio River			
Estebania		Pump	4,950		Groundwater			
Las Charcas		Pump	7,680		Groundwater			
Peralta		Gravity		5,244	Jura River			
Mult. La Estancia		Pump		7,878	Groundwater			
Mult. Pueblo Viejo		Pump		6,566	Groundwater			
Mult. Los Jovillos		Pump		4,214	Groundwater			
Mult. Guayabal		Gravity		3,585	Guayabal River			
Las Yayas De Viajama		Pump	7,512	9,765	Groundwater			
Hatillo		Pump	882	1,411	Groundwater			
Mult. Villarpando		Pump		3,243	Groundwater			
Mult. Tabara Arriba		Pump		13,920	Tabara River			
Mult. Tabara Abajo (P.F.)		Gravity		6,134	Tabara River			
Los Tramojos		Gravity		1,936	Cisterna			
Mult. Hato N. De Cortes		Pump		9,939				
Azuana Gomez-Blafara Lup.		Pump		2,925	Groundwater			
San Juan								
Acueducto Multiple Arroyo Dulce		Pump						
El Higuero-Madrigal		Pump	4,074	6,909			8.84	14.93
Acueducto Multiple De Cabral		Pump	24,033	37,821	Groundwater		52.15	83.44
Acueducto Mult. Enriquillo-Oviedo	Rapid Filteration and Chlorination	Gravity / Pump	26,400	42,240	Nizaito River		68.73	110
Acueducto Fondo Negro-Quita Coraza	Filteration	Pump	6,336	10,138	Yaque del Sur River		13.75	22
Acueducto Mult. Polo Los Arroyos	Simple Chlorination	Gravity	4,428	7,085	Surface Water	Intake Box	9.61	15.38
Acueducto Mult. Las Salinas	Filteration	Gravity	11,562	18,499	Saladillo Canal		25.09	50
Acueducto Ven A Ver	Simple Chlorination	Gravity	1,470	2,352	Acueducto Mult. Duverge		3.75	6
Acueducto Vicente Noble		Pump	13,333	21,333	Yaque del Sur River		28.93	46.3
Acueducto Mult. Loma Del Yaque	Simple Chlorination	Pump	3,972	5,941	Yaque del Sur River		8.63	12.9
Acueducto Las Matas De Farfan	Filteration	Gravity	28,296	45,274	Macasia River	Caucasian Dike	81.88	130
Acueducto Mult. Punta Cana-Arroyo Loro	Filteration	Gravity	2,172	3,775	Jose J. Puello Canal		4.71	7.54
Acueducto Mult. Rosario-Pueblo Nuevo-Cardon		Pump	11,520	18,432	Surface Water		25	40
Acueducto Multiple De Sabaneta	Simple Chlorination	Gravity	17,571	8,531	La Canita River		16.43	18.53
Acueducto Mult. El Corbano- La Mesopotamia	Rapid Filteration and Chlorination	Gravity	17,280	27,648	Sist. Independiente	Dike constructed by INDRHI	62.5	100
Acueducto Bebor Babor Barranca	Filteration	Gravity	2,448	5,539	Seco River		3.9	8.8
Acueducto Bohechio	Simple Chlorination	Pump	4,260	9,816	Rio Medio		15.4	24.65
Acueducto Mult. Canoa Los Bancos	Filteration	Pump	6,408	10,252	Yaque del Sur River		13.9	22.24
Acueducto Carreras De Yeguas	Filteration	Gravity	5,820	9,312		Dique Caucasiano	12.63	20.21
Acueducto Mult. El Cercado	Filteration	Gravity	9,216	14,746	Vallejuelo River		23.33	40
Acueducto Cuesta La Culata	Simple Chlorination	Pump	2,712	4,339	Groundwater		7.87	9.41
Acueducto Mult. Las Charcas De Maria Nova	Filteration	Gravity	4,044	6,470	Babor River		8.76	15
Acueducto Los Jobos	Simple Chlorination	Pump	900	1,440	Surface water, Maria Simon Spring		3.66	7
Acueducto San Juan		Gravity	133,588	21,372			48.31	77.31
Barabona								
Acueducto Multiple De Polo-Los Arroyos	Simple Chlorination	Gravity	4,428	7,085	Surface Water, Juan Moral River	Intake Box	9.61	15.38
Acueducto Multiple De Las Salinas	Filteration	Gravity	11,562	1,849	Saladillo Canal		25.09	50
Acueducto San Rafael		Gravity	675	1,078	San Rafael		1.46	2.34
Acueducto Ven A Ver	Simple Chlorination		1,470	2,352	Acued. Multiple Duverge		3.75	6
Acueducto Vicente Noble		Pump	13,333	21,333	Yaque del Sur River		28.93	46.3
Acueducto Pescaderia		Pump			Groundwater			
Acueducto Cabral		Pump			Groundwater and Spring			
Independencia								
Acueducto Multiple La Descubierta Bartolome	Filteration	Pump	8,267	13,227			14.47	2.15
Acueducto Multiple Duverge	Rapid Filteration	Gravity	13,500	21,600	Las Damas River	Direct Sead Dike Intake	65.5	100
Acueducto El Guayabal	Simple Chlorination	Pump	1,405	2,248	Guayabal		3.06	4.87
Acueducto Jimani	Rapid Filteration	Gravity	8,000	12,800		Lateral Intake Box	33.33	53.33
Acueducto Pastor Rio	Double Filteration	Gravity	2,822	4,525	Caliente Canal	Box Type	6.12	9.83
Baboruco								
Acueducto Muelle Urvilla El Jobo	Simple Chlorination	Pump	2,754	4,406	Groundwater		5,989.56	
Acueducto Villa Jaragua			13,010	20,816	Cercano Spring		28.23	45.17
Acueducto Multiple Mena	Simple Chlorination	Pump	2,448	3,917	Groundwater		5.31	8.5
Acueducto Multiple La Cienega Baboruco	Simple Chlorination	Gravity	7,926	12,682	Baja Guate Spring		47.2	27.22
Acueducto Galvan	Filteration	Gravity	9,404	15,046	Majagual Canal	Direct	20.41	23.15
Acueducto De Neyba	Filteration	Gravity	30,208	33,333	Manguito River	Caucasian Intake	60.28	96.45
Acueducto Los Rios Las Clavellinas	Double Filteration	Gravity	5,334	8,534	Barrero River	Direct		
Acueducto Multiple Tamayo	Filteration	Pump	11,568	18,500	Yaque del Sur River		32.52	50.42
Acueducto El Palmar		Pump	1,332	2,131	Groundwater		4.14	5.09
Acueducto Mult.Santana Conuquito		Pump	1,378	2,388	Groundwater			

Source : INAPA, 1998

Cuadro 3.6.3 Inventorio de Estaciones Hidroeléctricas

		1. Sabana Yegua Hydropower Station	2. Sabaneta Hydropower Station
Location		Sabana Yegua, Azua province	San Juan de la Maguana, San Juan province
Water Source		Yaque del Sur river	San Juan river
Capacity of the Generating Plant		13,000 kW	6,400 kW
Generating Power	Rainy season	6.5 GWh/month	3.0 GWh/month
	Dry season	3.0 GWh/month	1.3 GWh/month
Type of plant / turbine		Vertical Francis type	Vertical Francis type
Operation hour	Rainy season	24 hrs/day	18 hrs/day
	Dry season	16 hrs/day	12 hrs/day
Construction year		1980	June, 1981
Construction cost		RD$97,000,000	RD$57,500,000

		3. Las Damas Hydropower Station	4. El Salto se Constanza Hydropower Station
Location		Duverge, Independencia province	Constanza, La Vega province
Water Source		Las Damas river	El Salto river
Capacity of the Generating Plant		7,500 kW	606 kW
Generating Power	Rainy season	2.6 GWh/month	1.1 GWh/month
	Dry season	2.9 GWh/month	2.0 GWh/month
Type of plant / turbine		Horizontal Pelton type	Cross flow type
Operation hour	Rainy season	24 hrs/day	-
	Dry season	24 hrs/day	-
Construction year		November, 1967	December, 1994
Construction cost		RD$3,000,000	RD$30,000,000

Cuadro 3.7.1 Facilidades de las Oficinas de Extensión en el Area de Estudio

PROVINCE	MEAN OF TRANSPORTATION			OTHER FACILITIES					REMARKS
	LIGHT TRUCK	MOTORCYCLE	JEEP	COMPUTER	FILE CABINET	TYPEWRITER	DESK	CHAIRS	
BARAHONA	0	21	2	0	6	5	8	2	
BARAHONA			2						ONE JEEP OF TWO IS NOT WORKING
CABRAL		9		0	1	1	2	2	INCLUDE POLO AND SALINAS
FUNDACION		7		0	3	3	4		INCLUDES PENON AND JAQUIMEYES AREAS WHICH DO NOT HAVE OFFICES SPACES
VICENTE NOBLE		5		0	2	1	2		
BAHORUCO	1			0	3	3	6	4	
NEYBA	1			0	1	1	2	2	RADIO WORKS OCCASIONALLY
TAMAYO		5		0	1	1	2	2	
GALVAN				0	1	1	2		
SAN JUAN DE LA MAGUANA	9	22	2	1	34	14	73	36	
SAN JUAN	9		2	1	25	10	62	0	TWO OF THEM ARE IN BAD CONDITIONS IN SAN JUAN MUNICIPALITY
BOHECHIO		5		0	2	1	2	6	
JUAN DE HERRERA		8		0	2	1	3	10	
VALLEJUELO		4		0	2	1	3	8	
EL CERCADO		5		0	3	1	3	12	
SABANA ALTA		3		0	2	1	3	8	
ARROYO LORO		4		0	1	1	2	8	
PEDRO CORTO		5		0	2	1	4	15	
AZUA	4	15	0	0	17	12	19	39	TWO OF THEM ARE VERY OLD IN LIGHT TRUCS IN AZUA
AZUA	3	9			10	6	8	1	
EL SISTAL		3			3	2	4	7	DOES NOT HAVE PHONE SERVICE
LAS YAYAS		2			2	2	3	7	DOES NOT HAVE PHONE SERVICE
PADRRE LAS CASAS	1	1			2	2	4	10	
Total	14	58	4	1	60	34	106	81	

Cuadro 3.7.2 Credito Proporcionado por el Banco Agrícola en el Area de Estudio

	San Juan			Azua			Barahona			Bahoruco (Neyba)		
Activity	# of Loans	Value (RD$000)	Coverage (Ha)	# of Loans	Value (RD$000)	Coverage (Ha)	# of Loans	Value (RD$000)	Coverage (Ha)	# of Loans	Value (RD$000)	Coverage (Ha)
Rice	70	3,000	209	54	1,167	101	6	299	17			
Corn	10	99	21	2	67	18				2	317	212
Sorghum	1	70	25	1	65	13	37	1,164	307			
Coffee *	54	552	98	31	816	155	16	1,561	374	7	100	23
Red Beans	399	22,204	1,737	80	1,798	168				1	12	3
Pigeon Peas	15	185	74	3	42	21				7	102	25
Sweet Potato	19	415	83							4	49	9
Cassava	3	18	3				3	55	4			
Plantain*				81	2,310	146	72	2,451	258	20	451	28
Yams							33	1,238	193			
Yautia							5	73	6			
Potatoes							6	233	16			
Papaya	2	140	1							28	1,257	57
Grapes										30	874	22
Tobacco				12	246	25						
Total	573	26,683	2,251	264	6,510	649	178	7,073	1,176	99	3,162	380

* Includes rehabilitation and maintenance

Source: Banco Agricola, Boletin Estadistico 1996

	Study area			National			Share of Total		
Activity	# of Loans	Value (RD$000)	Coverage (Ha)	# of Loans	Value (RD$000)	Coverage (Ha)	# of Loan(%	Value (%)	Coverage (%)
Rice	130	4,465	330	3,779	512,879	27,799	3	1	1
Corn	14	483	251	39	1,051	602	36	46	42
Sorghum	39	1,299	345	41	1,492	3,219	95	87	11
Coffee *	108	3,029	650	417	21,276	5,078	26	14	13
Red Beans	480	24,014	1,908	588	27,855	3,180	82	86	60
Pigeon Peas	25	329	120	113	878	850	22	37	14
Sweet Potato	23	464	92	56	1,076	495	41	43	19
Cassava	6	73	7	213	3,072	1,463	3	2	0
Plantain*	173	5,211	433	1,118	15,061	3,130	15	35	14
Yams	33	1,238	193	103	2,523	412	32	49	47
Yautia	5	73	6	116	1,839	248	4	4	3
Potatoes	6	233	16	131	5,737	740	5	4	2
Papaya	30	1,397	58	N.A.	N.A.	N.A.	0	N.A.	N.A.
Grapes	30	874	22	30	874	23	100	100	100
Tobacco	12	246	25	233	7,120	2,685	5	3	1
Total	1,114	43,427	4,456	6,977	602,733	49,924	16	7	9

Cuadro 3.7.3 Principales Cooperativas y Asociaciones Campesinas en el Area de Estudio

Location	Number of Associations	Male	Female	Total
Cabral	43	1,556	573	2,129
Vicente Noble	21	746	297	1,043
Fundacion	34	1,576	614	2,190
Tamayo	49	1,468	90	151
Neyba	28	1,020	200	1,220
Galvan	25	1,241	176	1,417
Azua	205	4,150	565	4,715
San Juan	609	125	734	859
Total	1,014	11,882	3,249	13,724

Source: Ministry of Agriculture: Department of Rural Organization and Interview with Farmers Federations in the Study area, 1998.

Cuadro 3.7.4 Lista de las Principales Organizaciones No-gubernamentales que Operan en el Area de Estudio

Name	Location	Main Activities
servicio Social de Iglesias	Study area	Technical and Finacial assistance for small development projects
Mujeres en Desarrollo	Azua, Barahona	Support to women groups (training, credit)
Fundacion para el Desarrollo Dominicano (FDD)	Neyba, Barahona	Economic support to farmers associations and microenterprises
Asociacion Dominicana de Microempresas (ADEMI)	Study area	Credit to small business
Vision Mundial (World Vision)	Study area	Technical assistance in agroecology, funding for community projects
Centro Lemba	Barahona	Education, Technical and financial assistance, marketing for agricultural commodities
Fondo FIME	Study area	Credit provision to small farmers and rural poor
Instituto de Desarrollo de la Empresa Asociativa Campesina	Barahona and Bahoruco	Legal support and credit to farmer's associations
Buen Samaritano	Tamayo, Sugar plantation	Health and nutrition programs
Centro de Promocion de Agricultura Organica	Bahoruco	Education, Agroecology and environmental programs
Plan International	Study area	Education, community projects
Fundacion para el Desarrollo de Barahona	Barahona	Community projects
Fundacion para el Desarrollo de Azua	Azua	Community projectss
Fundacion para el Desarrollo de San Juan	San Juan	Community projects
CEPROS	Padre Las Casas	Natural Resources conservation projects
Source: JICA study Team, 1998		

Cuadro 3.7.5 Principales Leyes de Reformas de Agraria

Law 282. March 1972. Declare public utility and social interest the acquisition by the Government of all Land not in use to be managed by the Agrarian institute.

It is considered Land not in use when it is not currently cultivated and do not are included as national park.

Law 287. March 1972. Declare of public utility any land rent contract in Government land which exceed 100 tareas (6.25 hectares) in irrigated areas, done with individuals.

Law 289. march 1972. Prohibit the sharecropping system in the country on agricultural areas which do not allow enough income to sustain a rural family. The rural family has the option to own the land being sharecropped.

Law 290. March. declare of public utility any plot of land dedicated to rice production which are not in the hands of the Agrarian Institute and irrigated by canals built by the Government. Specifically this law is applied to those rice farms which exceed 500 tareas (32.25 hectares).

Law 314. Define and prohibit Latifundio (Big Land ownership) in the country according to the following type of land.:

Type I	1,500 tareas (94 ha)
Type II	2,100 tareas (131.ha)
Type III	4,000 tareas (250 ha)
Type IV	8,000 tareas (500 ha)
Type V	15,000 tareas (937 ha)
Type VI	25,000 tareas (1,562 ha)
Type VII	45,000 tareas (2,812 ha)

Law 391. Established that all rice land in the hand of the Agrarian Institute should distributed collectively among landless peasants. All collective farm should have the guidance and technical assistance of an IAD's agronomist

Source: Instituto Agrario Dominicano (IAD). 1995.

Cuadro 3.7.6 Asentamientos Agrarios en el Area de Estudio (1/2)

LAND SETTLEMENT	MUNICIPAL DISTRICTS	LAND DISTRIBUTED (ha)	NUMBER OF BENIFICIARIES	MAIN PURPOSE	AVERAGE FARM SIZE (ha)
NATIONAL	NATIONAL	567,308.81	95,250	Crops, livestock, forestry	5.96
BARAHONA					
Vicente Noble	Vicente Noble	311.57	100	coconuts and roots and tubers	3.12
Santo Elena I	Vicente Noble	2,221.95	466	coffee, citrus, roots and tubers	4.77
Monteada Nueva	Vicente Noble	408.43	110	coffee, roots and tubers	3.71
Pescaderia	Vicente Noble	275.47	83	coffee, roots and tubers	3.32
La Cienaga	Vicente Noble	233.27	50	coffee, roots and tubers	4.67
Polo	Vicente Noble	982.08	226	coffee, roots and tubers	4.35
La Malanga	Paraiso	268.99	75	Coffee, citrus, roots and tubers	3.59
Canoa	Vicente Noble	143.08	44	coconuts, roots and tubers	3.25
Loma del Curro	Vicente Noble	137.93	342	Roots and tubers	0.40
Santa Elena II	Barahona	94.34	25	coffee, roots and tubers	3.77
Chene	Barahona	94.34	30	Coffee, Citrus and tubers	3.14
Los tres puentees	Barahona	162.89	136	Roots and tubers	1.20
Damit	Barahona	53.14	54	Roots and tubers	0.98
Mena	Barahona	142.01	121	Roots and tubers	1.17
SUBTOTAL		5,529.50	1,862		2.97
BAHORUCO					
San Ramon	Tamayo	768.30	170	Roots and tubers	4.52
Tamayo	Tamayo	72.96	58	Roots and tubers	1.26
Jaragua	Villa Jaragua	217.11	78	Coconuts and roots and tubers	2.78
Plaza Cacique	Neyba	408.99	96	Roots and tubers	4.26
Galvan	Galvan	1,635.22	82	Roots and tubers	19.94
SUBTOTAL		3,102.58	484		6.41
INDEPENDENCIA					
Cristobal	Cristobal	191.70	72	Coconuts, Roots and tubers	2.66
Cristobal II	Duverge	181.45	84	Roots and tubers	2.16
Tierra Nueva	Jimani	250.82	81	Roots and tubers	3.10
Angel Feliz	La Descubierta	5,031.45	241	Coffee, Roots and tubers	20.88
Puerto Escondido	Duverge	251.57	100	Roots and tubers	2.52
Enriquillo	Jimani	128.30	80	Roots and tubers	1.60
San Jose	Independencia	1,383.65	74	Roots and tubers	18.70
SUBTOTAL		7,418.93	732		10.14
SAN JUAN					
Guanito	San Juan	1,309.25	400	Rice and tubers	3.27
Vallejuelo	Vallejuelo	777.04	284	Onion and tubers	2.74
Mogollon	San Juan	553.52	149	Rice	3.71
Pedro Corto	San Juan	1,711.38	548	Rice, citrus, coconut	3.12
Magueyal	San Juan	525.97	261	Rice	2.02
San Juan Bautista	San Juan	50.31	34	Roots and tubers	1.48
Los Bancos	San Juan	56.60	29	Roots and tubers	1.95
Santome	San Juan	628.93	330	Rice and tubers	1.91
Corral de los indios	San Juan	471.70	200	Roots and tubers	2.36
Mogollon II	San Juan	597.48	380	Rice and tubers	1.57
Carreras de Yegua	Matas de Farfan	220.13	115	Roots and tubers	1.91
El Progreso	San Juan	256.98	163	Roots and tubers	1.58
San Fco de Asis	San Juan	202.14	143	Roots and tubers	1.41
San Isidro	San Juan	169.94	106	Rice and tubers	1.60
San M. de Porres	San Juan	45.97	33	Roots and tubers	1.39
La Altagracia	San Juan	111.76	88	Roots and tubers	1.27
Las Mercedes	san Juan	72.26	47	Roots and tubers	1.54
Anacaona	san Juan	157.23	129	Roots and tubers	1.22
Canoa	San Juan	103.14	58	Roots and tubers	1.78
El Pinal	El Cercado	790.31	226	Coffee and tubers	3.50
Matayaya	San Juan	433.52	123	Roots and tubers	3.52
Santa Lucia	Las Matas de Farfan	75.66	41	Roots and tubers	1.85
SUBTOTAL		9,321.26	3,887		2.40

Cuadro 3.7.6 Asentamientos Agrarios en el Area de Estudio (2/2)

LAND SETTLEMENT	MUNICIPAL DISTRICTS	LAND DISTRIBUTED (ha)	NUMBER OF BENIFICIARIES	MAIN PURPOSE	AVERAGE FARM SIZE (ha)
AZUA					
012 A	Azua	731.32	171	Roots and tubers	4.28
012 B	El Rosario	684.28	160	Roots and tubers	4.28
012C	El Rosario	684.28	160	Roots and tubers	4.28
012 C-2	El Rosario	564.97	180	Roots and tubers	3.14
012 A-4	El Rosario	356.29	90	Roots and tubers	3.96
012 A 1/2	El Rosario	356.29	100	Roots and tubers	3.56
012 D-G	El Rosario	460.94	123	Roots and tubers	3.75
012 A-3	El Rosario	487.55	132	Roots and tubers	3.69
012 D-2	El Rosario	723.27	230	Roots and tubers	3.14
Cuota Parte	El Rosario	314.47	100	Roots and tubers	3.14
Piscicola	El Rosario	37.74	22	Fishering	1.72
D-1 Agricola	El Rosario	276.73	103	Roots and tubers	2.69
D-3	El Rosario	405.03	125	Roots and tubers	3.24
D-1 Ganadero	El Rosario	176.10	60	Livestock	2.94
Sabana Yegua	Sabana Yegua	210.69	99	Roots and tubers	2.13
La Clavellinas	Azua	157.23	76	Roots and tubers	2.07
El Higuerito	Pueblo Viejo	689.25	431	Roots and tubers	1.60
YSURA	Pueblo Viejo	1,291.64	778	Roots and Tubers	1.66
Bosque Seco I	Azua	23,270.44	1,539	Agroforestry and Roots an tubers	15.12
Bosque Seco II	Azua	32,100.63	1,560	Agroforestry	20.58
Bosque Seco III	Azua	52,295.60	1,610	Agroforestry	32.48
Guayabal	Padre Las Casas	2,567.86	545	Roots and tubers	4.71
SUBTOTAL		113,478.93	6,948		16.33

Cuadro 3.9.1 Registro de Usuarios del INDRHI (1/4)

Codigo	Nombre del Canal	Registro del INDRHI (1997/1998)				Observaciones
		Usuarios (nos.)	Area (ha)	Precio Unitario (RD$/ha)	Valor Total (RD$)	
ZONA DE SAN JUAN						
4301	Guanito - San Juan	538	885.42	102.04	90,348	
4302	Mijo	647	1,968.54	102.04	200,870	
4303	Yabano	58	119.74	102.04	12,218	
4304	Ex - Rusos	20	50.12	102.04	5,114	
4305	San Juan	736	1,558.22	102.04	159,001	
4306	El Donado	66	296.75	102.04	30,280	
4307	Vallejuelo No.1	145	216.19	102.04	22,060	
4308	Vallejuelo No.2	190	193.73	102.04	19,768	
4309	Rio La Maguana	71	138.31	102.04	14,113	
4310	Arroyo Mogollon	62	143.03	102.04	14,595	
4311	Los Burros	101	155.31	102.04	15,848	
4312	Los Santiles	291	345.41	102.04	35,246	
4314	Rio Mijo	128	363.81	102.04	37,123	
4315	Rio Jinova	525	1,155.72	102.04	117,930	
4316	Rio San Juan	688	1,868.32	102.04	190,643	
4317	Arroyo Dajay	56	109.14	102.04	11,137	
4318	Rio Yaque del Sur	109	137.61	102.04	14,042	
4319	Arroyo La Cana	14	13.09	102.04	1,336	
4320	Arroyo Guanarey	5	4.93	102.04	503	
4321	Arroyo Da. Maria	32	49.72	102.04	5,073	
4322	Arroyo Limon			102.04		
4323	Arroyo Bagui	7	7.61	102.04	777	
4324	Arroyo Pasatiempo	7	7.83	102.04	799	
4325	Arroyo Fondillo	15	39.29	102.04	4,009	
4326	Arroyo Alonzo	8	37.75	102.04	3,852	
4327	Arroyo Tenguerengue	18	84.73	102.04	8,646	
4328	Arryo Mondongo	4	8.52	102.04	869	
4329	Arroyo Socorro	5	6.54	102.04	667	
4330	Rio Bao Canafis	45	71.78	102.04	7,324	
4331	Canada Yarey	1	13.25	102.04	1,352	
4332	Arroyo Vallejuelo	7	5.42	102.04	553	
4333	Arroyo Carpintero	2	1.43	102.04	146	
4334	Canad. Juan Alv.	1	1.27	102.04	130	
4335	Arroyo Majagual	3	2.24	102.04	229	
4337	Rio la Jagua	1	0.87	102.04	89	
4338	Arroyo Quemado	2	3.13	102.04	319	
4339	Arroyo Loro	3	12.69	102.04	1,295	
4340	Arroyo Sanate	2	14.18	102.04	1,447	
4341	Arroyo Saltadero	18	79.29	102.04	8,091	
4348	Arroyo Campintero	3	3.52	102.04	359	
Sub-total		4,634	10,174.45		1,038,201	

Source: "Listado de Usuarios por Canales con Valor por Tarifa", Centro de Procesamiento Electronico de Datos, INDRHI, 1998

Cuadro 3.9.1 Registro de Usuarios del INDRHI (2/4)

Codigo	Nombre del Canal	Registro del INDRHI (1997/1998)				Observaciones
		Usuarios (nos.)	Area (ha)	Precio Unitario (RD$/ha)	Valor Total (RD$)	
ZONA DE AZUA						
4101	Azua	558	1,176.69	201.97	237,656	
4102	Irabon y Estebania	191	411.89	201.97	83,189	
4107	Hernan Cortes	757	1,413.19	201.97	285,422	
4109	Tabara Arriba	271	628.51	201.97	126,940	
4110	Harcos L. Toros	52	76.45	201.97	15,441	
4112	Bastidas	211	176.76	201.97	35,700	
4114	Las Charcas	3	4.16	201.97	840	
4115	Villarpando	134	104.99	201.97	21,205	
4117	Cachon Rosario			201.97		
4120	La Ceibita	50	92.97	201.97	18,777	
4121	Monte Grande	72	124.10	201.97	25,064	
4122	Oregano Grande	89	95.92	201.97	19,373	
4123	Periquito	252	278.64	201.97	56,277	
4124	El Corozo	48	55.76	201.97	11,262	
4125	Oregano Chiquito	114	184.11	201.97	37,185	
4129	El Muey	134	160.48	201.97	32,412	
4130	Concordia	118	168.47	201.97	34,026	
4132	Los Bancos P.	102	69.03	201.97	13,942	
4134	Rio Yaque del Sur	23	44.87	201.97	9,062	
4136	Yaque del Sur	5,011	12,144.09	201.97	2,452,742	
4137	Canal Azua	5	7.84	201.97	1,583	
4139	Canal Azua	20	28.23	201.97	5,702	
4140	Canal Azua	16	29.41	201.97	5,940	
4141	Canal Azua	1	1.25	201.97	252	
Sub-total		8,232	17,477.81		3,529,993	
ZONA DE BARAHONA(1/2)						
4201	Quita Corasa I	57	104.85	159.62	16,736	
4202	Quita Corasa	73	91.44	159.62	14,596	
4207	El Montazo	32	46.14	159.62	7,365	
4208	Arroyo Grande	118	108.42	159.62	17,306	
4209	Arroyo Grande Vivente Noble	2	4.39	159.62	701	
4210	Vicente Noble	1,065	1,663.20	159.62	265,480	
4211	La Guineera 161	181	187.47	159.62	29,924	
4214	Tacica	49	65.18	159.62	10,404	
4232	Los Saladillos	138	395.99	159.62	63,208	
4234	Cristobal	299	541.43	159.62	86,423	
4255	Olivares	1	1.57	159.62	251	
4256	Fondo Negro	196	213.68	159.62	34,108	
4257	Salina	204	181.54	159.62	28,977	
4258	Lavila Mella	1,663	560.26	159.62	89,429	
4262	Los Habitantes	316	596.70	159.62	95,245	
4263	Cachones Cabral	355	307.37	159.62	49,062	

Source: "Listado de Usuarios por Canales con Valor por Tarifa", Centro de Procesamiento Electronico de Datos, INDRHI, 1998

Cuadro 3.9.1 Registro de Usuarios del INDRHI (3/4)

Codigo	Nombre del Canal	Registro del INDRHI (1997/1998)				Observaciones
		Usuarios (nos.)	Area (ha)	Precio Unitario (RD$/ha)	Valor Total (RD$)	
ZONA DE BARAHONA (2/2)						
4264	Palo Alto	183	286.42	159.62	45,718	
4265	Santana	83	162.54	159.62	25,945	
4266	Hondura Tamay V	102	276.49	159.62	44,133	
4267	Cabeza Toro	23	32.86	159.62	5,245	
4268	Charco El Blanc	99	178.63	159.62	28,513	
4269	El Jobo	176	381.79	159.62	60,941	
4270	San Ramon	104	152.06	159.62	24,272	
4271	Los Conuquitos	101	222.90	159.62	35,579	
4272	La Chorrera	33	19.63	159.62	3,133	
4273	Rio Barbesi	38	120.61	159.62	19,252	
4274	B F94, Cabral	503	409.53	159.62	65,369	
4275	B. F95, Penon	277	348.95	159.62	55,699	
4276	B. F96, Fundac. 2	207	257.52	159.62	41,105	
4277	56464	147	173.08	159.62	27,627	
4278	56F162, Cachon	149	137.64	159.62	21,970	
4279	56F163, Penon	243	283.57	159.62	45,263	
4280	Pescaderia	75	103.01	159.62	16,442	
4281	Bomba Jaquimeye	291	420.77	159.62	67,163	
4282	Bombita	19	38.55	159.62	6,153	
4283	Los Tomates Mena	35	68.40	159.62	10,918	
4284	Los Tomates	6	14.38	159.62	2,295	
4285	Guaba de Mean (CIA. Mena)	75	120.84	159.62	19,288	
4286	Colector Cabral Los List.	66	70.37	159.62	11,232	
4287	Salina Zavila	36	85.54	159.62	13,654	
4288	Vuelta Grande	50	97.39	159.62	15,545	
4289	El Naranjo 10	25	20.61	159.62	3,290	
4290	50 Tiene Nombre	2	4.07	159.62	650	
4291	Canal Yaque del Sur	6	152.48	159.62	24,339	
4292	Proyecto A - C			159.62		
4293	Habanero	54	145.75	159.62	23,265	
4294	Los Callejones	30	31.86	159.62	5,085	
4295	54RRNCA	48	120.38	159.62	19,215	
4296	El Bao	31	80.20	159.62	12,802	
4296	Uvero Cabral	274	352.48	159.62	56,263	
Sub-total		8,340	10,440.93		1,666,581	

Source: "Listado de Usuarios por Canales con Valor por Tarja", Centro de Procesamiento Electronico de Datos, INDRHI, 1998

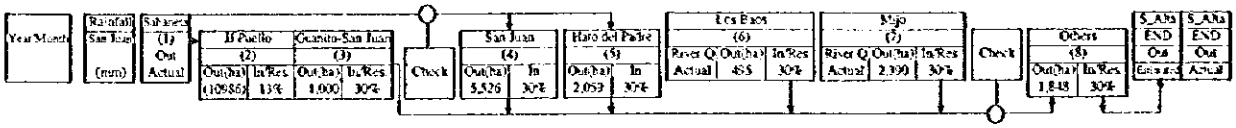
Cuadro 3.9.1 Registro de Usuarios del INDRHI (4/4)

Codigo	Nombre del Canal	Registro del INDRHI (1997/1998)				Observaciones
		Usuarios (nos.)	Area (ha)	Precio Unitario (RD$/ha)	Valor Total (RD$)	
ZONA DE NEIBA						
4401	Panzo	670	913.63	109.75	100,271	
4402	Cambronal	1,284	1,431.66	109.75	157,125	
4403	Vengan A Ver	82	90.58	109.75	9,941	
4404	Palma Dulce	180	216.67	109.75	23,780	
4405	Mella	82	143.52	109.75	15,751	
4406	Las Barias			109.75		
4407	Canal Cristobal	158	467.72	109.75	51,332	
4408	Las Lajitas	351	412.97	109.75	45,323	
4409	Plaza Cacique	388	570.89	109.75	62,655	
4413	Porveni - Canitas	144	345.36	109.75	37,903	
4414	Piedra Gorda	84	92.90	109.75	10,196	
4415	Las Clavellinas	551	772.84	109.75	84,819	
4416	Guaragua	37	76.41	109.75	8,386	
4417	Cachon Meregilo	136	252.67	109.75	27,731	
4418	Bomba Don Juan	33	26.48	109.75	2,906	
4420	Canal Guaraguao	454	1,397.68	109.75	153,395	
4421	Bomba L. Marias	149	268.35	109.75	29,451	
4422	Fuente El Mamon	137	167.25	109.75	18,356	
4423	Cachon Pocilga	218	403.71	109.75	44,307	
4425	Roman Alita	19	30.12	109.75	3,306	
4427	Cachon Mamey	209	351.78	109.75	38,608	
4432	Cachon L. Cocos	3	3.50	109.75	384	
4433	Canal Princ. B. Las Marias	16	20.19	109.75	2,216	
4434	Canal C 11			109.75		
4435	Desag Ing Barah	69	205.72	109.75	22,578	
4436	Cachon el Tanq	6	10.15	109.75	1,114	
4437	Cambronal			109.75		
4438	Canal Principal	2	1.88	109.75	206	
4439	Alcantarilla	11	19.72	109.75	2,164	
4440	Canal Los Rios	13	15.39	109.75	1,689	
4441	Fuente La Funda	4	6.42	109.75	705	
4443	Lat Talle El M	9	49.23	109.75	5,403	
4444	Canal Principal	1	2.50	109.75	274	
4445	Canal Principal	2	5.45	109.75	598	
4446	5-18 Z-19 Z-20	13	19.76	109.75	2,169	
4447	1 Y 2 El Estero	6	9.88	109.75	1,084	
4448	Canal Principal	1	1.90	109.75	209	
4451	Indesur	59	48.94	109.75	5,371	
4452	Bomba Z-89	4	12.64	109.75	1,387	
Sub-total		5,585	8,866.46		973,094	
Grand Total		26,791	46,959.65		7,207,869	

Source: "Listado de Usuarios por Canales con Valor por Tarifa", Centro de Procesamiento Electronico de Datos, INDRHI, 1998

Cuadro 3.9.2 Simulacion de Balance Hidrico por Bloques --- Bloque de San Juan

Present condition (without project)

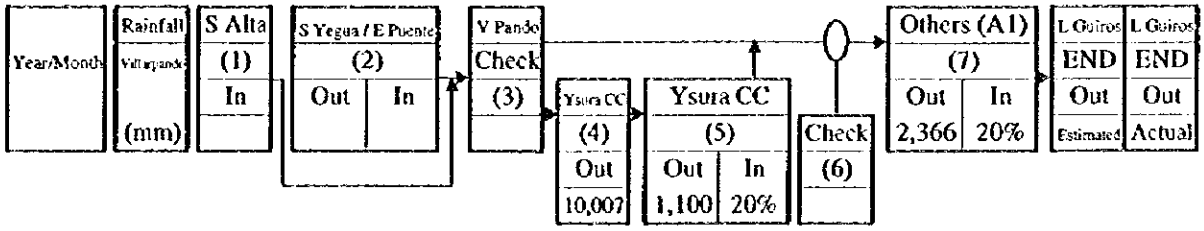


Year	(mm)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)
1981	1269.8	341.3	105.3	74.3	27.8	54.8	258.7	94.1	28.2	32.7	9.8	27.6	15.7	17.8	214.7	65.1	159.1	733.2	42.1	703.7	703.7	758.8
1982	733.2	313.2	104.3	70.6	28.1	51.0	241.4	90.7	27.2	31.2	9.3	18.4	11.1	10.7	160.9	65.1	115.3	478.8	42.1	449.3	449.3	457.1
1983	1010.1	231.6	92.7	61.3	28.0	41.9	182.6	74.7	22.4	27.0	8.1	11.0	8.0	5.4	108.7	63.0	64.6	415.4	42.1	389.0	389.8	284.2
1984	903.8	260.4	97.2	66.9	28.1	47.3	205.7	82.2	24.7	29.8	8.9	14.3	9.2	7.9	118.3	64.8	73.0	446.9	42.1	416.6	416.6	-
1985	788.5	225.9	190.8	52.5	27.8	33.1	152.9	70.8	21.2	25.0	7.5	12.7	8.3	5.8	125.9	63.0	81.8	339.6	42.1	301.1	306.7	-
1986	883.9	274.5	102.3	58.8	28.0	39.2	212.7	89.2	25.7	31.2	9.4	17.7	11.1	8.5	142.7	62.3	69.1	426.1	42.1	395.6	396.6	385.9
1987	1123.7	266.3	89.6	80.9	28.1	61.3	233.6	84.1	25.2	29.6	8.9	11.7	9.0	5.4	131.9	54.8	71.6	547.1	42.1	517.6	518.3	354.6
1988	1045.9	271.6	92.0	71.0	27.5	51.8	225.1	79.0	23.7	27.1	8.1	14.6	10.4	7.3	133.3	64.9	87.9	501.2	42.1	471.7	471.7	497.4
1989	1039.2	246.7	54.8	74.3	27.6	55.0	201.6	73.2	21.9	26.0	7.8	17.1	10.4	9.6	159.9	63.7	115.3	534.3	42.1	504.8	506.3	453.2
1990	905.0	244.8	85.8	64.8	25.7	45.8	201.4	64.7	19.4	23.2	7.0	24.9	8.5	15.9	114.3	47.1	62.3	457.5	42.1	428.0	416.0	410.3
1991	512.3	238.5	102.8	49.7	28.0	30.1	153.8	77.6	23.3	28.1	8.4	10.0	8.4	4.1	128.0	64.9	82.6	277.7	42.1	245.2	260.7	263.2
1992	1267.9	264.6	101.0	72.0	28.1	52.3	223.4	93.3	28.0	32.1	9.6	4.7	3.6	1.8	133.4	59.5	91.7	545.9	42.1	519.5	520.2	625.3
1993	968.5	284.6	105.8	80.0	28.1	60.3	224.5	94.3	28.3	32.3	9.8	21.8	10.1	14.8	138.2	64.3	93.2	508.5	42.1	479.0	479.0	-
1994	664.6	218.3	106.1	51.7	27.9	32.1	130.3	75.4	22.6	26.9	8.1	28.6	11.3	20.7	118.1	63.9	73.4	300.8	42.1	271.4	276.2	-
Mean	933.1	262.5	98.6	66.3	27.8	45.9	206.3	81.7	24.5	28.8	8.6	15.8	9.5	9.9	135.6	61.9	89.3	454.9	42.1	433.5	437.9	-

Note: MCM: Millones de metros cubicos
Out: Extracion de agua de la fuente (area de riego en hectareas, arriba)
In: Flujo de retorno de la fuente (tasa de flujo de retorno en porcentaje, arriba))
In/Res.: Flujo retorno, aporte residual de la cuenca y flujo remanente.
Actual: Registro de caudales actuales
Estimated: Caudale estimados por simulacion

Cuadro 3.9.3 Simulacion de Balance Hidrico por Bloques ··· Bloque de Azua

Present condition (without project)



(año)	(mm)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)
1981	584.3	758.8	729.6	980.1	1739.0	278.5	21.2	4.2	1483.2	45.7	9.1	1446.6	-
1982	415.2	467.1	769.4	867.1	1334.3	278.5	21.2	4.2	1077.8	45.7	9.1	1041.2	-
1983	665.6	284.2	629.6	-	909.0	278.5	21.2	4.2	657.3	45.7	9.1	620.7	-
1984	409.1	412.2	404.9	-	838.7	272.8	21.2	4.2	591.4	45.7	9.1	554.8	-
1985	444.6	366.7	555.9	-	854.4	278.5	21.2	4.2	598.3	45.7	9.1	561.7	-
1986	475.2	385.9	588.8	-	1027.2	278.5	21.2	4.2	771.9	45.7	9.1	735.3	718.0
1987	584.4	384.6	502.1	-	818.4	278.5	21.2	4.2	564.0	45.7	9.1	527.4	633.0
1988	551.2	497.4	515.8	-	1119.3	278.5	21.2	4.2	866.7	45.7	9.1	830.1	867.1
1989	746.5	463.2	813.4	-	1205.3	278.5	21.2	4.2	955.6	45.7	9.1	919.1	920.7
1990	514.9	410.3	421.8	-	832.1	266.8	21.2	4.2	594.7	45.7	9.1	558.2	647.0
1991	447.1	280.2	705.0	-	996.2	278.5	21.2	4.2	751.1	45.7	9.1	714.5	-
1992	313.1	625.3	575.2	-	1164.8	277.5	21.2	4.2	915.3	45.7	9.1	878.8	-
1993	617.3	440.5	832.8	-	1173.2	278.5	21.2	4.2	921.6	45.7	9.1	885.0	-
1994	670.6	255.5	473.4	468.7	724.2	278.5	21.2	4.2	474.4	45.7	9.1	437.8	-
Mean	531.4	430.9	608.4	-	1052.6	277.2	21.2	4.2	801.7	45.7	9.1	765.1	-

Note: MCM; Millones de metros cubicos

Out; Extracion de agua de la fuente (area de riego en hectareas, arriba)

In; Flujo de retorno de la fuente (tasa de flujo de retorno en porcentaje, arriba))

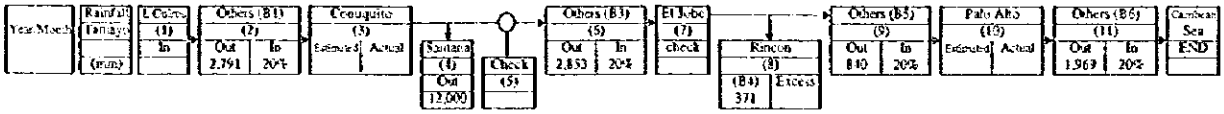
In/Res.; Flujo retorno, aporte residual de la cuenca y flujo remanente.

Actual; Registro de caudales actuales

Estimated; Caudale estimados por simulacion

Cuadro 3.9.4 Simulacion de Balance Hidrico por Bloques --- Bloque de Barahona

Present condition (without project)



Year	(mm)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)
1981	481.7	1136.6	109.4	21.9	1514.9	-	321.9	1133.0	111.8	22.4	1043.5	13.7	-	49.7	9.9	1011.0	924.4	79.4	15.9	947.5
1982	271.5	1941.2	109.4	21.9	1034.3	-	397.3	637.1	111.8	22.4	547.6	13.7	-	49.4	9.9	504.5	381.8	85.0	17.0	436.5
1983	341.8	620.7	109.4	21.9	572.4	-	280.9	291.6	111.8	22.4	202.1	13.7	-	49.4	9.9	154.5	-	73.9	14.8	95.3
1984	248.7	554.8	109.4	21.9	503.9	543.6	251.9	251.9	105.8	21.2	167.3	13.3	-	44.5	8.9	122.9	181.7	59.3	11.9	75.5
1985	655.3	561.7	109.4	21.9	558.6	412.8	276.1	282.5	111.8	22.4	193.1	13.7	-	48.1	9.6	148.9	218.1	68.7	13.7	93.9
1986	348.8	718.0	109.4	21.9	791.0	-	348.8	442.2	111.8	22.4	352.8	13.7	-	49.4	9.9	313.8	422.0	85.0	17.0	245.8
1987	476.9	633.0	109.4	21.9	618.3	513.6	289.8	328.5	111.8	22.4	239.0	13.7	-	45.2	9.0	197.3	-	60.6	12.1	148.8
1988	254.4	867.1	109.4	21.9	871.1	857.4	370.4	500.7	111.8	22.4	411.2	13.7	-	49.4	9.9	367.2	-	85.0	17.0	299.2
1989	303.6	920.7	109.4	21.9	881.4	-	383.2	498.2	111.8	22.4	428.7	13.7	-	49.4	9.9	361.6	-	85.0	17.0	293.6
1990	354.1	647.0	109.4	21.9	622.2	-	254.8	370.5	101.0	20.2	289.7	13.6	-	32.3	6.5	257.3	-	51.5	10.3	216.1
1991	157.8	703.8	109.4	21.9	658.0	666.9	320.1	337.9	111.8	22.4	248.5	13.7	-	49.4	9.9	189.8	-	80.6	16.1	135.3
1992	497.2	970.4	109.4	21.9	932.9	-	344.9	588.0	105.7	21.1	503.5	13.3	-	43.7	8.7	461.7	-	66.9	13.4	438.2
1993	449.6	885.0	109.4	21.9	890.1	-	351.0	539.1	111.8	22.4	449.7	13.7	-	49.4	9.9	405.8	-	82.2	16.4	340.0
1994	557.4	437.8	109.4	21.9	454.2	-	227.1	227.1	111.8	22.4	137.7	13.7	-	46.2	9.2	96.8	-	63.3	12.7	46.2
Mean	383.6	786.3	109.4	21.9	778.8	-	319.7	459.1	110.2	22.0	371.0	13.6	-	45.8	9.4	338.8	-	73.3	14.7	270.1

Note: MCM; Millones de metros cubicos
Out; Extracion de agua de la fuente (area de riego en hectareas, arriba)
In; Flujo de retorno de la fuente (tasa de flujo de retorno en porcentaje, arriba))
In/Res.; Flujo retorno, aporte residual de la cuenca y flujo remanente.
Actual; Registro de caudales actuales
Estimated; Caudale estimados por simulacion

Cuadro 3.9.5 Simulacion de Balance Hidrico Disponibilidad y Suficiencia

San Juan (sin proyecto)

Year		J.J.Puello		San Juan		Hato de Padr		Guanito San Jua		Mijo		Vallejuelo	
Drought/Wet		MCM	(%)	MCM	(%)	MCM	(%)	MCM	(%)	MCM	(%)	MCM	(%)
1981	+	57.9	98%	64.5	91%	22.2	96%	18.5	99%	43.3	99%	7.3	93%
1981/82		50.6	100%	32.4	98%	11.3	100%	9.5	100%	22.0	100%	3.5	45%
1982	-	58.1	98%	61.8	87%	20.6	89%	18.7	100%	43.3	99%	7.6	97%
1982/83		43.9	87%	27.3	83%	9.9	87%	9.5	100%	21.8	99%	3.1	40%
1983	+	49.5	84%	47.7	67%	17.1	74%	18.6	99%	41.3	95%	4.9	63%
1983/84		43.6	86%	28.7	87%	10.5	92%	9.5	100%	21.9	100%	3.5	45%
1984	-	48.9	83%	51.5	72%	18.6	80%	18.7	100%	43.0	98%	5.7	73%
1984/85		49.4	98%	30.1	91%	11.0	97%	9.5	100%	21.5	98%	3.2	41%
1985	-	51.2	86%	39.7	56%	14.2	61%	18.4	98%	41.6	95%	5.4	70%
1985/86		50.6	100%	33.0	100%	11.3	100%	9.5	100%	22.0	100%	2.9	38%
1986	-	55.0	93%	58.9	83%	20.4	88%	18.6	99%	40.4	92%	7.8	100%
1986/87		43.8	86%	27.4	83%	10.0	88%	9.5	100%	20.1	92%	3.3	42%
1987	+	45.4	77%	56.8	80%	19.6	85%	18.7	100%	43.3	99%	5.7	73%
1987/88		45.8	91%	28.4	86%	10.3	91%	9.5	100%	13.3	60%	3.4	44%
1988	+	46.3	78%	50.9	71%	16.9	73%	18.1	97%	43.3	99%	7.0	90%
1988/89		43.2	85%	26.5	80%	9.8	87%	9.5	100%	22.0	100%	3.5	45%
1989	+	50.3	85%	45.7	64%	15.8	69%	18.2	97%	41.9	96%	7.0	89%
1989/90		46.0	91%	28.9	88%	10.5	93%	9.5	100%	22.0	100%	3.0	39%
1990	?	37.9	64%	35.0	49%	12.4	54%	16.2	87%	30.0	69%	5.5	71%
1990/91		49.4	98%	30.5	93%	11.1	98%	9.5	100%	16.9	77%	3.5	45%
1991	-	55.3	93%	48.8	69%	17.6	76%	18.6	99%	43.3	99%	5.0	64%
1991/92		43.6	86%	27.2	82%	10.1	89%	9.5	100%	21.0	96%	2.3	29%
1992	+	55.5	94%	64.2	90%	21.8	95%	18.7	100%	38.7	88%	2.2	28%
1992/93		50.5	100%	33.0	100%	11.3	100%	9.5	100%	22.0	100%	1.7	22%
1993	+	55.3	93%	61.5	86%	21.4	93%	18.7	100%	42.4	97%	7.4	95%
1993/94		50.6	100%	33.0	100%	11.3	100%	9.5	100%	21.4	97%	3.5	45%
1994	-	55.6	94%	42.5	60%	15.6	68%	18.5	99%	42.7	98%	7.8	100%
Mean (1st)		47.0	93%	29.7	90%	10.7	94%	9.5	100%	20.6	94%	3.1	40%
Mean (2nd)		51.1	86%	51.1	72%	17.9	77%	18.4	98%	41.2	94%	6.1	78%

Note: "+"; ano humedo (de acuerdo a analisis de probabilidad)

"-"; ano seco (de acuerdo a analisis de probabilidad)

"?"; data no disponible

1st; La primera cosecha (Nov to Abr)

2nd; La segunda cosecha (May to Oct)

Cuadro 3.9.6 Simulacion de Balance Hidrico Disponibilidad y Suficiencia

Azua (sin proyecto)

Year		Ysura HRC		Ysura		Area A1	
Drought/Wet		MCM	(%)	MCM	(%)	MCM	(%)
1981	+	9.2	100%	102.4	100%	19.8	100%
1981/82		12.0	100%	154.4	100%	25.8	100%
1982	-	9.2	100%	102.4	100%	19.8	100%
1982/83		12.0	100%	154.4	100%	25.8	100%
1983	-	9.2	100%	102.4	100%	19.8	100%
1983/84		12.0	100%	148.7	96%	25.8	100%
1984	-	9.2	100%	102.4	100%	19.8	100%
1984/85		12.0	100%	154.4	100%	25.8	100%
1985	+	9.2	100%	102.4	100%	19.8	100%
1985/86		12.0	100%	154.4	100%	25.8	100%
1986	+	9.2	100%	102.4	100%	19.8	100%
1986/87		12.0	100%	154.4	100%	25.8	100%
1987	+	9.2	100%	102.4	100%	19.8	100%
1987/88		12.0	100%	154.4	100%	25.8	100%
1988	+	9.2	100%	102.4	100%	19.8	100%
1988/89		12.0	100%	154.4	100%	25.8	100%
1989	-	9.2	100%	102.4	100%	19.8	100%
1989/90		12.0	100%	154.4	100%	25.8	100%
1990	+	9.2	100%	102.4	100%	19.8	100%
1990/91		12.0	100%	154.4	100%	25.8	100%
1991	-	9.2	100%	90.7	89%	19.8	100%
1991/92		12.0	100%	154.4	100%	25.8	100%
1992	+	9.2	100%	102.4	100%	19.8	100%
1992/93		12.0	100%	153.3	99%	25.8	100%
1993	+	9.2	100%	102.4	100%	19.8	100%
1993/94		12.0	100%	154.4	100%	25.8	100%
1994	+	9.2	100%	102.4	100%	19.8	100%
Mean (1st)		12.0	100%	153.8	100%	25.8	100%
Mean (2nd)		9.2	100%	101.5	99%	19.8	100%

Note: "+"; ano humedo (de acuerdo a analisis de probabilidad)
"-"; ano seco (de acuerdo a analisis de probabilidad)
"?"; data no disponible
1st; La primera cosecha (Nov to Abr)
2nd; La segunda cosecha (May to Oct)
A1; Area de Riego entre Villarpando y Los Guiros

Cuadro 3.9.7 Simulacion de Balance Hidrico Disponibilidad y Suficiencia

Barahona (sin proyecto)

Year		Area B1		Area B2		Area B3		Area B4		Area B5		Area B6	
Drought/Wet		MCM	(%)	MCM	(%)	MCM	(%)	MCM	(%)	MCM	(%)	MCM	(%)
1981	+	54.5	100%	227.6	100%	55.4	100%	6.8	100%	24.8	100%	42.7	92%
1981/82		54.9	100%	193.5	87%	56.4	100%	6.9	100%	24.6	100%	42.3	90%
1982	-	54.5	100%	215.9	95%	55.4	100%	6.8	100%	24.8	100%	42.7	92%
1982/83		54.9	100%	134.7	60%	56.4	100%	6.9	100%	24.6	100%	37.6	80%
1983		54.5	100%	151.8	67%	55.4	100%	6.8	100%	24.8	100%	36.3	78%
1983/84		54.9	100%	106.9	48%	50.5	90%	6.5	95%	20.2	82%	26.1	56%
1984	-	54.5	100%	140.4	62%	55.4	100%	6.8	100%	24.3	98%	33.2	71%
1984/85		54.9	100%	135.0	61%	56.4	100%	6.9	100%	24.6	100%	37.3	80%
1985	+	54.5	100%	124.0	54%	55.4	100%	6.8	100%	23.5	95%	31.4	67%
1985/86		54.9	100%	189.8	85%	56.4	100%	6.9	100%	24.6	100%	42.3	90%
1986		54.5	100%	184.8	81%	55.4	100%	6.8	100%	24.8	100%	42.7	92%
1986/87		54.9	100%	106.7	48%	56.4	100%	6.9	100%	22.3	91%	26.0	55%
1987	+	54.5	100%	157.7	69%	55.4	100%	6.8	100%	22.9	92%	34.7	74%
1987/88		54.9	100%	172.0	77%	56.4	100%	6.9	100%	24.6	100%	42.3	90%
1988	-	54.5	100%	204.7	90%	55.4	100%	6.8	100%	24.8	100%	42.7	92%
1988/89		54.9	100%	174.3	78%	56.4	100%	6.9	100%	24.6	100%	42.3	90%
1989	-	54.5	100%	216.6	95%	55.4	100%	6.8	100%	24.8	100%	42.7	92%
1989/90		54.9	100%	129.6	58%	56.4	100%	6.9	100%	19.8	81%	28.8	62%
1990		54.5	100%	117.4	52%	44.5	80%	6.7	99%	12.4	50%	22.6	49%
1990/91		54.9	100%	149.2	67%	56.4	100%	6.9	100%	24.6	100%	38.0	81%
1991	-	54.5	100%	181.3	80%	55.4	100%	6.8	100%	24.8	100%	42.7	92%
1991/92		54.9	100%	106.5	48%	50.3	89%	6.5	95%	18.9	77%	24.4	52%
1992	+	54.5	100%	227.6	100%	55.4	100%	6.8	100%	24.8	100%	42.7	92%
1992/93		54.9	100%	158.1	71%	56.4	100%	6.9	100%	24.6	100%	39.5	84%
1993	+	54.5	100%	208.0	91%	55.4	100%	6.8	100%	24.8	100%	42.7	92%
1993/94		54.9	100%	119.7	54%	56.4	100%	6.9	100%	24.3	99%	32.2	69%
1994	+	54.5	100%	119.1	52%	55.4	100%	6.8	100%	21.9	88%	31.1	67%
Mean (1st)		54.9	100%	144.3	65%	55.5	98%	6.8	99%	23.3	95%	35.3	75%
Mean (2nd)		54.5	100%	173.0	76%	54.6	98%	6.8	100%	23.4	94%	37.5	81%

Note: "+"; ano humedo (de acuerdo a analisis de probabilidad)

"-"; ano seco (de acuerdo a analisis de probabilidad)

"?"; data no disponible

1st; La primera cosecha (Nov to Abr)

2nd; La segunda cosecha (May to Oct)

B1; Area de Riego entre Los Guiros y Derivadora Santana

B2; Area de Riego Santana

B3; Area de Riego entre Derivadora Santana y El Drenaje Tomate-Mena

B4; Area de Riego Tomate-Mena

B5; Area de Riego entre El Drenaje Tomate-Mena y Palo Alto

B6; Area de Riego entre Palo Alto y Mar Caribe

Cuadro 4.2.1 Practicas Culturales Recomendadas para Principales Cultivos en Area Estudio (1/2)

Practicas de Manejo Cultivo	Arroz	Habichuelas Rojas	Plátano y Guineo
Preparación de Terreno	La adecuada preparación del terreno ayuda al control de malezas.	Preparacion adecuada del terreno es necesaria para obtener altos rendimientos de habichuelas. Corte del terreno a 25 cm de profundidad, lugeo dos cruces a intervalos de 15 dias para romper los agregados grandes del suelo, y reducir malezas.	Hacer un corte profundo de suelo seguido de dos cruces. Hacer hoyos a distancia de 2.5 m x 2.5 m con distribución triangular para obtener una desidad de 1,600 plantas/ha..
Variedades Recomendadas	Se recomienda la varieda Prosequisa-4, la cual tiene un ciclo vegetativo de 120 dias y rendimiento de 4.5 ton/ha pueden ser obtenidos; Otras variedades recomendadas son Isa-40, y Juma-58.	La variedad más recomendada es la PC-50, la cual es tolerante a varias enfermedades y produce los más altos rendimientos en San Juan. Ciclo de 80 a 90 dias. Rend. 1.5 ton/ha Otras variedades recomend. son CIAS-95, José Beta, y Pompadour Checa.	Las variedades de plátano son "Macho por Hembra", "Barahooero", y de guineo son "Cavendish", "Media mata", and "Gross Michel"
Método de Siembra	Uso extensivo de semillas certificadas La siembra directa es el método usado en San Juan. La cantidad de semilla recomendada es 160 kg/ha. Pre-germinar las semilla, introduciendolas en agua por 24 horas,y luego exponerlas al aire libre por 3 dias. Relizar la siembra desde Mayo a Junio. Es muy importante realizar una buena nivelación del terreno para la siembra directa.	Sembrar lo antes posible dentro del periodo designado por la SEA desde principio de Nov a mediado de Dic. Distancia de siembra es 50 cm entre bileras y 10 cm entre plantas. La cantidada de semillas es 110 kg/ha. Los caret deben ser de 2.5 m de ancho y 25 m largo para hacer un buen control del agua de riego.	Se recomienda el uso de plantulas desarrolladas por el método in vitrus para sembrar plantas libres de enfermedades; En caso de usar cepas de una finca vecina es necesario hacer desinfeccion; Se recomienda una densidad de poblacion de 1600 plantas/ha. Iluminación adecuada es necesaria para obtener altos rendimientos. Colocar fertilizantes, insecticidas y nematicidas en el fondo del hoyo de siembra.
Fertilización	Es necesario realizar analisis de suelos para conocer requerimientos de fertilizacion; Como guia general se recomienda: N=180 kg/ha; P=90 kg/ha, and K=90 kg/ha. No usar nitratos en arroz sumergido, solo se debe aplicar nitrogeno en forma amoniacal o urea.	Es necesario hacer analisis de suelo para conocer requerimientos de fertilización; como guia general se recomienda N= 75 kg/ha; P=95 kg/ha,y K= 40 kg/ha. Aplicar el fertilizandte al momento de la siembra.	El plátano y el guineo requieren altas dosis de fertiliz. para obtener altos rendimiento. Las cantidades de nutrientes recomendadas son N= 250 kg/ha; P=110 kg/ha, and K= 150 kg/ha; Dividir en 2 a 3 applicctions por año. Es necesario realizar analisis de suelos para hacer una recomendación exacta de fertilización.
Riego	Buen manejo del agua de riego es necesario para la obtención de altos rendimientos de arroz. El periodo critico de requerimiento de agua es desde la floración hasta el llenado del grano. El agua de riego tiene varias funciones en la produccion de arroz, control de malezas, control insectos,control de temperatura y mejoramiento de las condicionesquimicas del suelo. La nivelación de tierra es esencial para un buen manejo del agua. El campo de arroz debe ser drenado 25 dias antes de la cosecha.	Es necesario hacer un manejo adecuado del agua a nivel de finca para evitar encharcamiento, erosion del suelo y perdida de los fertilizantes aplicados. Los periodos criticos de requerimiento de agua son (1) al momento de la siembra para asegurar buena germinación; (2) al inicio de la floración; y (3) a la formación del grano.	Riego debe aplicarse de una a dos veces por mes. Es necesario hacer adecuado manejo de agua a nivel de finca, evitando deficit y excesos de agua. Es necesario asegurar buen drenaje de fincas
Control de Insectos	Ataque de insectos es un gran problema en la producción de arroz en el area de Estudio. Es necesario hacer control de insectos con una combinación de insecticidas y el Manejo Integrado de Plagas. Aplicación de insecticidas tales como Karate en dosis de 3 lit/ha, divididos en tres aplicaciones es recomendado.	El uso de Manejo Integrado de Plagas es recomendado para un control eficiente de insectos. Para el control de la mosca blanca, insecticidas como Monocrotofos en dosis 1.5 % a 14, 21 y 25 dias despues de siembra. Contra la Empoasca aplicar Carbaryl en dosis de 1 gr por liter; Monocrotophos o Dimetoate a 1.5 ml/lit. Control adecuado de malezas ayuda a reducir incidencia de insectos.	Los insectos principales que afectan el plátano y guineo son el "Cosmopolita" y el "Trips". Los Nematodos son tambien problema importante. El control de insectos y nematods puede lograrse parcialmente con aplicacón de MIP. S e usan simples trampas para el control del "Cosmopolita". Insecticidas tales como "Sistemin" y "Furadan" son recomendados en dosis de 2 lit/ha y/o 2 kg/ha respectivamente.
Control de Enfermedades	La principales enfermedades son el Tison, la roya del tallo, y la mancha marron. Se recomiendan uso de variedades resistentes, semillas certificadas, buen manejo de agua de riego,niveles adecuados de fertilización, adecuado control de malezas e insect. Combinacion del MIP con fungicidas de oxidos de Zinc, Dithane o Antracol dependiendo de enfermedad, en dosis de 1 kg/ha.	Los más importante es el uso de variedades resistentes como la PC-50. Segundo, la introduccion de MIP; Control adecuado de insectos ayuda a reducir incidencia de enfermedades. Aplicacion de fungicidas en dosis de 1 kg/ha dividido en varias aplicaciones.	Las enfermedades foliares no representaa grandes problemas en el área de estudio, pero las enfermedades del sistema radicular pueden ser importantes. La aplicación de fugicidas tales como "Dithane" en dosis de 5 kg/ha es recomendado. IPM, including good fertilization, control of insect, control of weeds, and adequate water management will help to deduce incidence of roots diseases on plantain and banana.
Control de Malezas	Las malezas que afectan los arrozales en el área son Sagitaria sp, Cyperus sp, Cynodon sp, e Imperata sp. una combinación de herbicidas (Propanil en dosis de 4.5 lit/ha), combinado con control manual o mecanico. El adecuado manejo del agua de rieo ayuda al control de malezas.	Dejando un intervalo de15 dias entre corte y cruces de terreno ayuda al control de malezas. No permita que la malezas formen semillas. No hacer control de malezas durante la etapa de floración. Se recomienda el control mecanico de malezas, ya sea con traccion animal o tractor; esto ayuda a reducir costos y mejora el suelo.	Es necesario realizar un control adecuado de las malezas desde la plantación hasta que estos cultivos cubren el suelo por completo. Hacer de 3 a 4 deshierbos por año. Deshierbos combinados con el uso de herbicidas y mecanico. Despues que los plátanos y guineos cubren el suelo, el deshierbo se realiza menos frecuente con chapeos.
Cosecha	Cerca del 40 % de productores de arroz cosechan manualmente, otro 40 % cosecha con una mezcla de manual y mecanico, y solo cerca 20 % cosecha completamente mecanizado. El tipo de cosechadoras de arroz usadas en San Juan son grandes combinadas, las cuals no puedea ser usadas en parcelas pequeñas. La introducción de cosechadoras medianas podria ayudar a reducir los costos de producción para los pequeños productores.	Cosechar de 85 a 90 despues de la siembra. Esperar hasta que la habichuelas alcancen la madurez fisiologica, indicada por el amarillamientos de las hojas. Cosechar en la mañana para evitar apertura de las vainas y perdidas de granos.	La cosecha de plátano y guineo se inicia de 8 a 10 meses despues de la siembra; Despues de la primera cosecha se realizan cosechas sucesivas cada 21 a 30 días. La cosecha se realiza manualmente.

Fuentes de Recomendaciones: Arroz: (1) Boletin de produccion de Arroz, SEA, 1988; (2) Compendio de Agricultura Tropical, IICA 1986; (3) Costs de Producción, , Banco Agricola 1997;

Habichuelas Rojas: (1) Varios boletines, SEA Proyecto Titulo XII, y FDA, 1997; (2) Compendio de Agricultura Tropical, IICA 1986;

(3) Handbook on Tropical Legume Cultivation, AICAF, 1995

Plátano y Guineo: (1) Compendio de Agric. Tropical, IICA 1986; (2) Tropical Crops, J. W. Purseglove, 1972; (3) Costos de Producción, ABanco Agricola 1997;

(4) Notas de conversación con especialista del CIAZA

Cuadro 4.2.1 Practicas Culturales Recomendadas para Principales Cultivos en el Area de Estudio (2/2)

Prácticas de Manejo Cultivo	Tomate	Gandul	Caña de Azúcar	Café
Preparación de Terreno	La superficie del suelo debe limpiarse de todos los rastrojos de cosechas anterior antes de la preparación del terreno; Corte a profundidad de 20 a 30 cms; Si hay capa dura de suelo,debe cortarse el terreno entre 40 a 50 cm hacer cruce a intervalo 15 dia	Corte de la tierra a profundidad de 15 cm, y un cruce. Prepara surcos para facilitar el riego y mejor desarrollo de las raíces.	Se recomienda realizar corte profundo del terreno para facilitar el movimiento vertical de agua y con esto el lavado de sales, Remover los tallos de caña de la cosecha anterior antes del corte del terreno; Corte a 25 cm de prof ; Surco a 20cm de prof.	El chapeo y la apertura de los hoyos de siembra son las labores de preparación de tierra para la siembra de cafetos; Estas labores se realizan manualmente.
Variedades Recomendadas	Las variedades recomendadas son : Pepto -98, UC 82, Napolis VF, y los hybridos Gem Star, Gem Pride, Gem Pear, 960, y 1001.	Una nueva variedad enana que fue introducida desde la India, y probada en el CIAZA, donde se han comprobado su alto rendimiento y corto ciclo de crecimiento; Tambien la variedad UASD,	Las variedades recomendadas son B70-89, B76-56, B76-78, B76-196, y BR62-02; Se recomienda el ensayo con nuevas variedades resistentes al carbon.	Se recomienda la variedad "Caturra" para la resiembra de las 7,200 ha que se proponen dentro del área de Estudio;
Método de Siembra	Se recomienda el uso de plantula cultivadas en vivero de ambiente controlados para reducir los daños causados por ataque de insectos. Las plantulas estan listas para el trasplante a los 15 a 20 dias despues de sembrada El trasplate se realiza a 120 cm entre lineas y 25 cm entre plantas. Las raices deben enterrarse a profundidad de 5 cm.	La variedad enana de la India se siembra a una alta densidad de población (80 cm en bileras y 20 cm entre plantas). La cantidad de semilla usada es 20 kg/ha. Sembear las semillas a una profundidad de 4 a 5 cm.	La caña de azúcar se propaga por medio de pedazos denominados "semillas"; Se debe tener campos cuidados especialmente para la propagación de caña de "semillas" ; La caña usada para "semillas" debe tener de 8 a 10 meses de edada; Los pedazos para "semillas" deben ser seleccionados de la parte superior, 1/3 más nuevo de la caña, y deben tener por lo menos 2 a 3 yemas; Se siembra al chorrillo, con 25 % de sobreposición; se siembran cerca de 20,000 "semillas" en 1 ha de caña.	La mayoria de las plantaciones de café dentro del área de Estudio son viejas; Muy pequeñas áreas han sido replantadas o plantadas nuevas; Se recomienda las siembra de cafetos desarrollados en fundas plaiticas; la edad de los cafetos para trasplante debe ser entre 6 y 10 meses; La distancias de siembra es 2.5m by 2.5 m para obtener una densidad de población de 1,600 planats/ha; Los hoyos de siembra deben ser de 30 cm en toda dirección (30cm x 30 cm x 30 cm), rellenar los hoyos con suelo superficial.
Fertilización	El cultivo de tomate requiere cantidad relativamente altas de nutrientes para dar buenos rendimientos; Los requerimientos son mayores durante el periodo de formación del fruto; La cantidad total de nutrientes recomendada es N- 200 kg/ha; P-=90 kg/ha, y K= 150 kg/ha; Aplicar la mitad del fertilizante poco despues del trasplante, y la otra mitad antes de la floración; Se recomienda realizar analisis de suelo para una fertilización más adecuada.	El cultivo de gandul no requiere gran cantidad de fertilizantes; En muchos casos el suelo puede satisfacer los requerimientos del gandul; En los suelos que tienen bajo contenido de N se recomienda la siguiente cantidades de nutrientes N=45 kg/ha; P= 45 kg/ha, y K= 30 kg/ha.	Es necesario realizar analisis de suelo y ensayos de campo detallado para determinar los requerimientos de fertilización; Como un guia general se recomienda la cantidade de nutrientes como sigue : N=250 kg/ha; P=80 kg/ha; y K=300 kg/ha,Mezclar los abonos fosfatados con el suelo durante la preparación de la tierra; Dividir el nitrogeno en dos aplicaciones, la primera dos semanas despues de la siembra, y la segunda dos meses depues de la siembra.	La cantidad de fertilizante que recomienda aplicar es solo como una guia general; Es necesario realizar analisis de suelos y ensayos de varios niveles de fertilización debe ser realizados en el área Piloto del proyecto para el mejoramiento de la Produce. La cantidad de fertilizantes recomendada varia con el perido de desarrollo de los cafetos; Para el desarrollo de los cafetos aplicar: N-195 kg/ha; P= 120 kg/ha, y K= 60 kg/ha; Aplicar en circulos alrededor de cada planta.
Riego	El riego bien manejado es esencial para obtener la meta de rendimiento de tomate; deben evitarse tanto las deficiencias como los excesos de humedad en el sistema radicular del cultivo; La humedad del suelo se debe mantener entre 40 a 70 % de la C. C.	Las variedades recomendada la enana de India y UASD demandan menos agua debido a su ciclo de crecimiento más corto; riego debe ser a intervalos de 12 a 15 dias.	Se requiere de manejo adecuado del riego y drenaje a nivel de campo para poder obtener altos rendimientos de caña El agua de riego debe infiltrarse para mojar todo el sistema radicular,En los 3 primeros meses riego a intervalo 2 semanas, luego 3 semanas.	Secano
Control de Insectos	La gran incidencia de insectos, principalmente la mosca blanca, es uno de los principales problemas para la producción de tomate; Se recomienda el uso generalizado de MIP para ayudar al control de insectos; Insecticidas tales como nuvacron es Nuvacron es recomendado en dosis de 6 lits/ha dividido en varias aplicaciones; debe realizarse estimacion de la población de insectos y tener una relación de costo/beneficio	El control de insectos debe ser basado en una combinación de MIP y la aplicación racional de insecticidas, tal como Karate en dosis de 1 lit/ha; Suspender las aplicaciones de insecticidas por lo menos 15 dias antes de la cosecha del gandul verde.	El ataque de insectos no es un gran problema para la caña de azúcar dentro del área de Estudio, el insecto mas dañino es el barrenador (Diatrae sp.) su control es a base de insecticida en dosis de 3 a 4 lit/ha, divididos en 3 a 4 aplicaciones. Se recomienda la adopcion del Manejo Integrado de Plagas, para ayudar al control económico de los insectos.	Los insectos que afectan la producción de café en el área de Estudio incluyen afidos, el barrenador de hoja, y gusano medidor, Se recomienda el uso de insecticidas sistemicos en dosis de 2 lit/ha y la introducción de Manejo Integrado de Plagas.
Control de Enfermedades	La enfermedad principal que afecta la producción de tomate es la virosis que es transmitido por la mosquita blanca; Otras enfermedades son Rhizotonia, fusarium, y la alternaria; Es importante hacer un control adecuado de insectos para reducir incidencia de enfermedades; Se recomienda la amplia utilización de MIP para el control efectivo de enfermedades; Las medidas importantes incluye uso de variedades resistentes, adaptarse a la fecha de siembra indicada por la SEA; Control a tiempo de enfermedades.	Las principales enfermedades del gandul en el área de Estudio son la "Antracnosis y la mancha de la hoja, y algunas virosis. En general el uso de fungicidas parece ser no justificable económicamente Uso generalizado de Manejo Integrado de Plagas es recomendado.	La principal enfermadades que afectan la caña de azúcar dentro del área de Estudio son la "Roya" y el "Carbon". El control de estas enfermedades de ser basado en la introducción de variedades resistentes.	La enfermedad más importante que afecta los cafetos del área de Estudio es la mancha marron de la hoja causada por Cercospora sp. Se recomienda la aplicación de fungicidas como"Benlate" y "Cupravit"en dosis de 8 kg/ha y 3 kg/ha respectivamente. Se recomienda la introducción del Manejo Integrado de Plagas.
Control de Malezas	El control efectivo de malezas, tanto dentro del campo de tomate como en su alrededores es una de las medidas importantes del MIP. Las malezas se controlan manualmente; la mano de obra usada es en promedio 20 hombre-dia/ha.	El cultivo de gandul debe ser mantenido libre de malezas durante la primera etapa de su desarrollo para evitar reducción de los rendimientos; El control de malezas puede ser manual.	El control de malezas se realiza con una combinación manual y herbicidas; La mano de obra requerida para control de malezas es 15 hombre-dia/ha.	Las plantaciones de cafetales deben mateneerce libre de malezas para evitar reducciones importante del rendimiento El control de malezas se realiza manual.
Cosecha	La cosecha del tomate se realiza manualmente; Se utilizan en promedio 10 hombre-dia/ha.	La mayoria de los agricultore cosechan el gandul verde; Se cosecha manualmente; Se requiere de 8 a 10 hombre-dia/ha.	La cosecha de la caña se realiza manualmente; Con frecuencia se queman los campos de caña antes de la cosecha, esta práctica se debe eliminar; La mano de obra requerida para la cosecha de 1 ha de caña son 5 hombre-dia/ha.	Es necesario poner gran cuidado durante la cosecha y el manejo de post-cosecha del café para poder lograr buena calidad comercial del grano cosechado; No se debe mezclar granos de diferentes condiciones de maduración;

Fuentes de las recomendaciones:

Tomate: (1) Cultivo del Tomate, Boletin 19 de la FDA, 1993; (2) Costos de Producción, , Banco Agric., 1997; (3) Notas de conversacion con técnicos del CIAZA, y gerente de Industria tomatera;

Gandul: (1) Paviocion Commercial de Gandul, FDA, 1990; (2) Handbook of Tropical Legumes Cultivation, AICAF, 1995; (3) Notas de conversacion con especialistas del CIAZA.

Caña de Azúcar: (1) Estudio de Factibilidad para la Rehabilitación de el Sistema de Riego y Drenaje del Ingenio Barahona,Banco Mundial-CEA, 1986; (2) Reporte Anual del CEA, 1997;

(3) Notas y impresos suministrados por técnicos de ingenio Barahona; (4) Compendio de Agricultura Tropical, IICA, 1989.

Café: (1) Plan de Desarrollo Cafetalero, SEA 1997; (2) Compendio de Agricultura Tropical, IICA 1989; (3) Café., por Gordon Wrigley, Tropical Agriculture Series, 1986.

Cuadro 4.2.2 Produccion Anticipada de los Principales Cultivos con la Ejecucion del Proyecto

Crops	Present/Without Project			With Project			Projects Incremental Benefit of Production
	Area Planted (ha)	Yield (ton/ha)	Production (ton)	Area Planted (ha)	Yield (ton/ha)	Production (ton)	(ton)
(1) AZUA Irrigation District							
Plantain	4,048	18	72,860	5,013	23	115,300	42,440
Banana	791	26	20,570	791	36	28,480	7,910
Papaya	144	48	6,910	188	65	12,220	5,310
Ind. Tomato	3,170	25	79,250	3,731	30	111,930	32,680
Corn	970	2	1,940	1,203	2.8	3,370	1,430
Sorghum	862	3.5	3,020	1,068	4.5	4,810	1,790
Cassava	526	9	4,730	659	12	7,910	3,180
Pepper	83	15	1,250	98	18	1,760	510
Pigeon pea	263	1.7	450	366	3	1,100	650
Rice	325	2.5	810	325	4.5	1,460	650
Bean	929	0.9	840	1,329	1.5	1,990	1,150
Sweet potato	149	12	1,790	188	17	3,200	1,410
Eggplant	75	16	1,200	90	20	1,800	600
Melon	35	35	1,230	41	40	1,640	410
Avocado	10	10	100	12	12	140	40
Mango	25	12	300	30	16	480	180
Onion	75	11	830	88	13	1,140	310
Okra	80	12	960	94	15	1,410	450
Tobacco	37	1.6	60	53	2.2	120	60
(2) San Juan Irrigation District							
Bens	9049	1.1	9,950	14517	1.5	21,780	11,830
Rice	7973	3	23,920	7973	4.5	35,880	11,960
Sweet potato	2087	13	27,130	4491	17	76,350	49,220
Corn	1015	2	2,030	2244	2.8	6,280	4,250
Sorghum	735	3.5	2,570	1742	4.5	7,840	5,270
plantain	214	17	3,640	390	23	8,970	5,330
Pigeon pea	320	1.9	610	462	3	1,390	780
Banana	164	24	3,940	164	36	5,900	1,960
Cassava	327	10	3,270	427	12	5,120	1,850
Eggplant	163	17	2,770	214	20	4,280	1,510
Pepper	139	16	2,220	182	18	3,280	1,060
Melon	75	35	2,630	97	40	3,880	1,250
Papaya	218	52	11,340	279	65	18,140	6,800
Orange	25	15	380	32	20	640	260
Mango	20	12	240	25	16	400	160
Avocado	10	10	100	12	12	140	40
Onion	100	11	1,100	171	14	2,390	1,290
Coconut	25	6	150	32	8	260	110
(3) Yaque del Sur Irrigation District							
Plantain	5,655	18	101,790	7,223	23	166,129	64,340
Banana	1,419	26	36,890	1,419	36	51,084	14,190
Coconut	265	6	1,590	338	8	2,704	1,110
Corn	54	1.8	100	70	2.8	196	100
Sorghum	44	3.3	150	45	4.5	203	50
Rice	33	2.2	70	33	4.5	149	80
Bean	62	0.9	60	80	1.5	120	60
Pigeion pea	16	1.3	20	22	3	66	50
Cassava	257	8	2,060	322	12	3,864	1,800
Sweet potato	18	12	220	23	17	391	170
Tomato	61	24	1,460	78	30	2,340	880
Sugar Cane	1,140	30	34,200	760	115	87,400	53,200
(4) Lago Enriquillo Irrigation District							
Sugar cane	7660	30	229,800	3240	115	372,600	142,800
Plantain	700	18	12,600	3401	23	78,223	65,620
Banana	21	26	550	21	36	756	210
Rice	45	2.2	100	45	4.5	203	100
Bean	123	0.9	110	1075	1.5	1,613	1,500
Corn	156	1.8	280	1427	2.8	3,996	3,720
Sorghum	56	3.3	180	1327	4.5	5,972	5,790
Cassava	455	8	3,640	4014	12	48,168	44,530
Sweet potato	40	12	480	294	17	4,998	4,520
Eggplant	10	15	150	328	20	6,560	6,410
Tomato	94	24	2,260	1048	30	31,440	29,180
Pigeon pea	90	1.3	120	90	3	270	150

Cuadro 4.2.3 Infrastructura, Equipos y Maquinarias Requeridos para el Proyecto de Mejoramiento de la Produccion de Cafe

	Unit	Quantity
(i) Construction		
Construction of two (2) training centers, including office space and lodging space	m2	330 each
Improvement of rural roads	km	66
Construction of access to nurseries	km	19.5
Construction of Shaded Nurseries	m2	234,000
Water Supply for Nurseries (Pipes of about 10 cm diameter)	m	18,800
Construction of Drying Floors	m2	233,400
Construction of Small Storage	m2	23,000
(ii) Machinery and Equipment		
(a) Machinery and Equipment for Extension, Training and Organization		
Furniture for Training Centers	Chairs	60
	Desks	2
	Cabinets	2
	Blackboards	2
	Beds	40
Power Generators	15 kw	2
Motorcycles for Extension Workers		15
(b) Machinery and Equipment for Coffee Production and Post-harvest Management		
Pulping Machine	units	180
Engines for pulping machine (3 HP)		180
Coffee Huller		180

Cuadro 4.3.1. Fondo Para el Desarrollo Rural

Costos Detallados

	Unidad	Año					Total	Costo Unit.	Costo					Total
									Año					
		1	2	3	4	5		(US$000)	1	2	3	4	5	
I. Costos de Iversion														
A. Linea de Credito	L.S.								4,000.0	2,000.0	500.0			6,500.0
B. Equipos	No.													
1. Computadora	No.	3	2				5	2.5	7.5	5.0	-	-	-	12.5
2. Impresora	No.	3	1				4	1.2	3.6	1.2	-	-	-	4.8
3. Fax	No.	1	1				2	0.5	0.5	0.5	-	-	-	1.0
4. Fotocopiadora	No.	1					1	3	3.0	-	-	-	-	3.0
Subtotal									14.6	6.7	-	-	-	21.3
C. Vehiculos	No.													
1. Vehiculo (4WD)	No.	1					1	20	20.0	-	-	-	-	20.0
2. Motorcicleta	No.	3					3	7	21.0	-	-	-	-	21.0
Subtotal									41.0	-	-	-	-	41.0
D. Salarios														
Secretaria	P/M	12	24	24	24	24	108	0.5	6.0	12.0	12.0	12.0	12.0	54.0
Gerente	P/M	6	12	12	12	12	54	3	18.0	36.0	36.0	36.0	36.0	162.0
Personal Contabilidad	P/M	36	72	72	72	72	324	0.8	28.8	57.6	57.6	57.6	57.6	259.2
Oficiales de Crédito	P/M	18	36	36	36	36	162	2	36.0	72.0	72.0	72.0	72.0	324.0
Adogado	P/M	6	12	12	12	12	54	1.5	9.0	18.0	18.0	18.0	18.0	81.0
Contador	P/M	6	12	12	12	12	54	0.75	4.5	9.0	9.0	9.0	9.0	40.5
Consultor auditorfa Externa	Año								6.0	6.0	6.0	6.0	6.0	30.0
Subtotal									108.3	210.6	210.6	210.6	210.6	950.7
Total Costos Inversion									163.9	217.3	210.6	210.6	210.6	1,013.0
II. Costos Concurrentes														
A. Operacion y Mantenimiento														
1. Cosots Transporte Local	L.S.								3.0	4.0	4.5	4.5	4.5	20.5
2. Materiales y Suministro	Month	6	12	12	12	12	54	0.25	1.5	3.0	3.0	3.0	3.0	13.5
3. Alquiler Oficina	Month	6	24	24	24	24	102	0.5	3.0	12.0	12.0	12.0	12.0	51.0
4. Comunicaciones	Month	6	12	12	12	12	54	0.9	5.4	10.8	10.8	10.8	10.8	48.6
5. Mantenimiento Vehículo	Month	6	12	12	12	12	54	0.5	3.0	6.0	6.0	6.0	6.0	27.0
6. Chofer	P/M	6	12	12	12	12	54	0.4	2.4	4.8	4.8	4.8	4.8	21.6
Total Costos Recurrentes									18.3	40.6	41.1	41.1	41.1	182.2
TOTAL									**182.2**	**257.9**	**251.7**	**251.7**	**251.7**	**1,195.2**

*P/M : person/mes

Cuadro 4.3.2. Fondo para los Pobres Rurales

Costos Detallados

	Unidad	Cantidad					Total	Costo Unit.	Costo					Total
		Año							Año					
		1	2	3	4	5		(US$000)	1	2	3	4	5	
I. Costos de Iversion														
A. Linea de Credito	L.S.								3,000.0	1,000.0	-	-	-	4,000.0
B. Equipos	No.													
1. Computadora	No.	2					2	2.5	5.0	-	-	-	-	5.0
2. Impresora	No.	1					1	1.2	1.2	-	-	-	-	1.2
3. Fax	No.	1					1	0.5	0.5	-	-	-	-	0.5
4. Fotocopiadora	No.	1					1	3	3.0	-	-	-	-	3.0
Subtotal									9.7	-	-	-	-	9.7
C. Vehiculos	No.													
1. Vehiculo (4WD)	No.	1					1	20	20.0	-	-	-	-	20.0
2. Motorcicleta	No.	3					3	7	21.0	-	-	-	-	21.0
Subtotal									41.0	-	-	-	-	41.0
D. Salarios														
Secretaria	P/M	6	12	12	12	12	54	0.5	3.0	6.0	6.0	6.0	6.0	27.0
Gerente	P/M	6	12	12	12	12	54	3	18.0	36.0	36.0	36.0	36.0	162.0
Oficiales de Crédito	P/M	18	36	36	36	36	162	2	36.0	72.0	72.0	72.0	72.0	324.0
Evaluacion Externa	Año								-	6.0	-	-	6.0	12.0
Subtotal									57.0	120.0	114.0	114.0	120.0	525.0
Total Costos Inversion									107.7	120.0	114.0	114.0	120.0	575.7
II. Costos Concurrentes														
A. Operacion y Mantenimiento														
1. Cosots Transporte Local	L.S.								3.0	12.0	12.0	12.0	12.0	51.0
2. Materiales y Suministro	Mes	6	12	12	12	12	54	0.25	1.5	3.0	3.0	3.0	3.0	13.5
3. Alquiler Oficina	Mes								-	-	-	-	-	-
4. Comunicaciones	L.S.								5.0	10.0	10.0	10.0	10.0	45.0
5. Mantenimiento Vehículo		6	12	12	12	12	54	0.5	3.0	6.0	6.0	6.0	6.0	27.0
6. Chofer		6	12	12	12	12	54	0.4	2.4	4.8	4.8	4.8	4.8	21.6
Total Costos Recurrentes									14.9	35.8	35.8	35.8	35.8	158.1
TOTAL									122.6	155.8	149.8	149.8	155.8	733.8

* P/M : person/mes

Cuadro 4.3.3. Equipo de Laboratorio para Fortalecer el CIAZA

(EN US$)

ITEM	UNIDAD	CANTIDAD	COSTO UNIT.	TOTAL
EQUIPOS				
ZOOM STEREOMICROSCOPE WITH TRINOCULAR HEA	Unit	1	1995.00	1,995.00
BASIC MICROSCOPE	Unit	1	1735.00	1,735.00
MICROSCOPE CAMERA	Unit	1	326.00	326.00
TISSUE CULTURE ENCLOSURE	Unit	1	2800.00	2,800.00
LAMINAL FLOW HOOD CABINET BENCH TOP	Unit	1	687.00	687.00
REFRIGERATOR, 6.7 CUBIC FEET	Unit	1	1560.00	1,560.00
LAB OVEN, 294 X 20 1/2 W X 16" D	Unit	1	673.00	673.00
NICHOLAS ILLUMINATOR	Unit	1	192.00	192.00
AUTOCLAVE	Unit	1	495.00	495.00
TUTTNAUER STERILIZER/AUTOCLAVE	Unit	1	5075.00	5,075.00
CENTRIFUGES	Unit	1	439.00	439.00
MICROCENTRIFUGE	Unit	1	1985.00	1,985.00
DISSECTION EQUIPMENT	Set	1	450.00	450.00
INSECT MOUNTING EQUIPMENT	Set	1	650.00	650.00
COLONY COUNTER	Unit	1	1900.00	1,900.00
MAGNIFIER WITH GOOSENECK BASE	Unit	2	37.78	75.56
HYGROTHERMOGRAPH	Unit	1	99.75	99.75
MULLICELL CULTURE PLATES	Pkg.	48	25.75	1,236.00
HOT PLATES	Unit	2	601.00	1,202.00
STIR PLATE	Unit	2	298.00	596.00
BURNERS & ACCESSORIES	Unit	12	11.50	138.00
NETS	Unit	10	33.75	337.50
CRISTALERIA				
GRADUATED ERLENMEYER	Pkg.	42	20.50	861.00
CENTRIFUGE TUBES	Pkg.	30	70.00	2,100.00
PETRI DISHES	Pkg.	80	17.40	1,392.00
CHARGER FOR KILLING JAR	Unit	3	12.95	38.85
SNAP CAP VIALS	Unit	8	1100.00	8,800.00
GLASS CHAMBER SLIDES, STERILE	Box	10	237.75	2,377.50
PLASTIC CHAMBER SLIDES, STERILE	Box	8	271.10	2,168.80
MICROSCOPE SLIDES	Pkg.	6	99.20	595.20
GLASS COVER SLIPS	Box	10	2.34	23.40
GRADUATED, MOHR-TYPE PYREX PIPET	Pkg.	46	36.10	1,660.60
PIPETS	Pkg.	10	45.00	450.00
BEAKERS	Unit	6	66.75	400.50
GLASS JAR	Pkg.	30	17.30	519.00
FLASKS	Pkg.	12	32.50	390.00
MUEBLES				
CABINETS	Unit	5	548.00	2,740.00
STORAGE DRAWER FOR CORNELL CABINET	Unit	1	54.95	54.95
LABORATORY TABLES	Unit	3	1088.30	3,264.90
CARDBOARD GLASS-TOPPED EXHIBITION CASE	Case	1	62.45	62.45
RIKER MOUNTS	Unit	8	6.20	49.60
MATERIALES				
GLAZED PAPER ENVELOPES	Pkg.	6	5.65	33.90
POLYETHYLENE BAGS	Pkg.	12	8.50	102.00
BOTTLES	Unit	48	6.25	300.00
JAR CAPS	Unit	45	8.10	364.50
BRUSHES	Unit	18	17.75	319.50
BURETS	Unit	3	125.00	375.00
FILTERS	Box	24	8.45	202.80
TOTAL DE EQUIPOS Y MATERIALES				54,293.26

Cuadro 4.3.4. Fortalecimiento del CIAZA

Costos detallados

	Unidad	Cantidad Año 1	2	3	4	5	Total	Costo Unit. (US$000)	Costo Año 1	2	3	4	5	Total
I. Costos de Inversion														
A. Fondo Patrimonial	L.S.								1,500.0	1,500.0	1,000.0	500.0	500.0	5,000.0
B. Equipos														
1. Equipos de Laboratorio *	No.								55.0					55.0
2. Computadoras	No.	6					6	2.5	15.0	-	-	-	-	15.0
3. Impresoras	No.	5					5	1.2	6.0	-	-	-	-	6.0
4. Maquina de Fax	No.	1					1	0.5	0.5	-	-	-	-	0.5
5. Fotocopiadora	No.	1					1	3	3.0	-	-	-	-	3.0
6. Overhead Projector	No.	1					1	1.5	1.5	-	-	-	-	1.5
7. Tractor	No.	2					2	42	84.0	-	-	-	-	84.0
8. Arado	No.	1					1	6	6.0	-	-	-	-	6.0
9. Sembradora	No.	1					1	5.4	5.4	-	-	-	-	5.4
10. Infraestructura	L.S.								80.0	-	-	-	-	80.0
Subtotal									256.4	-	-	-	-	256.4
B. Capacitacion														
1. Programa Maestría Local	No.	2	2	2			6	3.57	7.1	7.1	7.1	-	-	21.4
2. Cursos Cortos	No.	4	4	4	4	4	20	5.68	22.7	22.7	22.7	22.7	22.7	113.6
3. Talleres	No.	4	4	4	4	4	20	2.37	9.5	9.5	9.5	9.5	9.5	47.4
4. Seminarios	No.	6	6	6	6	6	30	0.71	4.3	4.3	4.3	4.3	4.3	21.3
5. Conferencias	No.	12	12	12	12	12	60	0.29	3.5	3.5	3.5	3.5	3.5	17.4
6. Días de Campo	No.	3	3	3	3	3	15	0.61	1.8	1.8	1.8	1.8	1.8	9.2
Subtotal									48.9	48.9	48.9	41.8	41.8	230.3
D. Vehículos	No.													
1. Vehículo (4WD)	No.	3					3	20	60.0	-	-	-	-	60.0
2. Motorcicleta	No.	3					3	7	21.0	-	-	-	-	21.0
Subtotal									81.0	-	-	-	-	81.0
E. Salarios														
Secretaria	P/M	6	12	12	12	12	54	0.5	3.0	6.0	6.0	6.0	6.0	27.0
Gerente	P/M	6	12	12	12	12	54	3.2	19.2	38.4	38.4	38.4	38.4	172.8
Investigadores	P/M	36	72	72	72	72	324	2.5	90.0	180.0	180.0	180.0	180.0	810.0
Evaluación Externa	Año								-	10.0	-	-	10.0	20.0
Subtotal									112.2	234.4	224.4	224.4	234.4	1,029.8
Total Costos de Inversión									498.5	283.3	273.3	266.2	276.2	1,597.5
II. Costos Concurrentes														
A. Operación y Mantenimiento														
1. Costo Transporte Local	L.S.								3.0	6.0	6.0	6.0	6.0	27.0
2. Materiales	Mes	6	12	12	12	12	54	0.25	1.5	3.0	3.0	3.0	3.0	13.5
3. Materiales de Investigación		6	12	12	12	12	54	2.85	17.1	34.2	34.2	34.2	34.2	153.9
4. Alquiler Oficina	Mes								-	-	-	-	-	-
5. Subscripciones & Publicaciones	L.S.								5.0	3.0	3.0	3.0	3.0	17.0
Total Costos Concurrentes									21.6	43.2	43.2	43.2	43.2	211.4
TOTAL									520.1	326.5	316.5	309.4	319.4	1,808.9

* P/M : person/mes

Nota :

* Ver cuadro 4.3.3 para detalles

Cuadro 4.3.5. Actividades de Capacitacion para los Dias de Campo

Detallse de los Costos

Actividad de Capacitacion	Unidad	Cantidad Año 1	2	3	4	5	Total	Costo Unit. (US$000)	Costo year 1	2	3	4	5	Total
1. Cursos Cortos	No.	12	12	12	12	12	60	5.68	68.19	68.19	68.19	68.19	68.19	340.96
2. Talleres	No.	12	12	12	12	12	60	2.37	28.39	28.39	28.39	28.39	28.39	141.95
3. Seminarios	No.	6	6	6	6	6	30	0.71	4.28	4.28	4.28	4.28	4.28	21.40
4. Conferenciass	No.	12	12	12	12	12	60	0.29	3.42	3.42	3.42	3.42	3.42	17.12
5. Dias de Campo	No.	4	4	4	4	4	20	0.61	2.45	2.45	2.45	2.45	2.45	12.27
TOTAL									106.74	106.74	106.74	106.74	106.74	533.69

Cuadro 4.3.6 Lisa de Equipos para la Capacitacion de los Extensionistas (en US$)

Item	Cantidad	Costo Unitario	Costo Total
- Computadora	10	2,500	25,000
- UPS	10	300	3,000
- Fax	1	500	500
- Impresora	4	1,200	4,800
- Overhead Projector	2	1,500	3,000
- Data Show	1	5,400	5,400
- Scanner	2	1,400	2,800
- Photocoapiadora	1	3,000	3,000
- Maquina de Escribir	1	700	700
- Archivo de Metal	10	200	2,000
- Escritorio	12	190	2,280
- Sillas Escritorio	12	100	1,200
- Paper Holder	2	30	60
- Pantalla Portatil	2	225	450
- Camera Fotografica	2	300	600
- Video Camera	1	1,700	1,700
- VHS	1	350	350
- Televisor	2	350	700
- Mesa	4	300	1,200
- Sillas de Mesa	48	110	5,280
- Librero	3	200	600
- Binder	1	250	250
- Generador Electrico	2	6,000	12,000
Total Equipos			**76,870**

Cuadro 4.3.7 Capacitacion para los Extensionistas

Costos detallados

	Unidad	Cantidad					Total	Costo Unit.	Costos					Total
		Año							Año					
		1	2	3	4	5		(US$000)	1	2	3	4	5	
I. costos de Inversion														
A. Fondo	L.S.													-
B. Equipos														
1. Equipos Capacitacion [1]	No.	1						76.87	76.87					76.87
2. Infrastructura	L.S.								80.00	-	-	-	-	80.00
Subtotal									156.87	-	-	-	-	156.87
B. Capacitacion														
1. Cursos Cortos	No.	12	12	12	12	12	60	5.68	68.16	68.16	68.16	68.16	68.16	340.80
2. Talleres	No.	12	12	12	12	12	60	2.37	28.44	28.44	28.44	28.44	28.44	142.20
3. Seminarios	No.	6	6	6	6	6	30	0.71	4.26	4.26	4.26	4.26	4.26	21.30
4. Conferencias	No.	12	12	12	12	12	60	0.29	3.48	3.48	3.48	3.48	3.48	17.40
5. Dias de Campo	No.	4	4	4	4	4	20	0.61	2.44	2.44	2.44	2.44	2.44	12.20
Subtotal									106.78	106.78	106.78	106.78	106.78	533.90
C. Vehiclos	No.													
1. Vehiclo (4WD)	No.	3					3	20	60.00	-	-	-	-	60.00
2. Motorcicleta	No.	3					3	7	21.00	-	-	-	-	21.00
Subtotal									81.00	-	-	-	-	81.00
D. Salarios														
Secretaria	P/M	6	12	12	12	12	54	0.5	3.00	6.00	6.00	6.00	6.00	27.00
Gerente	P/M	6	12	12	12	12	54	3.2	19.20	38.40	38.40	38.40	38.40	172.80
Capacitadores	P/M	24	48	48	48	48	216	2.5	60.00	120.00	120.00	120.00	120.00	540.00
Evaluacion Externa	Año								-	10.00	-	-	10.00	20.00
Subtotal									82.20	174.40	164.40	164.40	174.40	759.80
Total Costos de Inversion									426.85	281.18	271.18	271.18	281.18	1,531.57
II. Costos Concurrentes														
A. Operacion y Mantenimiento														
1. Costo Transporte Local	L.S.								3.00	6.00	6.00	6.00	6.00	27.00
2. Materiales	Mes	6	12	12	12	12	54	0.25	1.50	3.00	3.00	3.00	3.00	13.50
3. Materiales de Capacitacion		6	12	12	12	12	54	1	6.00	12.00	12.00	12.00	12.00	54.00
4. Alquiler Oficina	Mes								-	-	-	-	-	-
5. Subscripciones y Public.	L.S.								3.00	3.00	3.00	3.00	3.00	15.00
Total Costos Concurrentes									10.50	21.00	21.00	21.00	21.00	109.50
TOTAL									437.35	302.18	292.18	292.18	302.18	1,641.07

* P/M : person/month

Nota :

[1] Ver cuadro 4.3.6 para detalles

Cuadro 4.3.8 Estimados de los Requerimientos de Multiplicacion de Semillas Certificadas y Material de Siembra

Crop	Planting Area With Project (ha)	Unit Requirement Seeds or Seedlings (kg/ha)	Total Seeds Requirement (tons)	Availbality of Good Seeds Without Project (tons/year)	Seeds to be Produced By the Project (tons/year)	Required Area For Seeds production (ha)
I. In Azua Zone						
Plantain	4,968	1,600 seedlings	1,589,760	683,597	906,163	(tissue culture)
Banana	586	2,000 seedlings	187,520	80,634	106,886	(tissue culture)
Corn	908	40	36	16	20	10
Sorghum	883	20	18	10	8	2
Pigeonpea	268	20	5	0	5	2
Bean	1,329	125	166	80	86	72
II. In San Juan						
Red Bean	14,517	125	1,815	907	907	756
Rice	7,973	160	1,276	319	957	266
Pigeonpea	462	15	7	1	6	2.5
Corn	2,244	40	90	40	50	24
Sorghum	1,742	20	35	20	15	4
III. Yaque del Sur & Lago Enriquillo						
Plantain	10,000	1,600 seedlings	3,200,000	1,376,000	1,824,000	(tissue culture)
Banana	1,440	2,000 seedlings	460,800	198,144	262,656	(tissue culture)
Corn	1,381	40	55	20	35	17
Sorghum	1,356	20	27	10	17	5
Pigeonpea	31	20	1	0	1	0.5

Cuadro 4.3.9 Infrastructura, Equipos y Maquinarias Requeridos para el Plan de Produccion de Semillas y Material de Siembra

I. Requirement for Seeds and Seedlings Production in CIAZA	Unit	Quantity
(i) Constructions		
Construction of Storage building (capacity for 130 tons of seeds)	m2	210
Construction of Drying Floor	m2	500
Construction of building for Tissue culture	m2	450
(ii) Machinery and Equipment		
Tractor	45 HP	1
Plowing Attachment	Plow	1
Plowing Attachment	Harrow	1
Seeds Planter		1
Harvester		1
Corn Sheller		1
Seeds Classifier		1
Seed Packaging		1
Weight scale		1
Pesticide Sprayer		2
Power Generator		2
Air Temperature and Humidity control		1
Light Truck		1
(iii) Equipment for Tissue culture Lab		
Low Temperature incubator		2
Tissue culture enclosure		2
Refrigerators	6.7 CF	4
Air conditioner	50 Btu	5
Oven		4
Autoclave		2
Sterilizer		2
Culture Plates		100
Forcepts for Dissection		10
Media Bottles		200
Beakers		100

II. Requirement for Seeds Production by San Juan Farmers Association		
(i) Constructions		
Construction of Storage buildings (capacity of about 1900 tons of seeds)	m2	3,000
Construction of Drying Floor	m2	5,000
(ii)Machinery and Equipment		
Tractor	90 HP	4
Plowing Attachment	Plow	4
Plowing Attachment	Harrow	4
Seeds Planter		4
Harvester		4
Corn Sheller		1
Seeds Classifier		4
Seed Packaging		4
Weight scale		4
Pesticide Sprayer		10
Power Generator		4
Air Temperature and Humidity control		4
Truck		4

Cuadro 4.3.10. Fortalecimiento de las Asociaciones de Productores Agropecuarios

costos Detallados

	Unidad	Cantidad						Costo Unit.	Costos					
		Año					Total		Año					Total
		1	2	3	4	5		(US$000)	1	2	3	4	5	
I. Costos de Iversion														
A. Linea de Credito	L.S.													-
1. Computadora	No.	5					5	2.8	14.00	-	-	-	-	14.00
2. Impresora	No.	2					2	1.2	2.40	-	-	-	-	2.40
3. Fax	No.	1					1	0.5	0.50	-	-	-	-	0.50
4. Fotocopiadora	No.	1					1	3	3.00	-	-	-	-	3.00
5. Overhead Projevtor	No.	#					-	1.5	-	-	-	-	-	-
Subtotal									19.90	-	-	-	-	19.90
B. Asistencia Técnica														
1. Organizacion y Gerencia	P/M	6	12	12	12			3	18.00	36.00	36.00	36.00	-	126.00
2. Mercados	P/M	6	12	12	12			3	18.00	36.00	36.00	36.00	-	126.00
3. Manejo de la Producción	P/M	6	12	12	12			3	18.00	36.00	36.00	36.00	-	126.00
Subtotal									54.00	108.00	108.00	108.00	-	378.00
C. Capacitación														
1. Cursos Cortos	No.	10	10	10	10	10		5.68	56.80	56.80	56.80	56.80	56.80	284.00
2. Viajes	No.	6	6	6	6	6		0.61	3.66	3.66	3.66	3.66	3.66	18.30
Subtotal									60.46	60.46	60.46	60.46	60.46	302.30
D. Vehiclos														
1. Vehiclo (4WD)	No.	2					2	20	40.00	-	-	-	-	40.00
2. Motorcicleta (2WD)	No.	4					4	10.7	42.80	-	-	-	-	42.80
Subtotal									82.80	-	-	-	-	82.80
E. Salarios														
Secretaria	P/M	6	12	12	12	12	54	0.5	3.00	6.00	6.00	6.00	6.00	27.00
Gerente	P/M	6	12	12	12	12	54	3.5	21.00	42.00	42.00	42.00	42.00	189.00
Técnicos Mercadeo	P/M	24	48	48	48	48	216	1.5	36.00	72.00	72.00	72.00	72.00	324.00
Evaluación Externa	Año								-	10.00	-	-	10.00	20.00
Subtotal									60.00	130.00	120.00	120.00	130.00	560.00
Total Costos de Inversión									277.16	298.46	288.46	288.46	190.46	1,343.00
II. Costos Concurrentes														
A. Operacion y Mantenimiento														
1. Costo Transporte Local	L.S.								3.00	6.00	6.00	6.00	6.00	27.00
2. Suministros	Mes	6	12	12	12	12	54	0.25	1.50	3.00	3.00	3.00	3.00	13.50
3. Alquiler Oficina	Mes	6	12	12	12	12	54	0.5	3.00	6.00	6.00	6.00	6.00	27.00
4. Subscripciones y Public.	L.S.								-	-	-	-	-	-
Total Costos Reccurentes									7.50	15.00	15.00	15.00	15.00	67.50
TOTAL									284.66	313.46	303.46	303.46	205.46	1,410.50

* P/M : person/mes

Cuadro 4.3.11. Sistema de Información de Mercados

Costos Detallados

	Unidad	Cantidad						Costo Unit.	Costos					
		Año					Total		Año					Total
		1	2	3	4	5		(US$000)	1	2	3	4	5	
I. Costos de Inversión														
A. Equipos														
1. Computadoras	No.	6					6	2.8	16.8	-	-	-	-	16.8
2. Impresoras	No.	5					5	1.2	6.0	-	-	-	-	6.0
3. Fax	No.	5					5	0.5	2.5	-	-	-	-	2.5
4. Fotocopiadora	No.	5					5	3	15.0	-	-	-	-	15.0
5. Scanner	No.	1					1	1.4	1.0	-	-	-	-	1.0
6. Overhead Projector	No.	1					1	1.5	1.5	-	-	-	-	1.5
7. Data Show	No.	1					1	5.4	5.4	-	-	-	-	5.4
Subtotal									48.2	-	-	-	-	48.2
C. Vehiculos	No.													
1. Vehiculo (4WD)	No.	1					1	20	20.0	-	-	-	-	20.0
2. Motocicleta	No.	4					4	7	28.0	-	-	-	-	28.0
Subtotal									48.0	-	-	-	-	48.0
D. Salarios														
Secretaria	P/M	6	12	12	12	12	54	0.5	3.0	6.0	6.0	6.0	6.0	27.0
Gerente	P/M	6	12	12	12	12	54	1.5	9.0	18.0	18.0	18.0	18.0	81.0
Operadores Sistema	P/M	30	60	60	60	60	270	0.4	12.0	24.0	24.0	24.0	24.0	108.0
Evaluacion Externa	Año								-	6.0	-	-	6.0	12.0
Subtotal									24.0	54.0	48.0	48.0	54.0	228.0
Total Costos Inversion									**120.2**	**54.0**	**48.0**	**48.0**	**54.0**	**324.2**
II. Costos Concurrentes														
A. Operacion y Mantenimiento														
1. Costo Transporte Local	L.S.								3.0	6.0	6.0	6.0	6.0	27.0
2. Suministros	Mes	6	12	12	12	12	54	2	12.0	24.0	24.0	24.0	24.0	108.0
3. Alquiler Oficina	Mes								-	-	-	-	-	-
4. Capacitación	L.S.								30.0	5.0	5.0	5.0	5.0	50.0
5. Subscripciones & Public.	L.S.								10.0	8.0	8.0	8.0	8.0	42.0
Total Costos Reccurentes									45.0	35.0	35.0	35.0	35.0	227.0
TOTAL									**165.2**	**89.0**	**83.0**	**83.0**	**89.0**	**551.2**

* P/M : person/mes

Cuadro 4.4.1 Nivel de Agua Simulado en la Presa de Sabaneta bajo las Condiciones Propuestas

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
1981	640.67	639.39	629.61	625.64	629.99	634.93	643.00	640.67	638.33	636.00	636.00	638.33
1982	640.67	642.15	634.55	632.80	637.09	642.66	643.00	640.67	638.33	636.00	636.00	638.33
1983	640.67	637.54	625.32	618.90	623.71	628.74	633.90	627.69	627.94	631.20	636.00	638.33
1984	640.67	637.47	626.17	619.95	624.85	629.62	631.64	639.00	637.09	635.55	636.00	638.33
1985	640.67	637.54	624.73	616.55	622.18	627.80	630.47	621.90	612.43	611.68	619.60	631.69
1986	640.67	638.53	627.00	620.29	624.98	632.45	639.76	639.26	637.05	636.00	636.00	638.33
1987	640.67	638.18	625.76	617.78	622.20	627.50	631.46	636.00	636.53	636.00	636.00	638.33
1988	640.67	638.85	626.22	615.64	619.50	623.73	623.44	609.00	619.87	620.62	636.00	638.33
1989	640.67	638.34	625.88	615.94	620.77	625.58	629.19	621.83	619.50	632.66	636.00	638.33
1990	640.67	637.12	622.79	609.55	613.31	619.92	615.22	609.00	609.00	620.87	636.00	638.33
1991	640.67	638.53	625.23	613.32	616.39	621.37	628.28	622.28	616.11	617.85	628.79	636.57
1992	640.10	634.30	615.15	609.00	615.13	624.27	639.46	640.67	638.33	636.00	636.00	638.33
1993	640.67	637.89	625.73	616.18	620.37	628.13	639.19	640.67	637.28	636.00	636.00	638.33
1994	640.67	636.33	621.16	609.00	614.85	623.20	632.42	622.21	609.00	609.00	621.80	638.33
Average	640.63	638.01	625.38	617.18	621.81	627.85	632.89	629.35	626.91	628.24	633.30	637.73
Drought of 1 in 5 year	640.67	637.12	622.79	609.55	615.13	623.20	628.28	621.83	612.43	617.85	628.79	638.33
Maximum Operation Level	640.67	643.00	643.00	643.00	643.00	643.00	643.00	640.67	638.33	636.00	636.00	638.33

Note : Flood periods
Transition periods
Normal periods

Cuadro 4.4.2 Nivel de Agua Simulado en la Presa de Sabana Yegua bajo las Condiciones Propuestas

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
1981		384.55	383.52	382.28	380.44	378.82	389.43	392.93	389.47	386.00	386.00	389.47
1982	392.93	394.56	394.05	393.30	391.75	390.63	395.41	392.93	389.47	386.00	386.00	388.26
1983	388.43	386.61	383.41	380.00	376.05	371.82	373.83	373.69	369.48	371.54	376.10	382.29
1984	383.58	381.34	378.33	374.60	369.46	363.53	362.57	371.94	368.07	363.35	373.92	390.90
1985	381.45	379.36	374.79	369.32	360.84	358.00	368.18	363.02	358.00	358.00	359.68	373.35
1986	382.20	382.34	380.54	378.15	375.53	374.94	380.68	385.36	383.71	385.02	384.83	388.85
1987	390.15	388.35	385.39	382.19	378.56	375.62	381.33	385.39	383.96	383.56	386.00	389.47
1988	392.93	394.80	393.23	391.42	389.95	388.26	388.69	389.03	389.47	386.00	386.00	389.47
1989	391.66	390.35	388.17	386.08	384.72	384.86	387.02	386.79	383.33	386.00	386.00	389.47
1990	390.73	389.91	387.77	385.36	382.71	378.91	374.39	368.45	358.00	358.00	372.91	388.18
1991	392.93	392.78	390.38	386.88	382.60	379.06	382.16	381.61	375.44	374.22	377.51	382.49
1992	382.28	376.96	369.84	359.14	358.00	363.97	385.08	390.78	388.41	386.00	386.00	389.47
1993	392.28	391.79	390.38	388.61	386.13	385.54	396.40	392.93	389.47	386.00	386.00	388.50
1994	388.63	386.00	381.92	378.43	372.43	368.37	378.70	376.31	366.75	358.00	368.35	377.78
Average	388.43	387.12	384.41	381.13	377.80	375.88	381.70	382.23	378.07	376.26	379.66	385.57
Drought of 1 in 5 year	382.28	381.34	378.33	374.60	369.46	363.97	373.83	371.94	366.75	358.00	372.91	389.90
Maximum Operation Level	392.93	396.40	396.40	396.40	396.40	396.40	396.40	392.93	389.47	386.00	386.00	389.47

Note : Flood periods
Transition periods
Normal periods

Cuadro 4.4.1 Nivel de Agua Simulado en la Presa de Sabaneta bajo las Condiciones Propuestas

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
1981	640.67	639.39	629.61	625.64	629.99	634.93	643.00	640.67	638.33	636.00	636.00	638.33
1982	640.67	642.15	634.55	632.80	637.09	642.66	643.00	640.67	638.33	636.00	636.00	638.33
1983	640.67	637.54	625.32	618.90	623.71	628.74	633.90	627.69	627.91	631.20	636.00	638.33
1984	640.67	637.47	626.17	619.95	624.85	629.62	631.64	639.00	637.09	635.55	636.00	638.33
1985	640.67	637.54	624.73	616.55	622.18	627.80	630.47	621.90	612.43	611.68	619.60	631.69
1986	640.67	638.53	627.00	620.29	624.98	632.45	639.76	639.26	637.05	636.00	636.00	638.33
1987	640.67	638.18	625.76	617.78	622.20	627.50	631.46	636.00	635.53	636.00	636.00	638.33
1988	640.67	638.85	626.22	615.64	619.50	623.73	623.44	609.00	619.87	620.62	636.00	638.33
1989	640.67	638.34	625.88	615.94	620.77	625.58	629.19	621.83	619.50	632.66	636.00	638.33
1990	640.67	637.12	622.79	609.55	613.31	619.92	615.22	609.00	609.00	620.87	636.00	638.33
1991	640.67	638.53	625.23	613.32	616.39	624.37	628.28	622.28	616.11	617.85	628.79	636.57
1992	640.10	634.30	615.15	609.00	615.13	624.27	639.46	640.67	638.33	636.00	636.00	638.33
1993	640.67	637.89	625.73	616.18	620.37	628.13	639.19	640.67	637.28	636.00	636.00	638.33
1994	640.67	636.33	621.16	609.00	614.85	623.20	632.42	622.21	609.00	609.00	621.80	638.33
Average	640.63	638.01	625.38	617.18	621.81	627.85	632.59	629.35	626.91	628.24	633.30	637.73
Drought of 1 in 5 year	640.67	637.12	622.79	609.55	615.13	623.20	628.28	621.83	612.43	617.85	628.79	638.33
Maximum Operation Level	640.67	643.00	643.00	643.00	643.00	643.00	643.00	640.67	638.33	636.00	636.00	638.33

Note : Flood periods
Transition periods
Normal periods

Cuadro 4.4.2 Nivel de Agua Simulado en la Presa de Sabana Yegua bajo las Condiciones Propuestas

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
1981		384.55	383.52	382.28	380.41	378.82	389.43	392.93	389.47	386.00	386.00	389.47
1982	392.93	394.56	394.05	393.30	391.75	390.63	395.41	392.93	389.47	386.00	386.00	388.26
1983	388.43	386.61	383.41	380.00	376.05	371.82	373.83	373.69	369.43	371.54	376.10	382.29
1984	383.58	381.34	378.33	374.60	369.46	363.53	362.57	371.94	368.07	363.35	373.92	380.90
1985	381.45	379.36	374.79	369.32	360.84	358.00	368.18	363.02	358.00	358.00	359.68	373.35
1986	382.20	382.34	380.54	378.15	375.53	374.94	380.68	385.36	383.71	385.02	384.83	388.85
1987	390.15	388.35	385.39	382.19	378.56	375.62	381.33	385.39	383.96	383.56	386.00	389.47
1988	392.93	394.80	393.23	391.42	389.95	388.26	388.69	389.03	389.47	386.00	386.00	389.47
1989	391.66	390.35	388.17	386.08	384.72	384.86	387.02	386.79	383.33	386.00	386.00	389.47
1990	390.73	389.91	387.77	385.36	382.71	378.91	374.39	368.45	358.00	358.00	372.91	383.18
1991	392.93	392.78	390.38	386.88	382.60	379.06	382.16	381.61	375.41	374.22	377.51	382.49
1992	382.28	376.96	369.84	359.14	358.00	363.97	365.08	390.78	388.41	385.00	385.00	389.47
1993	392.28	391.79	390.38	388.61	386.13	385.54	396.40	392.93	389.47	386.00	386.00	388.50
1994	388.63	386.00	381.92	378.43	372.43	368.37	378.70	376.31	366.75	358.00	358.35	377.78
Average	388.48	387.12	384.41	381.13	377.80	375.88	381.70	382.23	378.07	376.26	379.66	385.57
Drought of 1 in 5 year	382.28	381.34	378.33	374.60	369.46	363.97	373.83	371.94	366.75	358.00	372.91	380.90
Maximum Operation Level	392.93	396.40	396.40	396.40	396.40	396.40	396.40	392.93	389.47	386.00	386.00	389.47

Note : Flood periods
Transition periods
Normal periods

Cuadro 4.5.1 Estimatados de Requerimientos de agua de riego bajo la Condicion con Proyecto (1/19)
(J. J. Puello)

10,986 ha

Crop		Nov.	Dec.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
	ETo (mm/day)	4.1	4.8	5.4	5.7	5.6	5.9	5.9	5.8	5.1	4.5	4.2	3.8
Beans													
	Planting area (ha)	1,579	4,343	4,738	3,158	395							
	kc												
		0.50	0.80	1.10	0.40								
			0.50	0.80	1.10	0.40							
	Average kc	0.50	0.65	0.95	0.75	0.40							
	CU (mm/day)	2.0	3.1	5.2	4.3	2.2							
	CU(mm/month)	61.3	96.8	160.0	119.1	69.6							
	Effective rainfall (mm)	36.2	10.9	11.3	10.5	21.8							
	Net Requirement(MCM)	0.40	3.73	7.04	3.43	0.19							
Rice1													
	Planting area (ha)	105						105	841	1,576	1,681	1,576	841
	kc							1.10	1.15	1.20	1.25	1.00	
									1.10	1.15	1.20	1.25	1.00
		1.00								1.10	1.15	1.20	1.25
	Average kc	1.00						1.10	1.13	1.15	1.20	1.15	1.13
	CU (mm/day)	4.1						6.5	6.5	5.9	5.4	4.8	4.3
	CU(mm/month)	122.6						202.9	195.1	182.9	168.8	143.8	133.11
	Percolation (mm/mon)	150.0						155.0	150.0	155.0	155.0	150.0	155.0
	Effective rainfall (mm)	36.2						90.9	52.6	65.9	80.0	94.8	84.5
	Land Preparation, 300 mm (MCM)							2.36	2.36				
	Net Requirement(MCM)	0.25						2.64	4.82	4.29	4.10	3.14	1.71
Sweet Potato 1													
	Planting area			41	123	206	247	206	123	41			
	kc			0.45	0.75	1.10	0.75						
					0.45	0.75	1.10	0.75					
						0.45	0.75	1.10	0.75				
							0.45	0.75	1.10	0.75			
	Average kc			0.45	0.60	0.77	0.76	0.87	0.93	0.75			
	CU (mm/day)			2.44	3.40	4.30	4.51	5.16	5.35	3.85			
	CU(mm/month)			75.77	95.25	133.45	135.36	159.85	160.42	119.29			
	Effective rainfall (mm)			11	10	22	45	91	53	66			
	Net Requirement(MCM)			0.03	0.10	0.23	0.22	0.14	0.13	0.02			
Sweet Potato 2													
	Planting area (ha)	850	283						283	850	1,416	1,699	1,416
	kc								0.45	0.75	1.10	0.75	
										0.45	0.75	1.10	0.75
		0.75									0.45	0.75	1.10
		1.10	0.75									0.45	0.75
	Average kc	0.93	0.75						0.45	0.60	0.77	0.76	0.87
	CU (mm/day)	3.78	3.60						2.60	3.08	3.48	3.18	3.31
	CU(mm/month)	113.4	111.6						78.0	95.4	107.8	95.4	102.5
	Effective rainfall (mm)	36	11						53	66	80	95	84
	Net Requirement(MCM)	0.66	0.29						0.07	0.25	0.39	0.01	0.26
Corn&Sorghum													
	Planting area (ha)						164	491	818	982	818	491	164
	kc						0.50	0.80	1.10	0.60			
								0.50	0.80	1.10	0.60		
									0.50	0.80	1.10	0.60	
										0.50	0.80	1.10	0.60
	Average kc						0.50	0.65	0.80	0.75	0.83	0.85	0.60
	CU (mm/day)						2.96	3.87	4.62	3.85	3.78	3.54	2.29
	CU(mm/month)						88.8	119.9	138.7	119.3	117.2	106.3	71.0
	Effective rainfall (mm)						45	91	53	66	80	95	84
	Net Requirement(MCM)						0.07	0.14	0.70	0.52	0.30	0.06	0.00
Plantain	(ha)	45	45	45	45	45	45	45	45	45	45	45	45
Banana		120	120	120	120	120	120	120	120	120	120	120	120
Papaya		130	130	130	130	130	130	130	130	130	130	130	130
	Planting area	295	295	295	295	295	295	295	295	295	295	295	295
	kc	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
	CU (mm/day)	3.5	4.1	4.6	4.8	4.8	5.0	5.1	4.9	4.4	3.9	3.5	3.2
	CU(mm/month)	104.2	126.5	143.1	134.9	148.0	150.9	156.8	147.4	135.2	119.5	106.3	100.6
	Effective rainfall (mm)	36.2	10.9	11.3	10.5	21.8	45.5	90.9	52.6	65.9	80.0	94.8	84.5
	Net Requirement(MCM)	0.20	0.34	0.39	0.37	0.37	0.31	0.19	0.28	0.20	0.12	0.03	0.05
Pasture, Cassava, Pegion pea, Vegetables, and Other													
	Planting area (ha)	755	804	734	496	376	484	836	1,080	1,080	1,080	1,043	880
	Average kc	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
	CU (mm/day)	3.27	3.84	4.35	4.54	4.49	4.73	4.76	4.62	4.10	3.63	3.33	3.05
	CU(mm/month)	98.1	119.1	134.7	127.0	139.2	142.0	147.6	138.7	127.2	112.5	100.0	94.7
	Effective rainfall (mm)	36.2	10.9	11.3	10.5	21.8	45.5	90.9	52.6	65.9	80.0	94.8	84.5
	Net Requirement(MCM)	0.47	0.87	0.91	0.58	0.44	0.47	0.47	0.93	0.66	0.35	0.06	0.09
Total Net Requirements (MCM)		1.72	5.22	8.36	4.48	1.23	1.07	0.95	2.12	1.66	1.11	0.16	0.39
Total Net Requirement for Paddy (MCM)		0.25	0.00	0.00	0.00	0.00	0.00	2.64	4.82	4.29	4.10	3.14	1.71
Diversion Requirement (MCM)		4.37	11.87	19.01	10.18	2.80	2.43	7.06	13.75	11.72	10.24	6.16	4.06

Cuadro 4.5.1 Estimatados de Requerimientos de agua de riego bajo la Condicion con Proyecto (2/19)
(San Juan) 8,526 ha

Crop		Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
	ETo (mm/day)	4.1	4.8	5.4	5.7	5.6	5.9	5.9	5.8	5.1	4.5	4.2	3.8
Beans	Planting area (ha)	1,623	4,464	4,870	3,247	372							
	kc	0.50	0.80	1.10	0.40								
			0.50	0.80	1.10	0.40							
	Average kc	0.50	0.65	0.95	0.75	0.40							
	CU (mm/day)	2.0	3.1	5.2	4.3	2.2							
	CU(mm/month)	61.3	96.8	160.0	119.1	69.6							
	Effective rainfall (mm)	36.2	10.9	11.3	10.5	21.8							
	Net Requirement(MCM)	0.41	3.83	7.24	3.53	0.18							
Rice1	Planting area (ha)	138						138	1108	2077	2215	2077	1108
	kc							1.10	1.15	1.20	1.25	1.00	
									1.10	1.15	1.20	1.25	1.00
		1.00								1.10	1.15	1.20	1.25
	Average kc	1.00						1.10	1.13	1.15	1.20	1.15	1.13
	CU (mm/day)	4.1						6.5	6.5	5.9	5.4	4.8	4.3
	CU(mm/month)	122.6						203.9	195.1	182.9	168.8	143.8	133.1
	Percolation (mm/mon)	150.0						155.0	150.0	155.0	155.0	150.0	155.0
	Effective rainfall (mm)	36.2						90.9	52.6	65.9	80.0	94.8	84.5
	Land Preparation, 300 mm (MCM)							3.11	3.11				
	Net Requirement(MCM)	0.33						3.43	6.35	5.65	5.40	4.13	2.26
Rice2	Planting area (ha)	8	60	90	90	83	30						
	kc	1.10	1.15	1.20	1.25	1.00							
			1.10	1.15	1.20	1.25	1.00						
	Average kc	1.10	1.13	1.18	1.23	1.13	1.00						
	CU (mm/day)	4.5	5.4	6.4	6.9	6.3	5.9						
	CU(mm/month)	134.8	167.5	197.8	194.5	195.8	177.5						
	Percolation (mm/mon),	150.0	155.0	155.0	140.0	155.0	150.0						
	Effective rainfall (mm)	36.2	10.9	11.3	10.5	21.8	45.5						
	Land Preparation, 300 mm (MCM)	0.14	0.14										
	Net Requirement(MCM)	0.15	0.32	0.31	0.29	0.27	0.08						
Sweet Potato 1	Planting area	100	299	398	398	299	100						
	kc	0.45	0.75	1.10	0.75								
			0.45	0.75	1.10	0.75							
				0.45	0.75	1.10	0.75						
	Average kc	0.45	0.60	0.77	0.87	0.93	0.75						
	CU (mm/day)	1.8	2.9	4.2	4.9	5.2	4.4						
	CU(mm/month)	55.2	89.3	129.1	137.6	161.0	133.1						
	Effective rainfall (mm)	36.2	10.9	11.3	10.5	21.8	45.5						
	Net Requirement(MCM)	0.02	0.23	0.47	0.51	0.42	0.09						
Sweet Potato 2	Planting area (ha)	161						161	484	806	967	806	484
	kc							0.45	0.75	1.10	0.75		
									0.45	0.75	1.10	0.75	
										0.45	0.75	1.10	0.75
		0.75									0.45	0.75	1.10
	Average kc	0.75						0.45	0.60	0.77	0.76	0.87	0.93
	CU (mm/day)	3.1						2.7	3.5	3.9	3.5	3.6	3.5
	CU(mm/month)	91.9						83.0	104.1	121.9	107.2	108.4	109.4
	Effective rainfall (mm)	36.2						90.9	52.6	65.9	80.0	94.8	84.5
	Net Requirement(MCM)	0.09						0.00	0.75	0.45	0.26	0.11	0.12
Corn& Sorghum	Planting area (ha)	303						303	908	1,513	1,815	1,513	908
	kc							0.50	0.80	1.10	0.60		
									0.50	0.80	1.10	0.60	
										0.50	0.80	1.10	0.60
		0.60									0.50	0.80	1.10
	Average kc	0.60						0.50	0.65	0.80	0.75	0.83	0.85
	CU (mm/day)	2.45						2.97	3.76	4.10	3.40	3.47	3.24
	CU(mm/month)	73.5						92.2	112.7	127.2	105.5	104.2	100.6
	Effective rainfall (mm)	36						91	53	66	80	95	84
	Net Requirement(MCM)	0.11						0.00	0.55	0.93	0.46	0.14	0.15
Plantain	(ha)												
	Planting area	297	297	297	297	297	297	297	297	297	297	297	297
	kc	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
	CU (mm/day)	3.5	4.1	4.6	4.8	4.8	5.0	5.1	4.9	4.4	3.9	3.5	3.2
	CU(mm/month)	104.2	126.5	143.1	134.9	148.0	150.9	156.8	147.4	135.2	119.5	106.3	100.6
	Effective rainfall (mm)	36.2	10.9	11.3	10.5	21.8	45.5	90.9	52.6	65.9	80.0	94.8	84.5
	Net Requirement(MCM)	0.20	0.34	0.39	0.37	0.37	0.31	0.20	0.28	0.21	0.12	0.03	0.05
Pasture, Cassava, Region pea, Vegetables, and Others	Planting area (ha)	323	323	364	266	347	266	304	323	323	323	323	323
	Average kc	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
	CU (mm/day)	3.3	3.8	4.3	4.5	4.5	4.7	4.8	4.6	4.1	3.6	3.3	3.1
	CU(mm/month)	98.1	119.1	134.7	127.0	139.2	142.0	147.6	138.7	127.2	112.5	100.0	94.7
	Effective rainfall (mm)	36.2	10.9	11.3	10.5	21.8	45.5	90.9	52.6	65.9	80.0	94.8	84.5
	Net Requirement(MCM)	0.20	0.35	0.37	0.31	0.29	0.26	0.17	0.28	0.20	0.11	0.02	0.03
Total Net Requirements (MCM)		1.03	4.76	8.45	4.71	1.26	0.66	0.37	1.35	1.78	0.95	0.30	0.35
Total Net Requirement for Paddy (MCM)		0.48	0.32	0.31	0.29	0.27	0.08	3.48	6.35	5.65	5.40	4.13	2.26
Diversion Requirement (MCM)		3.02	10.68	18.56	10.53	3.14	1.54	6.80	13.84	13.53	11.33	7.77	4.63

Cuadro 4.5.1 Estimatados de Requerimientos de agua de riego bajo la Condicion con Proyecto (M19)
(Hato de Padre) 2,659 ha

Crop		Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
	ETo (mm/day)	4.1	4.8	5.4	5.7	5.6	5.9	5.9	5.8	5.1	4.5	4.2	3.8
Beans													
	Planting area (ha)	365	1,004	1,095	739	91							
	kc												
		0.50	0.80	1.10	0.40								
			0.50	0.80	1.10	0.40							
	Average kc	0.50	0.65	0.95	0.75	0.40							
	CU (mm/day)	2.0	3.1	5.2	4.3	2.2							
	CU(mm/month)	61.3	95.8	160.0	119.1	69.6							
	Effective rainfall (mm)	36.2	10.9	11.3	10.5	21.8							
	Net Requirement(MCM)	0.09	0.86	1.63	0.79	0.04							
Rice1		89	87	60	60	62	72	302	676	756	772	637	125
	Planting area (ha)	48						48	386	724	772	724	386
	kc							1.10	1.15	1.20	1.25	1.00	
									1.10	1.15	1.20	1.25	1.00
		1.00								1.10	1.15	1.20	1.25
	Average kc	1.00						1.10	1.13	1.15	1.20	1.15	1.13
	CU (mm/day)	4.1						6.5	6.5	5.9	5.4	4.8	4.3
	CU(mm/month)	122.6						202.9	195.4	182.9	168.8	143.8	133.11
	Percolation (mm/mon)	150.0						155.0	150.0	155.0	155.0	150.0	155.0
	Effective rainfall (mm)	36.2						90.9	52.6	65.9	80.0	91.8	84.5
	Land Preparation, 300 mm (MCM)							1.09	1.09				
	Net Requirement(MCM)	0.11						1.21	2.21	1.97	1.88	1.44	0.79
Rice2													
	Planting area (ha)		21	57	62	62	41	5					
	kc		1.10	1.15	1.20	1.25	1.00						
				1.10	1.15	1.20	1.25	1.00					
	Average kc		1.10	1.13	1.18	1.23	1.13	1.00					
	CU (mm/day)		5.3	6.1	6.7	6.9	6.7	5.9					
	CU(mm/month)		163.7	189.4	186.5	213.2	199.7	184.4					
	Percolation (mm/mon),		155.0	155.0	140.0	155.0	150.0	155.0					
	Effective rainfall (mm)		10.9	11.3	10.5	21.8	45.5	90.9					
	Land Preparation, 300 mm (MCM)		0.09	0.1									
	Net Requirement(MCM)		0.16	0.28	0.20	0.21	0.13	0.01					
Sweet Potato 1		40	42	52	81	90	90	90	90	226	245	156	136
	Planting area		28	85	114	114	85	28					
	kc		0.45	0.75	1.10	0.75							
				0.45	0.75	1.10	0.75						
					0.45	0.75	1.10	0.75					
	Average kc		0.45	0.60	0.77	0.87	0.93	0.75					
	CU (mm/day)		2.2	3.3	4.3	4.9	5.5	4.5					
	CU(mm/month)		66.99	101.02	131.71	150.85	164.21	138.33					
	Effective rainfall (mm)		11	11	10	22	45	91					
	Net Requirement(MCM)		0.02	0.08	0.13	0.15	0.10	0.01					
Sweet Potato 2													
	Planting area (ha)	52						52	156	259	311	259	156
	kc							0.45	0.75	1.10	0.75		
									0.45	0.75	1.10	0.75	
										0.45	0.75	1.10	0.75
		0.75									0.45	0.75	1.10
	Average kc	0.75						0.45	0.60	0.77	0.76	0.87	0.93
	CU (mm/day)	3.1						2.7	3.5	3.9	3.5	3.6	3.5
	CU(mm/month)	91.9						83.0	104.1	121.9	107.2	108.4	109.4
	Effective rainfall (mm)	36						91	53	66	80	95	84
	Net Requirement(MCM)	0.03						0.00	0.08	0.15	0.08	0.04	0.04
Corn& Sorghum								20	35	40	55	35	5
	Planting area (ha)	12						12	35	58	78	58	35
	kc							0.50	0.80	1.10	0.60		
									0.50	0.80	1.10	0.60	
										0.50	0.80	1.10	0.60
		0.60									0.50	0.80	1.10
	Average kc	0.60						0.50	0.65	0.80	0.75	0.83	0.85
	CU (mm/day)	2.5						3.0	3.8	4.1	3.4	3.5	3.2
	CU(mm/month)	73.5						92.2	112.7	127.2	105.5	104.2	100.6
	Effective rainfall (mm)	36						91	53	66	80	95	84
	Net Requirement(MCM)	0.00						0.00	0.02	0.04	0.02	0.01	0.01
Plantain		13	13	13	13	13	13	13	13	13	13	13	13
Banana		5	5	5	5	5	5	5	5	5	5	5	5
total	Planting area (ha)	18	18	18	18	18	18	18	18	18	18	18	18
	kc	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
	CU (mm/day)	3.5	4.1	4.6	4.8	4.8	5.0	5.1	4.9	4.4	3.9	3.5	3.2
	CU(mm/month)	104.2	126.5	143.1	134.9	148.0	150.9	156.8	147.4	135.2	119.5	106.3	100.6
	Effective rainfall (mm)	36.2	10.9	11.3	10.5	21.8	45.5	90.9	52.6	65.9	80.0	94.8	84.5
	Net Requirement(MCM)	0.01	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.01	0.01	0.00	0.00
Pasture, Cassava, Pegion pea, Vegetables, and Others													
	Planting area (ha)	80	80	72	70	48	70	72	80	80	80	75	80
	Average kc	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
	CU (mm/day)	3.3	3.8	4.3	4.5	4.5	4.7	4.8	4.6	4.1	3.6	3.3	3.1
	CU(mm/month)	98.4	119.1	134.7	127.0	139.2	142.0	147.6	138.7	127.2	112.5	100.0	94.7
	Effective rainfall (mm)	36.2	10.9	11.3	10.5	21.8	45.5	90.9	52.6	65.9	80.0	94.8	84.5
	Net Requirement(MCM)	0.05	0.09	0.09	0.08	0.06	0.07	0.04	0.07	0.05	0.03	0.00	0.01
Total Net Requirements (MCM)		0.19	0.98	1.82	1.02	0.27	0.19	0.07	0.19	0.24	0.14	0.05	0.06
Total Net Requirement for Paddy (MCM)		0.11	0.16	0.28	0.20	0.21	0.13	1.23	2.21	1.97	1.88	1.44	0.79
Diversion Requirement (MCM)		0.59	2.36	4.35	2.52	0.94	0.62	2.26	4.22	3.91	3.53	2.58	1.47

Cuadro 4.5.1 Estimatados de Requerimientos de agua de riego bajo la Condicion con Proyecto (4/19)
(Guanito San Juan)

1,000 ha

Crop		Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
	ETo (mm/day)	4.1	4.8	5.4	5.7	5.6	5.9	5.9	5.8	5.1	4.5	4.2	3.8
Beans													
	Planting area (ha)	312	857	935	624	78							
	kc	0.50	0.80	1.10	0.40								
			0.50	0.80	1.10	0.40							
	Average kc	0.50	0.65	0.95	0.75	0.40							
	CU (mm/day)	2.0	3.1	5.2	4.3	2.2							
	CU(mm/month)	61.3	96.8	160.0	119.1	69.6							
	Effective rainfall (mm)	36.2	10.9	11.3	10.5	21.8							
	Net Requirement(MCM)	0.08	0.74	1.39	0.68	0.04							
Rice1													
	Planting area (ha)						123	368	613	736	613	368	123
	kc						1.10	1.15	1.20	1.25	1.00		
								1.10	1.15	1.20	1.25	1.00	
									1.10	1.15	1.20	1.25	1.00
	Average kc						1.10	1.13	1.15	1.20	1.15	1.13	1.00
	CU (mm/day)						6.5	6.7	6.6	6.2	5.2	4.7	3.8
	CU(mm/month)						195.3	207.5	199.8	190.9	161.7	140.7	118.32
	Percolation (mm/mon)						150	155	150	155	155	150	155
	Effective rainfall (mm)						45.5	90.9	52.6	65.9	80.0	94.8	84.5
	Land Preparation, 300 mm (MCM)						0.28	0.74	0.74				
	Net Requirement(MCM)						1.10	1.74	2.56	2.06	1.45	0.72	0.23
Rice2													
	Planting area (ha)	13	14	14	9	1							5
	kc	1.35	1.20	1.25	1.00								1.10
		1.10	1.15	1.20	1.25	1.00							
	Average kc	1.13	1.18	1.23	1.13	1.00							1.10
	CU (mm/day)	4.6	5.6	6.7	6.4	5.6							4.2
	CU(mm/month)	137.9	174.9	206.3	178.6	174.1							130.1
	Percolation (mm/mon).	150.0	155.0	155.0	140.0	155.0							155.0
	Effective rainfall (mm)	36.2	10.9	11.3	10.5	21.8							84.5
	Land Preparation, 300 mm (MCM)	0.02											0.02
	Net Requirement(MCM)	0.05	0.04	0.05	0.03	0.00							0.03
Sweet Potato													
	Planting area	23	23	33	38	46	46	40	40	40	56	61	58
	Average kc	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
	CU (mm/day)	3.3	3.8	4.3	4.5	4.5	4.7	4.8	4.6	4.1	3.6	3.3	3.1
	CU(mm/month)	98.1	119.1	134.7	127.0	139.2	142.0	147.6	138.7	127.2	112.5	100.0	94.7
	Effective rainfall (mm)	36.2	10.9	11.3	10.5	21.8	45.5	90.9	52.6	65.9	80.0	94.8	84.5
	Net Requirement(MCM)	0.01	0.02	0.04	0.04	0.05	0.04	0.02	0.03	0.02	0.02	0.00	0.01
Corn & Sorghum													
	Planting area (ha)							49	147	196	196	147	49
	kc							0.50	0.80	1.10	0.60		
									0.50	0.60	1.10	0.60	
										0.50	0.80	1.10	0.60
	Average kc							0.50	0.65	0.80	0.83	0.85	0.60
	CU (mm/day)							3.0	3.8	4.1	3.8	3.5	2.3
	CU(mm/month)							92.2	112.7	127.2	117.2	106.3	71.0
	Effective rainfall (mm)							90.9	52.6	65.9	80.0	94.8	84.5
	Net Requirement(MCM)							0.00	0.09	0.12	0.07	0.02	0.00
Others													
	Planting area (ha)	28	28	24	16	13	16	24	28	28	28	28	28
	Average kc	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
	CU (mm/day)	3.3	3.8	4.3	4.5	4.5	4.7	4.8	4.6	4.1	3.6	3.3	3.1
	CU(mm/month)	98.1	119.1	134.7	127.0	139.2	142.0	147.6	138.7	127.2	112.5	100.0	94.7
	Effective rainfall (mm)	36.2	10.9	11.3	10.5	21.8	45.5	90.9	52.6	65.9	80.0	94.8	84.5
	Net Requirement(MCM)	0.03	0.03	0.03	0.02	0.01	0.02	0.01	0.02	0.02	0.01	0.00	0.00
Total Net Requirements (MCM)		0.16	0.79	1.46	0.74	0.11	0.06	0.04	0.15	0.16	0.10	0.02	0.01
Total Net Requirement for Paddy (MCM)		0.05	0.04	0.05	0.03	0.00	1.10	1.74	2.56	2.06	1.45	0.72	0.26
Diversion Requirement (MCM)		0.41	1.76	3.19	1.63	0.23	2.03	3.07	4.72	3.90	2.72	1.29	0.47

Cuadro 4.5.1 Estimatados de Requerimientos de agua de riego bajo la Condicion con Proyecto (5/19)
in the Mijo Irrigation Area 2,300 ha

Crop		Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
	ETo (mm/day)	4.1	4.8	5.4	5.7	5.6	5.9	5.9	5.8	5.1	4.5	4.2	3.8
Beans													
	Planting area (ha)	394	1,084	1,182	788	99							
	kc												
		0.50	0.80	1.10	0.40								
			0.50	0.80	1.10	0.40							
	Average kc	0.50	0.65	0.95	0.75	0.40							
	CU (mm/day)	2.0	3.1	5.2	4.3	2.2							
	CU(mm/month)	61.3	96.8	160.0	119.1	69.6							
	Effective rainfall (mm)	36.2	10.9	11.3	10.5	21.8							
	Net Requirement(MCM)	0.10	0.93	1.76	0.86	0.05							
Rice									Max. area =		1250		
	Planting area (ha)	417	52					52	417	833	1198	1198	833
	kc							1.10	1.15	1.20	1.25	1.00	
									1.10	1.15	1.20	1.25	1.00
		1.00								1.10	1.15	1.20	1.25
		1.25	1.00								1.10	1.15	1.20
	Average kc	1.13	1.03					1.10	1.13	1.15	1.18	1.15	1.15
	CU (mm/day)	4.6	4.8					6.5	6.5	5.9	5.3	4.8	4.4
	CU(mm/month)	137.9	148.9					202.9	195.1	182.9	165.3	143.8	136.1
	Percolation (mm/mon)	150.0	155.0					155.0	150.0	155.0	155.0	150.0	155.0
	Effective rainfall (mm)	36.2	10.9					90.9	52.6	65.9	80.0	94.8	84.5
	Land Preparation, 300 mm (MCM)							1.20	1.20	1.20			
	Net Requirement(MCM)	1.05	0.15					1.34	2.42	3.46	2.88	2.38	1.72
Sweet Potato 1													
	Planting area	25	74	98	98	74	25						
	kc	0.45	0.75	1.10	0.75								
			0.45	0.75	1.10	0.75							
				0.45	0.75	1.10	0.75						
	Average kc	0.45	0.60	0.77	0.87	0.93	0.75						
	CU (mm/day)	1.84	2.88	4.16	4.91	5.19	4.44						
	CU(mm/month)	55.16	89.32	129.08	137.59	161.01	133.14						
	Effective rainfall (mm)	36	11	11	10	22	45						
	Net Requirement(MCM)	0.00	0.06	0.12	0.13	0.10	0.02						
Sweet Potato 2													
	Planting area (ha)						30	91	152	182	152	91	30
	kc						0.45	0.75	1.10	0.72			
								0.45	0.75	1.10	0.72		
									0.45	0.75	1.10	0.72	
	Average kc						0.45	0.60	0.77	0.76	0.86	0.91	0.72
	CU (mm/day)						2.7	3.6	4.4	3.9	3.9	3.8	2.7
	CU(mm/month)						79.9	110.7	133.0	120.1	120.5	113.8	85.2
	Effective rainfall (mm)						45	91	53	66	80	95	84
	Net Requirement(MCM)						0.01	0.02	0.12	0.10	0.06	0.02	0.00
Cornd Sorghum													
	Planting area (ha)					47	140	234	281	234	140	47	
	kc					0.50	0.80	1.10	0.60				
							0.50	0.80	1.10	0.60			
								0.50	0.80	1.10	0.60		
									0.50	0.80	1.10	0.50	
	Average kc					0.50	0.65	0.80	0.75	0.83	0.85	0.60	
	CU (mm/day)					2.8	3.8	4.8	4.3	4.3	3.9	2.5	
	CU(mm/month)					87.0	115.4	147.6	130.1	132.5	119.5	75.0	
	Effective rainfall (mm)					21.8	45.5	90.9	52.6	65.9	80.0	94.8	
	Net Requirement(MCM)					0.03	0.10	0.13	0.22	0.16	0.06	0.00	
Plantain		0	0	0	0	0	0	0	0	0	0	0	0
Banana		30	30	30	30	30	30	30	30	30	30	30	30
Papaya		21	21	21	21	21	21	21	21	21	21	21	21
sub-total	Planting area (ha)	51	51	51	51	51	51	51	51	51	51	51	51
	Average kc	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
	CU (mm/day)	3.47	4.08	4.62	4.82	4.77	5.03	5.06	4.91	4.36	3.85	3.54	3.24
	CU(mm/month)	104.19	126.53	143.12	134.94	147.95	150.90	156.78	147.42	135.20	119.55	100.05	100.57
	Effective rainfall (mm)	36.18	10.93	11.30	10.49	21.84	45.50	90.94	52.58	65.89	79.97	94.75	84.48
	Net Requirement(MCM)	0.03	0.05	0.06	0.06	0.06	0.05	0.03	0.04	0.03	0.02	0.00	0.01
Others													
	Planting area (ha)	449	449	416	349	316	349	416	449	449	449	449	449
	Average kc	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
	CU (mm/day)	3.3	3.8	4.3	4.5	4.5	4.7	4.8	4.6	4.1	3.6	3.3	3.1
	CU(mm/month)	98.1	119.1	134.7	127.0	139.2	142.0	147.6	138.7	127.2	112.5	100.0	94.7
	Effective rainfall (mm)	36.2	10.9	11.3	10.5	21.8	45.5	90.9	52.6	65.9	80.0	94.8	84.5
	Net Requirement(MCM)	0.28	0.49	0.51	0.41	0.37	0.34	0.24	0.39	0.28	0.15	0.02	0.05
Total Net Requirements (MCM)		0.41	1.53	2.45	1.44	0.61	0.51	0.42	0.77	0.56	0.28	0.04	0.05
Total Net Requirement for Paddy (MCM)		1.05	0.15	0.00	0.00	0.00	0.00	1.34	2.42	3.46	2.88	2.38	1.72
Diversion Requirement (MCM)		2.68	3.51	5.20	3.07	1.29	1.09	3.19	5.80	7.17	5.56	4.20	3.08

Cuadro 4.5.1 Estimatados de Requerimientos de agua de riego bajo la Condicion con Proyecto (6/19)

1818 ha

Crop		Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
	ETo (mm/day)	4.1	4.8	5.4	5.7	5.6	5.9	5.9	5.8	5.1	4.5	4.2	3.8
Beans	Planting area (ha)	459	1,263	1,378	919	105							
	kc	0.50	0.80	1.10	0.40								
			0.50	0.80	1.10	0.40							
	Average kc	0.50	0.65	0.95	0.75	0.40							
	CU (mm/day)	2.0	3.1	5.2	4.3	2.2							
	CU(mm/month)	61.3	96.8	160.0	119.1	69.6							
	Effective rainfall (mm)	36.2	10.9	11.3	10.5	21.8							
	Net Requirement(MCM)	0.12	1.08	2.05	1.00	0.05							
Rice1	Planting area (ha)	58						58	463	867	926	867	463
	kc							1.10	1.15	1.20	1.25	1.00	
									1.10	1.15	1.20	1.25	1.00
		1.00								1.10	1.15	1.20	1.25
	Average kc	1.00						1.10	1.13	1.15	1.20	1.15	1.13
	CU (mm/day)	4.1						6.5	6.5	5.9	5.4	4.8	4.3
	CU(mm/month)	122.6						202.9	195.1	182.9	168.8	143.8	133.11
	Percolation (mm/mon)	150.0						155.0	150.0	155.0	155.0	150.0	155.0
	Effective rainfall (mm)	36.2						90.9	52.6	65.9	80.0	92.8	84.5
	Land Preparation, 300 mm (MCM)							1.30	1.30				
	Net Requirement(MCM)	0.18						1.46	2.65	2.36	2.26	1.73	0.94
Rice2													
	Planting area (ha)		4	30	45	45	41	15					
	kc		1.10	1.15	1.20	1.25	1.00						
				1.10	1.15	1.20	1.25	1.00					
	Average kc		1.10	1.13	1.18	1.23	1.13	1.00					
	CU (mm/day)		5.3	6.1	6.7	6.9	6.7	5.9					
	CU(mm/month)		163.7	189.4	186.5	213.2	199.7	184.4					
	Percolation (mm/mon).		155.0	155.0	140.0	155.0	150.0	155.0					
	Effective rainfall (mm)		10.9	11.3	10.5	21.8	45.5	90.9					
	Land Preparation, 300 mm (MCM)		0.07	0.07									
	Net Requirement(MCM)		0.08	0.17	0.14	0.16	0.13	0.04					
Sweet Potato 1													
	Planting area	19	56	93	112	93	56	19					
	kc	0.45	0.75	1.10	0.75								
			0.45	0.75	1.10	0.75							
				0.45	0.75	1.10	0.75						
					0.45	0.75	1.10	0.75					
	Average kc	0.45	0.60	0.77	0.76	0.87	0.93	0.75					
	CU (mm/day)	1.8	2.9	4.2	4.3	4.9	5.5	4.5					
	CU(mm/month)	55.2	89.3	129.1	121.1	150.9	164.2	138.3					
	Effective rainfall (mm)	36.2	10.9	11.3	10.5	21.8	45.5	90.9					
	Net Requirement(MCM)	0.00	0.04	0.11	0.12	0.12	0.07	0.01					
Sweet Potato 2													
	Planting area (ha)	42						42	127	211	253	211	127
	kc							0.45	0.75	1.10	0.75		
									0.45	0.75	1.10	0.75	
										0.45	0.75	1.10	0.75
		0.75									0.45	0.75	1.1
	Average kc	0.38						0.45	0.60	0.77	0.76	0.87	0.935
	CU (mm/day)	1.5						2.7	3.5	3.9	3.5	3.6	3.5
	CU(mm/month)	46.0						83.0	104.1	121.9	107.2	108.4	109.4
	Effective rainfall (mm)	36.2						90.9	52.6	65.9	80.0	94.8	84.5
	Net Requirement(MCM)	0.00						0.00	0.07	0.12	0.07	0.03	0.03
Corn&Sorghum													
Corn&Sorghum	Planting area (ha)	68						68	205	341	410	341	205
	kc							0.50	0.80	1.10	0.60		
									0.50	0.80	1.10	0.60	
										0.50	0.80	1.10	0.60
		0.60									0.50	0.80	1.10
	Average kc	0.60						0.50	0.65	0.80	0.75	0.83	0.85
	CU (mm/day)	2.5						3.0	3.8	4.1	3.4	3.5	3.2
	CU(mm/month)	73.5						92.2	112.7	127.2	105.5	104.2	100.6
	Effective rainfall (mm)	36.2						90.9	52.6	65.9	80.0	94.8	84.5
	Net Requirement(MCM)	0.03						0.00	0.12	0.21	0.19	0.03	0.03
Plantain	(ha)	52	52	52	52	52	52	52	52	52	52	52	52
Banana		9	9	9	9	9	9	9	9	9	9	9	9
Subtotal	Planting area	61	61	61	61	61	61	61	61	61	61	61	61
	kc	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
	CU (mm/day)	3.5	4.1	4.6	4.8	4.8	5.0	5.1	4.9	4.4	3.9	3.5	3.2
	CU(mm/month)	104.2	126.5	143.1	134.9	145.0	150.9	156.8	147.4	135.2	119.5	106.3	100.6
	Effective rainfall (mm)	36.2	10.9	11.3	10.5	21.8	45.5	90.9	52.6	65.9	80.0	94.8	84.5
	Net Requirement(MCM)	0.04	0.07	0.08	0.08	0.08	0.06	0.01	0.06	0.04	0.02	0.01	0.01
Pasture, Cassava, Pegion pea, Vegetables, and Others													
	Planting area (ha)	61	61	51	42	28	30	58	84	89	89	86	72
	Average kc	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
	CU (mm/day)	3.3	3.8	4.3	4.5	4.5	4.7	4.8	4.6	4.1	3.6	3.3	3.1
	CU(mm/month)	98.1	119.1	134.7	127.0	139.2	142.0	147.6	138.7	127.2	112.5	100.0	94.7
	Effective rainfall (mm)	36.2	10.9	11.3	10.5	21.8	45.5	90.9	52.6	65.9	80.0	94.8	84.5
	Net Requirement(MCM)	0.04	0.07	0.07	0.05	0.03	0.03	0.03	0.07	0.05	0.03	0.00	0.01
Total Net Requirements (MCM)		0.23	1.26	2.31	1.25	0.28	0.161	0.08	0.32	0.42	0.23	0.07	0.08
Total Net Requirement for Paddy (MCM)		0.14	0.08	0.17	0.14	0.16	0.13	1.49	2.65	2.36	2.26	1.73	0.94
Diversion Requirement (MCM)		0.72	2.83	5.20	2.90	0.66	0.56	2.75	5.25	4.97	4.37	3.13	1.80

Cuadro 4.5.1 Estimatados de Requerimientos de agua de riego bajo la Condicion con Proyecto (7/19)
(Valle Jeelo)

495 ha

Crop		Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
	ETo (mm/day)	4.1	4.8	5.4	5.7	5.6	5.9	5.9	5.8	5.1	4.5	4.2	3.8
Beans	Planting area (ha)	361	241	30								120	331
	kc	1.10	0.40									0.50	0.80
		0.80	1.10	0.40									0.50
	Average kc	0.95	0.75	0.40								0.50	0.65
	CU (mm/day)	3.9	3.6	2.2								2.1	2.5
	CU(mm/month)	116.4	111.6	67.3								62.5	76.9
	Effective rainfall (mm)	36.2	10.9	11.3								94.8	84.5
	Net Requirement(MCM)	0.29	0.24	0.02								0.00	0.00
Corn (1)	Planting area (ha)						35	104	139	139	104	35	
	kc						0.50	0.80	1.10	0.60			
								0.50	0.80	1.10	0.60		
									0.50	0.80	1.10	0.60	
	Average kc						0.50	0.65	0.80	0.83	0.85	0.60	
	CU (mm/day)						3.0	3.9	4.6	4.3	3.9	2.5	
	CU(mm/month)						88.8	119.9	138.7	132.5	119.5	75.0	
	Effective rainfall (mm)						45.5	90.9	52.6	65.9	80.0	94.8	
	Net Requirement(MCM)						0.02	0.03	0.12	0.09	0.04	0.00	
Corn (2)	Planting area modified	139	139	104	35							35	104
	kc	1.10	0.60									0.50	0.80
		0.80	1.10	0.60									0.50
		0.50	0.80	1.10	0.60								
	Average kc	0.80	0.83	0.85	0.60							0.50	0.65
	CU (mm/day)	3.27	4.00	4.62	3.40							2.08	2.48
	CU(mm/month)	98.1	124.0	143.1	95.3							62.5	76.9
	Effective rainfall (mm)	36.2	10.9	11.3	10.5							94.8	84.5
	Net Requirement(MCM)	0.09	0.16	0.14	0.03							0.00	0.00
Onion (1)	Planting area (ha)								31	85	93	85	31
	kc								0.50	0.80	1.00	1.00	
										0.50	0.80	1.00	1.00
	Average kc								0.50	0.65	0.90	1.00	1.00
	CU (mm/day)								6.3	5.8	5.4	5.2	4.8
	CU(mm/month)								188.4	179.2	168.5	155.1	149.3
	Effective rainfall (mm)								52.6	65.9	80.0	94.8	84.5
	Net Requirement(MCM)								0.04	0.10	0.05	0.05	0.02
Onion (2)	Planting area				31	85	93	85	31				
	kc				0.50	0.80	1.00	1.00					
						0.50	0.80	1.00	1.00				
	Average kc				0.50	0.65	0.90	1.00	1.00				
	CU (mm/day)				2.8	3.6	5.3	5.9	5.8				
	CU(mm/month)				79.4	113.1	159.8	184.4	173.4				
	Effective rainfall (mm)				10.5	21.8	45.5	90.9	52.6				
	Net Requirement(MCM)				0.02	0.03	0.11	0.08	0.04				
Pigeon pea (1)	Planting area (ha)							23	46	46	23		
	kc							0.60	1.00	0.80			
									0.60	1.00	0.80		
	Average kc							0.60	0.80	0.90	0.80		
	CU (mm/day)							3.6	4.6	4.6	3.6		
	CU(mm/month)							110.7	138.7	143.1	112.5		
	Effective rainfall (mm)							90.9	52.6	65.9	80.0		
	Net Requirement(MCM)							0.00	0.04	0.04	0.01		
Pigeon pea (2)	Planting area (ha)	23									23	46	46
	kc										0.60	1.00	0.80
		0.80										0.60	1.00
	Average kc	0.80									0.60	0.80	0.90
	CU (mm/day)	3.3									2.7	3.3	3.4
	CU(mm/month)	98.1									84.4	100.0	106.5
	Effective rainfall (mm)	36.2									80.0	94.8	84.5
	Net Requirement(MCM)	0.01									0.00	0.00	0.01
Sweet Potato		28	21	7							7	21	28
	kc	0.75									0.45	0.75	1.10
		1.10	0.75									0.45	0.75
		0.75	1.10	0.75									0.45
	Average kc	0.87	0.93	0.75							0.45	0.60	0.77
	CU (mm/day)	3.5	4.4	4.1							2.0	2.5	2.9
	CU(mm/month)	106.2	137.7	126.3							63.3	75.0	90.7
	Effective rainfall (mm)	36.2	10.9	11.3							80.0	94.8	84.5
	Net Requirement(MCM)	0.02	0.03	0.01							0.00	0.00	0.00
Cassava	Planting area (ha)	19	19	15	9	3		3	9	15	19	19	19
	kc	1.12	0.82					0.45	0.45	0.75	0.80	0.80	1.12
		1.12	1.12	0.82					0.45	0.45	0.75	0.80	0.80
		0.80	1.12	1.12	0.82					0.45	0.45	0.75	0.80
		0.80	0.80	1.12	1.12	0.82					0.45	0.45	0.75
	Average kc	0.96	0.97	1.02	0.97	0.82		0.45	0.45	0.55	0.61	0.70	0.87
	CU (mm/day)	3.9	4.6	5.5	5.5	4.6		2.7	2.6	2.8	2.8	2.9	3.3
	CU(mm/month)	117.7	143.6	171.7	154.0	142.2		83.0	78.0	87.5	86.1	87.5	102.6
	Effective rainfall (mm)	36.2	10.9	11.3	10.5	21.8		90.9	52.6	65.9	80.0	94.8	84.5
	Net Requirement(MCM)	0.02	0.02	0.02	0.01	0.00		0.00	0.00	0.00	0.00	0.00	0.00
Total Net Requirements (MCM)		0.42	0.45	0.19	0.06	0.08	0.12	0.11	0.24	0.23	0.13	0.05	0.04
Total Net Requirement for Paddy (MCM)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Diversion Requirement (MCM)		0.90	0.96	0.40	0.14	0.17	0.26	0.24	0.51	0.48	0.28	0.11	0.08

Cuadro 4.5.1 Estimatados de Requerimientos de agua de riego bajo la Condicion con Proyecto (8/19)
(Canal Conduccion YSURA)

1,100 ha

Crop		Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
	ETo (mm/day)	4.6	4.5	4.7	5.4	6.1	6.3	5.9	6.3	6.8	6.5	5.8	5.0
Plantain	(ha)	470	470	470	470	470	470	470	470	470	470	470	470
Banana		43	43	43	43	43	43	43	43	43	43	43	43
Papaya		37	37	37	37	37	37	37	37	37	37	37	37
Sub-total		549	549	549	549	549	549	549	549	549	549	549	549
	kc	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
	CU (mm/day)	3.8721	3.803	4.0233	4.5768	5.1612	5.3255	5.0025	5.3527	5.7898	5.5135	4.8934	4.2308
	CU(mm/month)	116.2	117.9	124.7	128.2	160.0	159.8	155.1	160.9	179.5	170.9	146.8	131.2
	Effective rainfall (mm)	26.7	12.1	15.0	9.1	19.8	25.0	52.6	37.5	25.3	57.6	72.1	81.6
	Net Requirement(MCM)	0.49	0.58	0.60	0.65	0.77	0.74	0.56	0.68	0.85	0.62	0.41	0.27
Corn&Sorghum													
Corn&Sorghum	Planting area modified	37						37	110	183	220	183	110
	kc							0.50	0.80	1.10	0.60		
									0.50	0.80	1.10	0.60	
										0.50	0.80	1.10	0.60
		0.60									0.50	0.80	1.10
	Average kc	0.60						0.50	0.65	0.80	0.75	0.83	0.85
	CU (mm/day)	2.7						2.9	4.1	5.4	4.9	4.8	4.2
	CU(mm/month)	82.0						91.2	123.0	168.9	150.8	143.9	131.2
	Effective rainfall (mm)	26.7						52.6	37.5	25.3	57.6	72.1	81.6
	Net Requirement(MCM)	0.02						0.01	0.09	0.26	0.20	0.13	0.05
Cassava	Planting area (ha)	92	92	76	45	15		15	46	76	92	92	92
	kc	1.12	0.82					0.45	0.45	0.75	0.80	0.80	1.12
		1.12	1.12	0.82					0.45	0.45	0.75	0.80	0.80
		0.80	1.12	1.12	0.82					0.45	0.45	0.75	0.80
		0.80	0.80	1.12	1.12	0.82					0.45	0.45	0.75
	Average kc	0.96	0.97	1.02	0.97	0.82		0.45	0.45	0.55	0.61	0.70	0.87
	CU (mm/day)	4.4	4.3	4.8	5.2	5.0		2.6	2.8	3.7	4.0	4.0	4.3
	CU(mm/month)	131.2	133.8	149.7	146.2	154.3		82.1	85.2	116.1	123.2	120.9	133.9
	Effective rainfall (mm)	26.7	12.1	15.0	9.1	19.8		52.6	37.5	25.3	57.6	72.1	81.6
	Net Requirement(MCM)	0.10	0.11	0.10	0.06	0.03		0.00	0.02	0.07	0.06	0.04	0.05
Pigeon pea	Planting area (ha)	20					20	39	39	20	20	39	39
	kc						0.60	1.00	0.80		0.60	1.00	0.80
		0.80						0.60	1.00	0.80		0.60	1.00
	Average kc	0.80					0.60	0.80	0.90	0.80	0.60	0.80	0.90
	CU (mm/day)	3.6					3.8	4.7	5.7	5.4	3.9	4.6	4.5
	CU(mm/month)	109.3					112.8	146.0	170.3	168.9	120.6	138.1	138.9
	Effective rainfall (mm)	26.7					25.0	52.6	37.5	25.3	57.6	72.1	81.6
	Net Requirement(MCM)	0.02					0.02	0.04	0.05	0.03	0.01	0.03	0.03
Sweet Potato	Planting area (ha)	4	11	18	21	18	11	4					
	kc	0.45	0.75	1.10	0.75								
			0.45	0.75	1.10	0.75							
				0.45	0.75	1.10	0.75						
					0.45	0.75	1.10	0.75					
	Average kc	0.45	0.60	0.77	0.76	0.87	0.93	0.75					
	CU (mm/day)	2.0	2.7	3.6	4.1	5.3	5.8	4.4					
	CU(mm/month)	61.5	83.2	112.5	115.0	163.1	173.9	132.4					
	Effective rainfall (mm)	26.7	12.1	15.0	9.1	19.8	25.0	52.6					
	Net Requirement(MCM)	0.00	0.01	0.02	0.02	0.03	0.02	0.00					
Beans	Planting area (ha)	141	388	423	282	33							
	kc	0.50	0.80	1.10	0.40								
			0.50	0.80	1.10	0.40							
	Average kc	0.50	0.65	0.95	0.75	0.40							
	CU (mm/day)	2.3	2.9	4.5	4.0	2.4							
	CU(mm/month)	68.3	90.2	139.4	113.1	75.3							
	Effective rainfall (mm)	26.7	12.1	15.0	9.1	19.8							
	Net Requirement(MCM)	0.06	0.30	0.53	0.29	0.02							
Tobacco	Planting area (ha)	4	13	18	18	9	1						
	kc	0.40	0.70	1.10	1.00								
			0.40	0.70	1.10	1.00							
				0.40	0.70	1.10	1.00						
	Average kc	0.40	0.55	0.73	0.93	1.05	1.00						
	CU (mm/day)	1.8	2.5	3.5	5.0	6.4	6.3						
	CU(mm/month)	54.7	76.3	107.6	140.7	193.6	188.0						
	Effective rainfall (mm)	26.7	12.1	15.0	9.1	19.8	25.0						
	Net Requirement(MCM)	0.00	0.01	0.02	0.02	0.02	0.00						
Other Crops (ha)		0	0	0	0	0	0	5	11	11	11	11	5
	kc	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
	CU (mm/day)	3.6	3.6	3.8	4.3	4.9	5.0	4.7	5.0	5.4	5.2	4.6	4.0
	CU(mm/month)	109.3	111.0	117.4	120.6	150.6	150.4	146.0	151.4	168.9	160.9	138.1	123.4
	Effective rainfall (mm)	26.7	12.1	15.0	9.1	19.8	25.0	52.6	37.5	25.3	57.6	72.1	81.6
	Net Requirement(MCM)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.01	0.01	0.00
Net Requirement for Upland (MCM)		0.68	1.01	1.26	1.06	0.85	0.78	0.63	0.86	1.22	0.91	0.62	0.40
Net Requirement for Paddy (MCM)		0	0	0	0	0	0	0	0	0	0	0	0
Diversion Requirement (MCM)		1.46	2.16	2.69	2.25	1.81	1.65	1.33	1.83	2.60	1.94	1.33	0.85

Cuadro 4.5.1 Estimatados de Requerimientos de agua de riego bajo la Condicion con Proyecto (9/19)

(Area de YSURA y Area de la Prolongacion de YSURA)

2,732 ha

Extension area 1,138 ha

Crop		Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
	Eto (mm/day)	4.6	4.5	4.7	5.4	6.1	6.3	5.9	6.3	6.8	6.5	5.8	5.0
Plantain		3,407	3,407	3,407	3,407	3,407	3,407	3,407	3,407	3,407	3,407	3,407	3,407
Banana		543	543	543	543	543	543	543	543	543	543	543	543
Papaya		60	60	60	60	60	60	60	60	60	60	60	60
Sub-total		4,010	4,010	4,010	4,010	4,010	4,010	4,010	4,010	4,010	4,010	4,010	4,010
	kc	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
	CU (mm/day)	3.9	3.8	4.0	4.6	5.2	5.3	5.0	5.4	5.8	5.5	4.9	4.2
	CU(mm/month)	116.2	117.9	124.7	128.2	160.0	159.8	155.1	160.9	179.5	170.9	146.8	131.2
	Effective rainfall (mm)	36.7	12.1	15.0	9.1	19.8	25.0	52.6	37.5	25.3	57.6	72.1	81.6
	Net Requirement(MCM)	3.53	4.24	4.40	4.77	5.62	5.40	4.11	4.95	6.18	4.54	3.00	1.99
Tomato													
	Planting area modified	2,322	3,482	3,482	2,322	290							290
	kc	0.80	1.10	0.60									0.50
		0.50	0.80	1.10	0.60								
			0.50	0.80	1.10	0.60							
	Average kc	0.65	0.80	0.83	0.85	0.60							0.50
	CU (mm/day)	3.0	3.6	3.9	4.6	3.6							2.5
	CU(mm/month)	88.8	111.0	122.3	128.2	112.9							77.2
	Effective rainfall (mm)	26.7	12.1	15.0	9.1	19.8							81.6
	Net Requirement(MCM)	1.44	3.44	3.73	2.76	0.27							0.00
Corn& Sorghum	Planting area modified				373	1,119	1,492	1,492	1,119	373			
	kc				0.50	0.80	1.10	0.60					
						0.50	0.80	1.10	0.60				
							0.50	0.80	1.10	0.60			
	Average kc				0.50	0.65	0.80	0.83	0.85	0.60			
	CU (mm/day)				2.69	3.95	5.01	4.90	5.36	4.09			
	CU(mm/month)				75.4	122.4	150.4	152.0	160.9	126.7			
	Effective rainfall (mm)				9.1	19.8	25.0	52.6	37.5	25.3			
	Net Requirement(MCM)				0.25	1.15	1.87	1.48	1.38	0.38			
Rice													
	Planting area (ha)	3						11	34	45	45	42	23
	kc							1.10	1.15	1.25	1.25	1.00	
									1.10	1.15	1.25	1.25	1.00
		1.00								1.10	1.15	1.25	1.25
	Average kc	1.00						1.10	1.13	1.17	1.22	1.17	1.13
	CU (mm/day)	4.6						6.5	7.1	7.9	7.9	6.7	5.6
	CU(mm/month)	136.7						200.7	212.9	246.4	244.6	201.5	173.59
	Percolation (mm/mon)	150.0						155.0	150.0	155.0	155.0	150.0	155.0
	Effective rainfall (mm)	26.7						52.6	37.5	25.3	57.6	72.1	81.6
	Land Preperation, 300 mm (MCM)							0.07	0.07				
	Net Requirement(MCM)	0.01						0.10	0.18	0.17	0.15	0.12	0.06
Other crops		852	872	819	632	447	447	761	1163	1235	1235	1170	1023
	kc	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
	CU (mm/day)	3.6	3.6	3.8	4.3	4.9	5.0	4.7	5.0	5.4	5.2	4.6	4.6
	CU(mm/month)	109.3	111.0	117.4	120.6	150.6	150.4	146.0	151.4	168.9	160.9	138.1	123.4
	Effective rainfall (mm)	26.7	12.1	15.0	9.1	19.8	25.0	52.6	37.5	25.3	57.6	72.1	81.6
	Net Requirement(MCM)	0.70	0.86	0.84	0.70	0.58	0.56	0.21	1.33	1.77	1.28	0.77	0.43
Net Requirement for Upland (MCM)		5.73	8.55	8.97	8.49	7.62	7.83	6.31	7.66	8.34	5.82	3.77	2.42
Net Requirement for Paddy (MCM)		0.01	0.00	0.00	0.00	0.00	0.00	0.10	0.18	0.17	0.15	0.12	0.06
Diversion Requirement (MCM)		13.01	19.43	20.39	19.29	17.33	17.80	14.52	17.73	19.26	13.51	8.78	5.59

Cuadro 4.5.1 Estimatados de Requerimientos de agua de riego bajo la Condicion con Proyecto (10/19)
(Area de Prolongacion con Aguas de Subterraneas)

Extension area 1,138 ha

Crop		Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
	ETo (mm/day)	4.6	4.5	4.7	5.4	6.1	6.3	5.9	6.3	6.8	6.5	5.8	5.0
Plantain		236	236	236	236	236	236	236	236	236	236	236	236
Banana		40	40	40	40	40	40	40	40	40	40	40	40
Papaya		6	6	6	6	6	6	6	6	6	6	6	6
Sub-total		281	281	281	281	281	281	281	281	281	281	281	281
	kc	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
	CU (mm/day)	3.9	3.8	4.0	4.6	5.2	5.3	5.0	5.4	5.8	5.5	4.9	4.2
	CU(mm/month)	116.2	117.9	124.7	128.2	160.0	159.8	155.1	160.9	179.5	170.9	146.8	131.2
	Effective rainfall (mm)	26.7	12.1	15.0	9.1	19.8	25.0	52.6	37.5	25.3	57.6	72.1	81.6
	Net Requirement(MCM)	0.25	0.30	0.31	0.34	0.39	0.38	0.29	0.35	0.43	0.32	0.21	0.14
Tomato													
	Planting area modified	163	244	244	163	20							20
	kc	0.80	1.10	0.60									0.50
		0.50	0.80	1.10	0.60								
			0.50	0.80	1.10	0.60							
	Average kc	0.65	0.80	0.83	0.85	0.60							0.50
	CU (mm/day)	3.0	3.6	3.9	4.6	3.6							2.5
	CU(mm/month)	88.8	111.0	122.3	128.2	112.9							77.2
	Effective rainfall (mm)	26.7	12.1	15.0	9.1	19.8							81.6
	Net Requirement(MCM)	0.10	0.24	0.26	0.19	0.02							0.00
Corn& Sorghum	Planting area modified				20	60	79	79	60	20			
	kc				0.50	0.80	1.10	0.60					
						0.50	0.80	1.10	0.60				
							0.50	0.80	1.10	0.60			
	Average kc				0.50	0.65	0.80	0.83	0.85	0.60			
	CU (mm/day)				2.69	3.95	5.01	4.90	5.36	4.09			
	CU(mm/month)				75.4	122.4	150.4	152.0	160.9	126.7			
	Effective rainfall (mm)				9.1	19.8	25.0	52.6	37.5	25.3			
	Net Requirement(MCM)				0.01	0.06	0.10	0.08	0.07	0.02			
Rice													
	Planting area (ha)	3						11	34	45	45	42	23
	kc							1.10	1.15	1.25	1.25	1.00	
									1.10	1.15	1.25	1.25	1.00
		1.00								1.10	1.15	1.25	1.25
	Average kc	1.00						1.10	1.13	1.17	1.22	1.17	1.13
	CU (mm/day)	4.6						6.5	7.1	7.9	7.9	6.7	5.6
	CU(mm/month)	136.7						200.7	212.9	246.4	244.6	203.5	173.59
	Percolation (mm/mon)	150.0						155.0	150.0	155.0	155.0	150.0	155.0
	Effective rainfall (mm)	26.7						52.6	37.5	25.3	57.6	72.1	81.6
	Land Preparation, 200 mm (MCM)							0.07	0.07				
	Net Requirement(MCM)	0.01						0.10	0.18	0.11	0.15	0.12	0.06
Other crops		130	130	123	103	83	86	116	143	150	150	147	138
	kc	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
	CU (mm/day)	3.6	3.6	3.8	4.3	4.9	5.0	4.7	5.0	5.4	5.2	4.6	4.0
	CU(mm/month)	109.3	111.0	117.4	120.6	150.6	150.4	146.0	151.4	168.9	160.9	138.1	123.4
	Effective rainfall (mm)	26.7	12.1	15.0	9.1	19.8	25.0	52.6	37.5	25.3	57.6	72.1	81.6
	Net Requirement(MCM)	0.11	0.13	0.13	0.11	0.11	0.11	0.11	0.16	0.22	0.16	0.10	0.06
Net Requirement for Upland (MCM)		0.46	0.67	0.70	0.66	0.58	0.59	0.48	0.58	0.67	0.47	0.31	0.20
Net Requirement for Paddy (MCM)		0.01	0.00	0.00	0.00	0.00	0.00	0.10	0.18	0.11	0.15	0.12	0.06
Diversion Requirement (MCM)		0.90	1.28	1.34	1.26	1.12	1.13	1.07	1.40	1.55	1.15	0.78	0.47

Cuadro 4.5.1 Estimatados de Requerimientos de agua de riego bajo la Condicion con Proyecto (11/19)
(Villarpando - Los Guiros)

2,366 ha

Crop		Nov.	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
	ETo (mm/day)	4.6	4.5	4.7	5.4	6.1	6.3	5.9	6.3	6.8	6.5	5.8	5.0
Plantain (ha)		847	847	847	847	847	847	847	847	847	847	847	847
Banana		160	160	160	160	160	160	160	160	160	160	160	160
Papaya		73	73	73	73	73	73	73	73	73	73	73	73
Sub-total		1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080
	kc	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
	CU (mm/day)	3.9	3.8	4.0	4.6	5.2	5.3	5.0	5.4	5.8	5.5	4.9	4.2
	CU(mm/month)	116.2	113.9	124.7	128.2	160.0	159.8	155.1	160.9	179.5	170.9	146.8	131.2
	Effective rainfall (mm)	26.7	12.1	15.0	9.1	19.8	25.0	52.6	37.5	25.3	57.6	72.1	81.6
	Net Requirement(MCM)	0.97	1.14	1.18	1.29	1.51	1.46	1.11	1.33	1.67	1.22	0.81	0.54
Corn & Sorghum	Planting area modified	73	0	0	0	0	0	73	220	367	440	367	220
	kc							0.50	0.80	1.10	0.60		
									0.50	0.60	1.10	0.60	
										0.50	0.50	1.10	0.60
		0.60									0.50	0.80	1.10
	Average kc	0.60						0.50	0.65	0.80	0.75	0.83	0.85
	CU (mm/day)	2.7						2.9	4.1	5.4	4.9	4.8	4.2
	CU(mm/month)	82.0						91.2	123.0	168.9	150.8	143.9	131.2
	Effective rainfall (mm)	26.7						52.6	37.5	25.3	57.6	72.1	81.6
	Net Requirement(MCM)	0.04						0.03	0.19	0.53	0.43	0.26	0.11
Cassava	Planting area (ha)	153	183	153	92	31	0	31	92	153	183	183	183
	kc	1.12	0.82					0.45	0.45	0.75	0.80	0.80	1.12
		1.12	1.12	0.82					0.45	0.45	0.75	0.80	0.80
		0.80	1.12	1.12	0.82					0.45	0.45	0.75	0.80
		0.80	0.80	1.12	1.12	0.82					0.45	0.45	0.75
	Average kc	0.96	0.97	1.02	0.97	0.82		0.45	0.45	0.55	0.61	0.70	0.87
	CU (mm/day)	4.4	4.3	4.8	5.2	5.0		2.6	2.8	3.7	4.0	4.0	4.3
	CU(mm/month)	131.2	133.8	149.7	146.2	154.3		82.1	85.2	116.1	123.2	120.9	133.9
	Effective rainfall (mm)	26.7	12.1	15.0	9.1	19.8		52.6	37.5	25.3	57.6	72.1	81.6
	Net Requirement(MCM)	0.19	0.22	0.21	0.13	0.04		0.01	0.04	0.14	0.12	0.09	0.10
Pigeon pea	Planting area (ha)	39	0	0	0	0	39	78	78	78	78	78	78
	kc						0.55	0.55	0.55	0.75	0.95	0.95	0.75
		0.75						0.55	0.55	0.55	0.75	0.95	0.95
	Average kc	0.75					0.55	0.55	0.55	0.65	0.85	0.95	0.85
	CU (mm/day)	3.4					3.4	3.2	3.5	4.4	5.5	5.5	4.2
	CU(mm/month)	102.5					103.4	100.3	104.1	137.3	170.9	164.0	131.2
	Effective rainfall (mm)	26.7					25.0	52.6	37.5	25.3	57.6	72.1	81.6
	Net Requirement(MCM)	0.03					0.03	0.04	0.05	0.09	0.09	0.07	0.04
Sweet Potato	Planting area (ha)	7	21	35	42	35	21	7	0	0	0	0	0
	kc	0.45	0.75	1.10	0.75								
			0.45	0.75	1.10	0.75							
				0.45	0.75	1.10	0.75						
					0.45	0.75	1.10	0.75					
	Average kc	0.45	0.60	0.77	0.76	0.87	0.93	0.75					
	CU (mm/day)	2.0	2.7	3.6	4.1	5.3	5.8	4.4					
	CU(mm/month)	61.5	83.2	112.5	115.0	163.1	173.9	132.4					
	Effective rainfall (mm)	26.7	12.1	15.0	9.1	19.8	25.0	52.6					
	Net Requirement(MCM)	0.00	0.02	0.03	0.04	0.05	0.03	0.01					
Beans	Planting area (ha)	212	635	847	776	423	53	0	0	0	0	0	0
	kc	0.50	0.80	1.10	0.40								
			0.50	0.80	1.10	0.40							
				0.50	0.80	1.10	0.40						
	Average kc	0.50	0.65	0.80	0.77	0.75	0.40						
	CU (mm/day)	2.3	2.9	3.8	4.1	4.6	2.5						
	CU(mm/month)	68.3	90.2	117.4	115.6	141.2	35.2						
	Effective rainfall (mm)	26.7	12.1	15.0	9.1	19.8	25.0						
	Net Requirement(MCM)	0.09	0.50	0.87	0.83	0.51	0.03						
Tobacco	Planting area (ha)	9	26	35	35	18	2	0	0	0	0	0	0
	kc	0.40	0.70	1.10	1.00								
			0.40	0.70	1.10	1.00							
				0.40	0.70	1.10	1.00						
	Average kc	0.40	0.55	0.73	0.93	1.05	1.00						
	CU (mm/day)	1.8	2.5	3.5	5.0	6.4	6.3						
	CU(mm/month)	54.7	76.3	107.6	140.7	197.6	188.0						
	Effective rainfall (mm)	26.7	12.1	15.0	9.1	19.8	25.0						
	Net Requirement(MCM)	0.00	0.02	0.03	0.05	0.03	0.00						
Rice	Planting area (ha)							2	5	7	7	7	4
	kc							1.10	1.15	1.25	1.25	1.00	
									1.10	1.15	1.25	1.25	1.00
		1.00								1.10	1.15	1.25	1.25
	Average kc	1.00						1.10	1.13	1.17	1.22	1.17	1.13
	CU (mm/day)	4.6						6.5	7.1	7.9	7.9	6.7	5.6
	CU(mm/month)	136.7						200.7	212.9	246.4	244.6	201.5	173.59
	Percolation (mm/mon)	150.0						155.0	150.0	155.0	155.0	150.0	155.0
	Effective rainfall (mm)	26.7						52.6	37.5	25.3	57.6	72.1	81.6
	Land Preparation, 300 mm (MCM)							0.01	0.01				
	Net Requirement(MCM)	0.00						0.02	0.03	0.03	0.02	0.02	0.01
Other Crops (ha)		0	0	0	0	0	2	9	14	14	14	12	5
	kc	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
	CU (mm/day)	3.6	3.6	3.8	4.3	4.9	5.0	4.7	5.0	5.4	5.2	4.6	4.0
	CU(mm/month)	109.3	111.0	117.4	120.6	150.6	150.4	146.0	151.4	168.9	160.9	138.1	123.4
	Effective rainfall (mm)	26.7	12.1	15.0	9.1	19.8	25.0	52.6	37.5	25.3	57.6	72.1	81.6
	Net Requirement(MCM)	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.02	0.01	0.01	0.00
Total Net Requirement for Upland (MCM)		1.32	1.90	2.32	2.33	2.15	1.55	1.20	1.63	2.44	1.86	1.24	0.78
Total Net Requirement for Paddy (MCM)		0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.03	0.02	0.02	0.01
Diversion Requirement (MCM)		4.13	5.94	7.26	7.28	6.72	4.84	3.77	5.17	7.68	5.86	3.92	2.46

Cuadro 4.5.1 Estimatados de Requerimientos de agua de riego bajo la Condicion con Proyecto (12/19)
(Amliana Gomez y Biafara)

2,160 ha

Crop		Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
	ETo (mm/day)	4.6	4.5	4.7	5.4	6.1	6.3	5.9	6.3	6.8	6.5	5.8	5.0
Plantain & Banana	(ha)	1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080
Papaya		42	42	42	42	42	42	42	42	42	42	42	42
Sub-total		1,122	1,122	1,122	1,122	1,122	1,122	1,122	1,122	1,122	1,122	1,122	1,122
	Planting area modified	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000
	kc	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
	CU (mm/day)	3.9	3.8	4.0	4.6	5.2	5.3	5.0	5.4	5.8	5.5	4.9	4.2
	CU(mm/month)	116.2	117.9	124.7	128.2	160.0	159.8	155.1	160.9	179.5	170.9	146.8	131.2
	Effective rainfall (mm)	26.7	12.1	15.0	9.1	19.8	25.0	52.6	37.5	25.3	57.6	72.1	81.6
	Net Requirement(MCM)	1.00	1.19	1.23	1.34	1.57	1.51	1.15	1.38	1.73	1.27	0.84	0.56
Cornd Sorghum		60	20						90	250	312	250	90
Cornd Sorghum		36						36	108	179	265	179	108
	kc							0.50	0.80	1.10	0.60		
									0.50	0.80	1.10	0.50	
										0.50	0.80	1.10	0.60
		0.60									0.50	0.80	1.10
	Average kc	0.60						0.50	0.65	0.80	0.75	0.83	0.85
	CU (mm/day)	2.7						2.9	4.1	5.4	4.9	4.8	4.2
	CU(mm/month)	82.0						91.2	123.0	168.9	150.8	143.9	131.2
	Effective rainfall (mm)	26.7						52.6	37.5	25.3	57.6	72.1	81.6
	Net Requirement(MCM)	0.02						0.01	0.09	0.26	0.20	0.13	0.05
		130	130	130	110	80		80	65	90	130	130	130
Cassava	Planting area (ha)	65	65	54	33	11		11	33	54	65	65	65
	kc	1.02	0.82					0.45	0.45	0.75	0.83	0.80	1.12
		1.02	1.12	0.82					0.45	0.45	0.75	0.80	0.80
		0.80	1.12	1.12	0.82					0.45	0.45	0.75	0.80
		0.80	0.80	1.12	1.12	0.82					0.45	0.45	0.75
	Average kc	0.96	0.97	1.02	0.97	0.82		0.45	0.45	0.55	0.61	0.70	0.87
	CU (mm/day)	4.4	4.3	4.8	5.2	5.0		2.6	2.8	3.7	4.0	4.0	4.3
	CU(mm/month)	131.2	133.8	149.7	145.2	154.3		82.1	85.2	116.1	123.2	120.9	133.9
	Effective rainfall (mm)	26.7	12.1	15.0	9.1	19.8		52.6	37.5	25.3	57.6	72.1	81.6
	Net Requirement(MCM)	0.07	0.08	0.07	0.04	0.01		0.00	0.02	0.05	0.04	0.03	0.03
							10	30	55	55	55	45	15
Pigeon pea	Planting area (ha)	22					22	43	43	22	22	43	43
	kc						0.60	1.00	0.80		0.60	1.00	0.80
		0.80						0.60	1.00	0.80		0.60	1.00
	Average kc	0.80					0.60	0.80	0.90	0.80	0.60	0.80	0.90
	CU (mm/day)	3.6					3.8	4.7	5.7	5.4	3.9	4.6	4.5
	CU(mm/month)	109.3					112.8	146.0	170.3	168.9	120.5	138.1	138.9
	Effective rainfall (mm)	26.7					25.0	52.6	37.5	25.3	57.6	72.1	81.6
	Net Requirement(MCM)	0.02					0.02	0.04	0.06	0.03	0.01	0.03	0.02
		5	13	26	26	26	20	10					
Sweet Potato 1	Planting area (ha)	11	33	54	65	54	33	11					
	kc	0.45	0.75	1.10	0.75								
			0.45	0.75	1.10	0.75							
				0.45	0.75	1.10	0.75						
					0.45	0.75	1.10	0.75					
	Average kc	0.45	0.60	0.77	0.76	0.87	0.93	0.75					
	CU (mm/day)	2.0	2.7	3.6	4.1	5.3	5.9	4.4					
	CU(mm/month)	61.5	83.2	112.5	115.0	163.1	173.9	132.4					
	Effective rainfall (mm)	26.7	12.1	15.0	9.1	19.8	25.0	52.6					
	Net Requirement(MCM)	0.00	0.02	0.05	0.07	0.08	0.05	0.01					
Sweet Potato 2													
	Planting area (ha)	11						11	33	54	65	54	33
	kc							0.45	0.75	1.10	0.75		
									0.45	0.75	1.10	0.75	
										0.45	0.75	1.10	0.75
		0.75									0.45	0.75	1.1
	Average kc	0.38						0.45	0.60	0.77	0.76	0.87	0.925
	CU (mm/day)	1.45						2.25	3.22	4.44	4.20	4.24	3.91
	CU(mm/month)	43.6						69.8	96.5	137.6	130.3	127.2	121.3
	Effective rainfall (mm)	1						1	1	1	1	1	1
	Net Requirement(MCM)	0.00						0.01	0.03	0.07	0.08	0.07	0.04
Tomato													
	Planting area modified	30	45	45	30	4							4
	kc	0.80	1.10	0.60									0.50
		0.50	0.80	1.10	0.60								
			0.50	0.80	1.10	0.60							
	Average kc	0.65	0.80	0.83	0.85	0.60							0.50
	CU (mm/day)	3.0	3.6	3.9	4.6	3.6							2.5
	CU(mm/month)	88.8	111.0	122.3	128.2	112.9							77.2
	Effective rainfall (mm)	26.7	12.1	15.0	9.1	19.8							81.6
	Net Requirement(MCM)	0.02	0.04	0.05	0.04	0.00							0.00
Tobacco	Planting area (ha)	17	51	68	62	34	4						
	kc	0.40	0.70	1.10	1.00								
			0.40	0.70	1.10	1.00							
				0.40	0.70	1.10	1.00						
	Average kc	0.40	0.55	0.73	0.93	1.05	1.00						
	CU (mm/day)	1.8	2.5	3.5	5.0	6.4	6.3						
	CU(mm/month)	54.7	76.3	107.6	140.7	197.6	188.0						
	Effective rainfall (mm)	26.7	12.1	15.0	9.1	19.8	25.0						
	Net Requirement(MCM)	0.00	0.04	0.06	0.08	0.06	0.01						
Vegetables (ha)		215	215	215	215	215	215	215	215	215	215	215	215
	kc	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
	CU (mm/day)	3.6	3.6	3.8	4.3	4.9	5.0	4.7	5.0	5.4	5.2	4.6	4.0
	CU(mm/month)	109.3	111.0	117.4	120.6	150.6	150.4	146.0	151.4	168.9	160.9	138.1	123.4
	Effective rainfall (mm)	26.7	12.1	15.0	9.1	19.8	25.0	52.6	37.5	25.3	57.6	72.1	81.6
	Net Requirement(MCM)	0.18	0.21	0.22	0.24	0.28	0.27	0.20	0.24	0.31	0.22	0.14	0.09
Net Requirement for Crops (MCM)		1.34	1.59	1.69	1.81	2.01	1.86	1.42	1.79	2.38	1.75	1.17	0.76
Diversion Requirement (MCM)		2.80	3.38	3.59	3.84	4.28	3.95	3.01	3.82	5.06	3.72	2.49	1.61

Cuadro 4.5.1 Estimatados de Requerimientos de agua de riego bajo la Condicion con Proyecto (13/19)
(Los Guiros - Santana)

2,791 ha

Crop		Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
	ETo (mm/day)	4.6	4.5	4.7	5.4	6.1	6.3	5.9	6.3	6.8	6.5	5.8	5.0
Plantain	(ha)	2,080	2,080	2,080	2,080	2,080	2,080	2,080	2,080	2,080	2,080	2,080	2,080
Banana		470	470	470	470	470	470	470	470	470	470	470	470
Coconut		88	88	88	88	88	88	88	88	88	88	88	88
Sub total		2,638	2,638	2,638	2,638	2,638	2,638	2,638	2,638	2,638	2,638	2,638	2,638
	kc	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
	CU (mm/day)	3.8721	3.803	4.0233	4.5768	5.1612	5.3255	5.0025	5.3627	5.7898	5.5135	4.8924	4.2308
	CU(mm/month)	116.2	117.9	124.7	128.2	160.0	159.8	155.1	160.9	179.5	170.9	146.8	131.2
	Effective rainfall (mm)	20.0	12.7	4.6	5.8	10.1	20.0	41.9	40.2	15.4	39.3	39.9	40.4
	Net Requirement(MCM)	2.54	2.78	3.17	3.23	3.95	3.69	2.99	3.18	4.33	3.47	2.82	2.39
Cont.Sorghum	Planting area modified							11	33	44	44	33	11
	kc							0.50	0.80	1.10	0.60		
									0.50	0.80	1.10	0.60	
										0.50	0.80	1.10	0.60
	Average kc							0.50	0.65	0.80	0.83	0.85	0.30
	CU (mm/day)							2.93	4.10	5.45	5.41	4.89	1.49
	CU(mm/month)							91.2	123.0	168.9	167.6	146.8	46.3
	Effective rainfall (mm)							41.9	40.2	15.4	39.3	39.9	40.4
	Net Requirement(MCM)							0.01	0.03	0.07	0.06	0.04	0.00
Rice	Planting area (ha)	1						3	8	10	10	9	5
	kc							1.10	1.15	1.25	1.25	1.00	
									1.10	1.15	1.25	1.25	1.00
		1.00								1.10	1.15	1.25	1.25
	Average kc	1.00						1.10	1.13	1.17	1.22	1.17	1.13
	CU (mm/day)	4.6						6.5	7.1	7.9	7.9	6.7	5.6
	CU(mm/month)	136.7						200.7	212.9	246.4	244.6	201.5	173.6
	Percolation (mm/mon)	0.0						0.0	0.0	0.0	0.0	0.0	0.0
	Effective rainfall (mm)	20.0						41.9	40.2	15.4	39.3	39.9	40.4
	Land Preparation, 300 mm (MCM)							0.02	0.02				
	Net Requirement(MCM)	0.00						0.02	0.03	0.02	0.02	0.02	0.01
Beans	Planting area (ha)	7	20	22	15	2							
	kc	0.50	0.80	1.10	0.40								
			0.50	0.80	1.10	0.40							
	Average kc	0.50	0.65	0.95	0.75	0.40							
	CU (mm/day)	2.3	2.9	4.5	4.0	2.4							
	CU(mm/month)	68.3	90.2	139.4	113.1	75.3							
	Effective rainfall (mm)	20.0	12.7	4.6	5.8	10.1							
	Net Requirement(MCM)	0.00	0.02	0.03	0.02	0.00							
Pasture & Other Crops (ha)		106	116	94	48	12	22	69	96	99	99	99	98
	kc	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
	CU (mm/day)	3.6	3.6	3.8	4.3	4.9	5.0	4.7	5.0	5.4	5.2	4.6	4.0
	CU(mm/month)	109.3	111.0	117.4	120.6	150.6	150.4	146.0	151.4	168.9	160.9	138.1	123.4
	Effective rainfall (mm)	20.0	12.7	4.6	5.8	10.1	20.0	41.9	40.2	15.4	39.3	39.9	40.4
	Net Requirement(MCM)	0.09	0.11	0.11	0.06	0.02	0.03	0.07	0.11	0.15	0.12	0.10	0.08
Total Net Requirement for Upland (MCM)		2.63	2.91	3.30	3.30	3.97	3.72	3.06	3.32	4.55	3.65	2.95	2.48
Total Net Requirement for Paddy (MCM)		0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.02	0.02	0.02	0.01
Diversion Requirement (MCM)		5.61	6.18	7.03	7.02	8.45	7.90	6.55	7.11	9.72	7.80	6.31	5.28

Cuadro 4.5.1 Estimatados de Requerimientos de agua de riego bajo la Condicion con Proyecto (14/19)
(Santana)

12,000 ha

Crop		Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
	ETo (mm/day)	4.6	4.5	4.7	5.4	6.1	6.3	5.9	6.3	6.8	6.5	5.8	5.0
Sugar cane	(ha)	3,240	3,240	3,240	3,240	3,240	3,240	3,240	3,240	3,240	3,240	3,240	3,240
		0.85	0.80	0.65	0.50	0.80	0.95	1.10	1.15	1.15	1.15	1.15	1.15
	kc	1.15	0.85	0.80	0.65	0.50	0.80	0.95	1.10	1.15	1.15	1.15	1.15
		1.15	1.15	0.85	0.80	0.65	0.50	0.80	0.95	1.10	1.15	1.15	1.15
		1.15	1.15	1.15	0.85	0.80	0.65	0.50	0.80	0.95	1.10	1.15	1.15
		1.15	1.15	1.15	1.15	0.85	0.80	0.65	0.50	0.80	0.95	1.10	1.15
		1.15	1.15	1.15	1.15	1.15	0.85	0.80	0.65	0.50	0.80	0.95	1.10
		1.10	1.15	1.15	1.15	1.15	1.15	0.85	0.80	0.65	0.50	0.80	0.95
	Average kc	1.10	1.06	0.99	0.89	0.84	0.81	0.81	0.85	0.90	0.97	1.06	1.11
	CU (mm/day)	5.01	4.73	4.67	4.81	5.12	5.10	4.75	5.36	6.13	6.30	6.13	5.55
	CU(mm/month)	150.3	146.6	144.6	134.6	158.7	153.1	147.3	160.9	190.0	195.3	183.8	171.9
	Effective rainfall (mm)	20.0	12.7	4.6	5.8	10.1	20.0	41.9	40.2	15.4	39.3	39.9	40.4
	Net Requirement(MCM)	4.22	4.34	4.54	4.17	4.81	4.31	3.42	3.91	5.66	5.06	4.66	4.26
Plantain	(ha)	2,786	2,786	2,786	2,786	2,786	2,786	2,786	2,786	2,786	2,786	2,786	2,786
Banana		21	21	21	21	21	21	21	21	21	21	21	21
Coconut		0	0	0	0	0	0	0	0	0	0	0	0
Sub-total		2,807	2,807	2,807	2,807	2,807	2,807	2,807	2,807	2,807	2,807	2,807	2,807
	kc	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
	CU (mm/day)	3.9	3.8	4.0	4.6	5.2	5.3	5.0	5.4	5.8	5.5	4.9	4.2
	CU(mm/month)	116.2	117.9	124.7	128.2	160.0	159.8	155.1	160.9	179.5	170.9	146.8	131.2
	Effective rainfall (mm)	20.0	12.7	4.6	5.8	10.1	20.0	41.9	40.2	15.4	39.3	39.9	40.4
	Net Requirement(MCM)	2.70	2.95	3.37	3.41	4.21	3.92	3.18	3.39	4.61	3.70	3.00	2.55
Corn&Sorghum													
	Planting area modified	0	0	0	0	0	0	656	1,967	2,622	2,622	1,967	656
								0.50	0.80	1.10	0.60		
	kc								0.50	0.80	1.10	0.60	
										0.50	0.80	1.10	0.60
	Average kc							0.50	0.65	0.80	0.83	0.85	0.30
	CU (mm/day)							2.94	4.10	5.45	5.41	4.89	1.49
	CU(mm/month)							91.2	123.0	168.9	167.6	146.8	46.3
	Effective rainfall (mm)							41.9	40.2	15.4	39.3	39.9	40.4
	Net Requirement(MCM)							0.00	0.00	0.00	0.84	2.10	0.15
Rice	Planting area (ha)	0.8						3.3	9.8	13.0	13.0	12.2	6.5
								1.10	1.15	1.25	1.25	1.00	
	kc								1.10	1.15	1.25	1.25	1.00
										1.10	1.15	1.25	1.25
		1.00											
	Average kc	1.00						1.10	1.13	1.17	1.22	1.17	1.13
	CU (mm/day)	4.6						6.5	7.1	7.9	7.9	6.7	5.6
	CU(mm/month)	136.7						200.7	212.9	246.4	244.6	201.5	173.6
	Percolation (mm/mon)	150.0						155.0	150.0	155.0	155.0	150.0	155.0
	Effective rainfall (mm)	20.0						41.9	40.2	15.4	39.3	39.9	40.4
	Land Preparation, 300 mm (MCM)							0.01	0.01	0.01			
	Net Requirement(MCM)	0.00						0.02	0.04	0.06	0.05	0.04	0.02
Beans	Planting area (ha)	328	901	983	656	82	0	0	0	0	0	0	0
	kc	0.50	0.80	1.10	0.40								
			0.50	0.80	1.10	0.40							
	Average kc	0.50	0.65	0.95	0.75	0.40							
	CU (mm/day)	2.3	2.9	4.5	4.0	2.4							
	CU(mm/month)	68.3	90.2	139.4	113.1	75.3							
	Effective rainfall (mm)	20.0	12.7	4.6	5.8	10.1							
	Net Requirement(MCM)	0.16	0.70	1.33	0.70	0.05							
Other Crops (ha)		4,228	4,654	3,737	1,901	492	918	2,983	4,196	4,261	4,261	4,261	4,032
	kc	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
	CU (mm/day)	3.6	3.6	3.8	4.3	4.9	5.0	4.7	5.0	5.4	5.2	4.6	4.0
	CU(mm/month)	109.3	111.0	117.4	120.6	150.6	150.4	146.0	151.4	168.9	160.9	138.1	123.4
	Effective rainfall (mm)	20.0	12.7	4.6	5.8	10.1	20.0	41.9	40.2	15.4	39.3	39.9	40.4
	Net Requirement(MCM)	3.78	4.58	4.21	2.18	0.69	1.20	3.11	4.67	6.54	5.18	4.18	3.35
Total Net Requirement for Upland (MCM)		10.86	12.57	13.45	10.50	9.76	9.43	9.70	11.96	15.81	14.27	13.95	10.31
Total Net Requirement for Paddy (MCM)		0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.04	0.06	0.05	0.04	0.02
Diversion Requirement (MCM)		23.10	26.74	28.62	22.33	20.77	20.06	20.67	25.53	33.88	31.51	29.74	21.97

Cuadro 4.5.1 Estimatados de Requerimientos de agua de riego bajo la Condicion con Proyecto (15/19)

(Santana downstream - Tomate)

2,853 ha

Crop		Nov.	Dec	Jan.	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
	ETo (mm/day)	4.6	4.5	4.7	5.4	6.1	6.3	5.9	6.3	6.8	6.5	5.8	5.0
Plantain	(ha)	2,131	2,131	2,131	2,131	2,131	2,131	2,131	2,131	2,131	2,131	2,131	2,131
Banana		464	464	464	464	464	464	464	464	464	464	464	464
Coconut		98	98	98	98	98	98	98	98	98	98	98	98
Sub-total		2,693	2,693	2,693	2,693	2,693	2,693	2,693	2,693	2,693	2,693	2,693	2,693
	Planting area modified	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000
	kc	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
	CU (mm/day)	3.9	3.8	4.0	4.6	5.2	5.3	5.0	5.4	5.8	5.5	4.9	4.2
	CU(mm/month)	116.2	117.9	124.7	128.2	160.0	159.8	155.1	160.9	179.5	170.9	146.8	131.2
	Effective rainfall (mm)	20.0	12.7	4.6	5.8	10.1	20.0	41.9	40.2	15.4	39.3	39.9	40.4
	Net Requirement(MCM)	2.59	2.83	3.24	3.30	4.04	3.76	3.05	3.25	4.43	3.55	2.88	2.41
Corn&Sorghum	Planting area modified							9	26	35	35	26	9
	kc							0.50	0.80	1.10	0.60		
									0.50	0.80	1.10	0.60	
										0.50	0.80	1.10	0.60
	Average kc							0.50	0.65	0.80	0.83	0.85	0.30
	CU (mm/day)							2.94	4.10	5.45	5.41	4.89	1.49
	CU(mm/month)							91.2	123.0	168.9	167.6	146.8	46.3
	Effective rainfall (mm)							41.9	40.2	15.4	39.3	39.9	40.4
	Net Requirement(MCM)							0.00	0.00	0.00	0.01	0.03	0.00
Rice	Planting area (ha)	1						3	8	10	10	9	5
	kc							1.10	1.15	1.25	1.25	1.00	
									1.10	1.15	1.25	1.25	1.00
		1.00								1.10	1.15	1.25	1.25
	Average kc	1.00						1.10	1.13	1.17	1.22	1.17	1.13
	CU (mm/day)	4.6						6.5	7.1	7.9	7.9	6.7	5.6
	CU(mm/month)	136.7						200.7	212.9	246.4	244.6	201.5	173.6
	Percolation (mm/mon)	150.0						155.0	150.0	155.0	155.0	150.0	155.0
	Effective rainfall (mm)	20.0						41.9	40.2	15.4	39.3	39.9	40.4
	Land Preparation, 300 mm (MCM)							0.01	0.01	0.01			
	Net Requirement(MCM)	0.00						0.02	0.03	0.05	0.04	0.03	0.01
Beans													
	Planting area (ha)	10	27	29	19	2							
	kc												
		0.50	0.80	1.10	0.40								
			0.50	0.80	1.10	0.40							
	Average kc	0.50	0.65	0.95	0.75	0.40							
	CU (mm/day)	2.3	2.9	4.5	4.0	2.4							
	CU(mm/month)	68.3	90.2	139.4	113.1	75.3							
	Effective rainfall (mm)	20.0	12.7	4.6	5.8	10.1							
	Net Requirement(MCM)	0.00	0.02	0.04	0.02	0.00							
Pasture & Other Crops	(ha)	122	133	107	54	13	26	81	112	115	115	115	113
	kc	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
	CU (mm/day)	3.6	3.6	3.8	4.3	4.9	5.0	4.7	5.0	5.4	5.2	4.6	4.0
	CU(mm/month)	109.3	111.0	117.4	120.6	150.6	150.4	146.0	151.4	168.9	160.9	138.1	123.4
	Effective rainfall (mm)	20.0	12.7	4.6	5.8	10.1	20.0	41.9	40.2	15.4	39.3	39.9	40.4
	Net Requirement(MCM)	0.11	0.13	0.12	0.06	0.02	0.03	0.08	0.12	0.18	0.14	0.11	0.09
Total Net Requirement for Upland (MCM)		2.70	2.99	3.40	3.38	4.06	3.80	3.13	3.37	4.60	3.70	3.02	2.54
Total Net Requirement for Paddy (MCM)		0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.05	0.04	0.03	0.01
Diversion Requirement (MCM)		5.76	6.35	7.23	7.19	8.63	8.08	6.70	7.24	9.86	7.93	6.47	5.43

Table 4.5.1 Estimate of Irrigation Water Requirements with Project Condition (16/19)
(Los Tomate - Mena) **374 ha**

Crop		Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
	ETo (mm/day)	4.6	4.5	4.7	5.4	6.1	6.3	5.9	6.3	6.8	6.5	5.8	5.0
Plantain	(ha)	266	266	266	266	266	266	266	266	266	266	266	266
Banaba		60	60	60	60	60	60	60	60	60	60	60	60
Coconut		21	21	21	21	21	21	21	21	21	21	21	21
Sub-total		348	348	348	348	348	348	348	348	348	348	348	348
	kc	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
	CU (mm/day)	3.9	3.8	4.0	4.6	5.2	5.3	5.0	5.4	5.8	5.5	4.9	4.2
	CU(mm/month)	116.2	117.9	124.7	128.2	160.0	159.8	155.1	160.9	179.5	170.9	146.8	131.2
	Effective rainfall (mm)	20.0	12.7	4.6	5.8	10.1	20.0	41.9	40.2	15.4	39.3	39.9	40.4
	Net Requirement(MCM)	0.33	0.37	0.42	0.43	0.52	0.49	0.39	0.42	0.57	0.46	0.37	0.33
Corn& Sorghum	Planting area modified							1	3	4	4	3	1
	kc							0.50	0.80	1.10	0.60		
									0.50	0.80	1.10	0.60	
										0.50	0.80	1.10	0.60
	Average kc							0.50	0.65	0.80	0.83	0.85	0.30
	CU (mm/day)							2.94	4.10	5.45	5.41	4.89	1.49
	CU(mm/month)							91.2	123.0	168.9	167.6	146.8	46.3
	Effective rainfall (mm)							41.9	40.2	15.4	39.3	39.9	40.4
	Net Requirement(MCM)							0.00	0.00	0.00	0.00	0.00	0.00
Rice	Planting area (ha)	0						1	2	2	2	2	1
	kc							1.10	1.15	1.25	1.25	1.00	
									1.10	1.15	1.25	1.25	1.00
		1.00								1.10	1.15	1.25	1.25
	Average kc	1.00						1.10	1.13	1.17	1.22	1.17	1.13
	CU (mm/day)	4.6						6.5	7.1	7.9	7.9	6.7	5.6
	CU(mm/month)	136.7						200.7	212.9	246.4	244.6	201.5	173.6
	Percolation (mm/mon)	150.0						155.0	150.0	155.0	155.0	150.0	155.0
	Effective rainfall (mm)	20.0						41.9	40.2	15.4	39.3	39.9	40.4
	Land Preparation, 300 mm (MCM)							0.00	0.00	0.00			
	Net Requirement(MCM)	0.00						0.00	0.01	0.01	0.01	0.01	0.00
Beans	Planting area (ha)	1	2	2	1	0							
	kc	0.50	0.80	1.10	0.40								
			0.50	0.80	1.10	0.40							
	Average kc	0.50	0.65	0.95	0.75	0.40							
	CU (mm/day)	2.3	2.9	4.5	4.0	2.4							
	CU(mm/month)	68.3	90.2	139.4	113.1	75.3							
	Effective rainfall (mm)	20.0	12.7	4.6	5.8	10.1							
	Net Requirement(MCM)	0.00	0.00	0.00	0.00	0.00							
Pasture & Other Crops (ha)		17	18	15	8	2	3	11	16	17	17	17	17
	kc	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
	CU (mm/day)	3.6	3.6	3.8	4.3	4.9	5.0	4.7	5.0	5.4	5.2	4.6	4.0
	CU(mm/month)	109.3	111.0	117.4	120.6	150.6	150.4	146.0	151.4	168.9	160.9	138.1	123.4
	Effective rainfall (mm)	20.0	12.7	4.6	5.8	10.1	20.0	41.9	40.2	15.4	39.3	39.9	40.4
	Net Requirement(MCM)	0.02	0.02	0.02	0.01	0.00	0.00	0.01	0.02	0.03	0.02	0.02	0.01
Total Net Requirement for Upland (MCM)		0.35	0.39	0.44	0.44	0.52	0.49	0.40	0.44	0.60	0.48	0.39	0.33
Total Net Requirement for Paddy (MCM)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.00
Diversion Requirement (MCM)		0.74	0.82	0.93	0.93	1.12	1.04	0.87	0.94	1.29	1.03	0.84	0.71

Cuadro 4.5.1 Estimatados de Requerimientos de agua de riego bajo la Condicion con Proyecto (17/19)
(Tamate - Palo Alto)

1,565 ha

Crop		Nov.	Dec.	Jan.	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
	ETo (mm/day)	4.6	4.5	4.7	5.4	6.1	6.3	5.9	6.3	6.8	6.5	5.8	5.0
Sugar cane	(ha)	200	200	200	200	200	200	200	200	200	200	200	200
		0.85	0.80	0.65	0.50	0.80	0.95	1.10	1.15	1.15	1.15	1.15	1.15
	kc	1.15	0.85	0.80	0.65	0.50	0.80	0.95	1.10	1.15	1.15	1.15	1.15
		1.15	1.15	0.85	0.80	0.65	0.50	0.80	0.95	1.10	1.15	1.15	1.15
		1.15	1.15	1.15	0.85	0.80	0.65	0.50	0.80	0.95	1.10	1.15	1.15
		1.15	1.15	1.15	1.15	0.85	0.80	0.65	0.50	0.80	0.95	1.10	1.15
		1.15	1.15	1.15	1.15	1.15	0.85	0.80	0.65	0.50	0.80	0.95	1.10
		1.10	1.15	1.15	1.15	1.15	1.15	0.85	0.80	0.65	0.50	0.80	0.95
	Average kc	1.10	1.06	0.99	0.89	0.84	0.81	0.81	0.85	0.90	0.92	1.06	1.11
	CU (mm/day)	5.01	4.73	4.67	4.81	5.12	5.10	4.75	5.36	6.13	6.30	6.13	5.55
	CU(mm/month)	150.3	146.6	144.6	134.6	158.7	153.1	147.3	160.9	190.0	195.3	183.8	171.9
	Effective rainfall (mm)	20.0	12.7	4.6	5.8	10.1	20.0	41.9	40.2	15.4	39.3	39.9	40.4
	Net Requirement(MCM)	0.26	0.27	0.28	0.26	0.30	0.27	0.21	0.24	0.35	0.31	0.29	0.26
Plantain	(ha)	1,139	1,139	1,139	1,139	1,139	1,139	1,139	1,139	1,139	1,139	1,139	1,139
Banana		105	105	105	105	105	105	105	105	105	105	105	105
Coconut		55	55	55	55	55	55	55	55	55	55	55	55
Sub-total		1,298	1,298	1,298	1,298	1,298	1,298	1,298	1,298	1,298	1,298	1,298	1,298
	kc	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
	CU (mm/day)	3.9	3.8	4.0	4.6	5.2	5.3	5.0	5.4	5.8	5.5	4.9	4.2
	CU(mm/month)	116.2	117.9	124.7	128.2	160.0	159.8	155.1	160.9	179.5	170.9	146.8	131.2
	Effective rainfall (mm)	20.0	12.7	4.6	5.8	10.1	20.0	41.9	40.2	15.4	39.3	39.9	40.4
	Net Requirement(MCM)	1.25	1.37	1.56	1.59	1.95	1.81	1.47	1.57	2.13	1.71	1.39	1.16
Cont'd Sorghum	Planting area modified							3	8	11	11	8	3
	kc							0.50	0.80	1.10	0.60		
									0.50	0.80	1.10	0.60	
										0.50	0.80	1.10	0.60
	Average kc							0.50	0.65	0.80	0.83	0.85	0.30
	CU (mm/day)							2.94	4.10	5.45	5.41	4.89	1.49
	CU(mm/month)							91.2	123.0	168.9	167.6	146.8	46.3
	Effective rainfall (mm)							41.9	40.2	15.4	39.3	39.9	40.4
	Net Requirement(MCM)							0.00	0.00	0.00	0.00	0.01	0.00
Rice	Planting area (ha)	0						2	5	6	6	5	2
	kc							1.10	1.15	1.25	1.25	1.00	
									1.10	1.15	1.25	1.25	1.00
		1.00								1.10	1.15	1.25	1.25
	Average kc	1.00						1.10	1.13	1.17	1.22	1.17	1.13
	CU (mm/day)	4.6						6.5	7.1	7.9	7.9	6.7	5.6
	CU(mm/month)	136.7						200.7	212.9	246.4	244.6	201.5	173.6
	Percolation (mm/mon)	0.0						0.0	0.0	0.0	0.0	0.0	0.0
	Effective rainfall (mm)	20.0						41.9	40.2	15.4	39.3	39.9	40.4
	Land Preparation, 300 mm (MCM)							0.01	0.01	0.01			
	Net Requirement(MCM)	0.00						0.01	0.01	0.02	0.01	0.01	0.00
Beans													
	Planting area (ha)	5	13	14	9	1							
	kc	0.50	0.80	1.10	0.40								
			0.50	0.80	1.10	0.40							
	Average kc	0.50	0.65	0.95	0.75	0.40							
	CU (mm/day)	2.3	2.9	4.5	4.0	2.4							
	CU(mm/month)	68.3	90.2	139.4	113.1	75.3							
	Effective rainfall (mm)	20.0	12.7	4.6	5.8	10.1							
	Net Requirement(MCM)	0.00	0.01	0.02	0.01	0.00							
Other Crops (ha)		61	74	64	42	15	10	33	47	49	49	49	49
	kc	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
	CU (mm/day)	3.6	3.6	3.8	4.3	4.9	5.9	4.7	5.0	5.4	5.2	4.6	4.0
	CU(mm/month)	109.3	111.0	117.4	120.6	150.6	150.4	146.0	151.4	168.9	160.9	138.1	123.4
	Effective rainfall (mm)	20.0	12.7	4.6	5.8	10.1	20.0	41.9	40.2	15.4	39.3	39.9	40.4
	Net Requirement(MCM)	0.05	0.07	0.07	0.05	0.02	0.01	0.03	0.05	0.08	0.06	0.05	0.04
Total Net Requirement for Upland (MCM)		1.57	1.72	1.93	1.90	2.27	2.09	1.72	1.86	2.56	2.08	1.73	1.48
Total Net Requirement for Paddy (MCM)		0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.01	0.01	0.00
Diversion Requirement (MCM)		3.33	3.65	4.11	4.05	4.82	4.46	3.66	3.98	5.47	4.46	3.70	3.16

Cuadro 4.5.1 Estimatados de Requerimientos de agua de riego bajo la Condicion con Proyecto (18/19)
(Palo Alto - mar) **2,669 ha**

Crop		Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
	ETo (mm/day)	4.6	4.5	4.7	5.4	6.1	6.3	5.9	6.3	6.8	6.5	5.8	5.0
Sugar cane	(ha)	560	560	560	560	560	560	560	560	560	560	560	560
		0.85	0.80	0.65	0.50	0.80	0.95	1.10	1.15	1.15	1.15	1.15	1.15
	kc	1.15	0.85	0.80	0.65	0.50	0.80	0.95	1.10	1.15	1.15	1.15	1.15
		1.15	1.15	0.85	0.80	0.65	0.50	0.80	0.95	1.10	1.15	1.15	1.15
		1.15	1.15	1.15	0.85	0.80	0.65	0.50	0.80	0.95	1.10	1.15	1.15
		1.15	1.15	1.15	1.15	0.85	0.80	0.65	0.50	0.80	0.95	1.10	1.15
		1.15	1.15	1.15	1.15	1.15	0.85	0.80	0.65	0.50	0.80	0.95	1.10
		1.10	1.15	1.15	1.15	1.15	1.15	0.85	0.80	0.65	0.50	0.80	0.95
	Average kc	1.10	1.06	0.99	0.89	0.84	0.81	0.81	0.65	0.90	0.97	1.06	1.11
	CU (mm/day)	5.01	4.73	4.67	4.81	5.12	5.10	4.75	5.36	6.13	6.30	6.13	5.55
	CU(mm/month)	150.3	146.6	144.6	134.6	158.7	153.1	147.3	160.9	190.0	195.3	183.8	171.9
	Effective rainfall (mm)	20.0	12.7	4.6	5.8	10.1	20.0	41.9	40.2	15.4	39.3	39.9	40.4
	Net Requirement(MCM)	0.73	0.75	0.78	0.72	0.83	0.74	0.59	0.68	0.98	0.87	0.81	0.74
Plantain	(ha)	1,597	1,597	1,597	1,597	1,597	1,597	1,597	1,597	1,597	1,597	1,597	1,597
Banana		320	320	320	320	320	320	320	320	320	320	320	320
Coconut		76	76	76	76	76	76	76	76	76	76	76	76
Sub-total		1,993	1,993	1,993	1,993	1,993	1,993	1,993	1,993	1,993	1,993	1,993	1,993
	kc	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
	CU (mm/day)	3.9	3.8	4.0	4.6	5.2	5.3	5.0	5.4	5.8	5.5	4.9	4.2
	CU(mm/month)	116.2	117.9	124.7	128.2	160.0	159.8	155.1	160.9	179.5	170.9	146.8	131.2
	Effective rainfall (mm)	20.0	12.7	4.6	5.8	10.1	20.0	41.9	40.2	15.4	39.3	39.9	40.4
	Net Requirement(MCM)	1.92	2.10	2.39	2.44	2.99	2.78	2.26	2.40	3.27	2.62	2.13	1.81
Cereal Sorghum	Planting area modified							6	19	25	25	19	6
								0.50	0.80	1.10	0.60		
	kc								0.50	0.80	1.10	0.60	
										0.50	0.80	1.10	0.60
	Average kc							0.50	0.65	0.80	0.83	0.85	0.30
	CU (mm/day)							2.94	4.10	5.45	5.41	4.89	1.49
	CU(mm/month)							91.2	123.0	168.9	167.6	146.8	46.3
	Effective rainfall (mm)							41.9	40.2	15.4	39.3	39.9	40.4
	Net Requirement(MCM)							0.00	0.00	0.00	0.01	0.02	0.00
Rice	Planting area (ha)	0						1	4	5	5	5	3
								1.10	1.15	1.25	1.25	1.00	
	kc								1.10	1.15	1.25	1.25	1.00
										1.10	1.15	1.25	1.25
		1.00											
	Average kc	1.00						1.10	1.13	1.17	1.22	1.17	1.13
	CU (mm/day)	4.6						6.5	7.1	7.9	7.9	6.7	5.6
	CU(mm/month)	136.7						200.7	212.9	245.4	244.6	201.5	173.6
	Percolation (mm/mon)	150.0						155.0	150.0	155.0	155.0	150.0	155.0
	Effective rainfall (mm)	20.0						41.9	40.2	15.4	39.3	39.9	40.4
	Land Preparation, 300 mm (MCM)							0.01	0.01	0.01			
	Net Requirement(MCM)	0.00						0.01	0.02	0.02	0.02	0.01	0.01
Beans	Planting area (ha)	4	12	13	8	1							
	kc	0.50	0.80	1.10	0.40								
			0.50	0.80	1.10	0.40							
	Average kc	0.50	0.65	0.95	0.75	0.40							
	CU (mm/day)	2.3	2.9	4.5	4.0	2.4							
	CU(mm/month)	68.3	90.2	139.4	113.1	75.3							
	Effective rainfall (mm)	20.0	12.7	4.6	5.8	10.1							
	Net Requirement(MCM)	0.00	0.01	0.02	0.01	0.00							
Pasture & Other Crops (ha)		89	95	26	37	9	19	60	84	86	86	66	85
	kc	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
	CU (mm/day)	3.6	3.6	3.8	4.3	4.9	5.0	4.7	5.0	5.4	5.2	4.6	4.0
	CU(mm/month)	109.3	111.0	117.4	120.6	150.6	150.4	146.0	151.4	168.9	160.9	138.1	123.4
	Effective rainfall (mm)	20.0	12.7	4.6	5.8	10.1	20.0	41.9	40.2	15.4	39.3	39.9	40.4
	Net Requirement(MCM)	0.08	0.09	0.09	0.04	0.01	0.02	0.06	0.09	0.13	0.10	0.08	0.07
Total Net Requirement for Upland (MCM)		2.73	2.95	3.28	3.21	3.83	3.55	2.91	3.17	4.38	3.61	3.04	2.62
Total Net Requirement for Paddy (MCM)		0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.02	0.02	0.01	0.01
Diversion Requirement (MCM)		5.80	6.28	6.98	6.83	8.15	7.56	6.20	6.78	9.36	7.71	6.49	5.58

Cuadro 4.5.1 Estimatados de Requerimientos de agua de riego bajo la Condicion con Proyecto (19/19)
(Aguacatico)

750 ha

Crop		Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
	ETo (mm/day)	4.6	4.5	4.7	5.4	6.1	6.3	5.9	6.3	6.8	6.5	5.8	5.0
Plantain & Banana	(ha)	443	443	443	443	443	443	443	443	443	443	443	443
Fruit tress	(ha)	225	225	225	225	225	225	225	225	225	225	225	225
Sub-total		668	668	668	668	668	668	668	668	668	668	668	668
	kc	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
	CU (mm/day)	3.9	3.8	4.0	4.6	5.2	5.3	5.0	5.4	5.8	5.5	4.9	4.2
	CU(mm/month)	116.2	117.9	124.7	128.2	160.0	159.8	155.1	160.9	179.5	170.9	145.8	131.2
	Effective rainfall (mm)	20.0	12.7	4.6	5.8	10.1	20.0	41.9	40.2	15.4	39.3	39.9	40.4
	Net Requirement(MCM)	0.64	0.70	0.80	0.82	1.00	0.93	0.76	0.81	1.10	0.88	0.71	0.61
Corn& Sorghum(1)	Planting area modified						4	13	18	18	13	4	
	kc						0.50	0.83	1.10	0.60			
								0.50	0.80	1.10	0.60		
									0.50	0.60	1.10	0.60	
	Average kc						0.50	0.65	0.80	0.83	0.85	0.30	
	CU (mm/day)						3.13	3.83	5.05	5.68	5.51	1.73	
	CU(mm/mooth)						94.0	118.6	151.4	176.0	170.9	51.8	
	Effective rainfall (mm)						20.0	41.9	40.2	15.4	39.3	39.9	
	Net Requirement(MCM)						0.00	0.01	0.02	0.03	0.02	0.00	
Corn& Sorghum(2)	Planting area modified	18	18	13	4							4	13
	kc	1.10	0.60									0.50	0.80
		0.80	1.10	0.60									0.50
		0.50	0.80	1.10	0.60								
	Average kc	0.80	0.83	0.85	0.30							0.50	0.65
	CU (mm/day)	3.64	3.73	4.02	1.62							2.88	3.24
	CU(mm/month)	109.3	115.6	124.7	45.2							86.3	100.3
	Effective rainfall (mm)	20.0	12.7	4.6	5.8							39.9	40.4
	Net Requirement(MCM)	0.02	0.02	0.03	0.00							0.00	0.01
Pigeon pea	Planting area (ha)	24					21	41	41	21	24	47	47
	kc						0.60	1.00	0.80		0.60	1.00	0.80
		0.80						0.60	1.00	0.80		0.60	1.00
	Average kc	0.80					0.60	0.80	0.90	0.80	0.60	0.80	0.90
	CU (mm/day)	3.6					3.8	4.7	5.7	5.4	3.9	4.6	4.5
	CU(mm/month)	109.3					112.8	146.0	170.3	168.9	120.6	138.1	138.9
	Effective rainfall (mm)	20.0					20.0	41.9	40.2	15.4	39.3	39.9	40.4
	Net Requirement(MCM)	0.02					0.02	0.04	0.05	0.03	0.02	0.05	0.05
Melon	Planting area (ha)	8	12	11	4								1
	kc												
		0.75	1.00	0.70									0.50
		0.50	0.75	1.00	0.70								
	Average kc	0.63	0.88	0.85	0.70								0.50
	CU (mm/day)	2.8	3.9	4.0	3.8								2.5
	CU(mm/month)	85.4	121.4	124.7	105.5								77.2
	Effective rainfall (mm)	20.0	12.7	4.6	5.8								40.4
	Net Requirement(MCM)	0.01	0.01	0.01	0.00								0.00
Tomato	Planting area (ha)	12	18	18	12	3							3
	kc	0.80	1.10	0.60									0.50
		0.50	0.80	1.10	0.60								
			0.50	0.80	1.10	0.60							
	Average kc	0.65	0.80	0.83	0.85	0.60							0.50
	CU (mm/day)	3.0	3.6	3.9	4.6	3.6							2.5
	CU(mm/month)	85.8	111.0	122.3	128.2	112.9							77.2
	Effective rainfall (mm)	20.0	12.7	4.6	5.8	10.1							40.4
	Net Requirement(MCM)	0.01	0.02	0.02	0.01	0.00							0.00
Vegetables	(ha)	24	24	24	24	24	24	18	18	18	18	18	18
	kc	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
	CU (mm/day)	3.6	3.6	3.8	4.3	4.9	5.0	4.7	5.0	5.4	5.2	4.6	4.0
	CU(mm/month)	109.3	111.0	117.4	120.6	150.6	150.4	146.0	151.4	168.9	160.9	138.1	123.4
	Effective rainfall (mm)	20.0	12.7	4.6	5.8	10.1	20.0	41.9	40.2	15.4	39.3	39.9	40.4
	Net Requirement(MCM)	0.02	0.02	0.03	0.03	0.03	0.03	0.02	0.03	0.03	0.02	0.02	0.01
Total Net Requirement for Upland (MCM)		0.71	0.77	0.88	0.86	1.04	0.99	0.83	0.90	1.18	0.94	0.78	0.68
Diversion Requirement (MCM)		1.52	1.65	1.87	1.84	2.21	2.10	1.76	1.91	2.52	1.99	1.66	1.44

Cuadro 4.6.1 Proyeccion sobre la Oferta de Agua

	Population in 1998	Population in 2010	Water Supply Ratio in 1993 (%)	INAPA On-going & Planned Project	Proposed Project in this Study
Azua					
Azua de Compostela	72,642	120,066	69		
Guayabal	8,973	14,831	55		1
Las Charcas	9,534	15,758	69		
Las Yayas de Biajama	11,472	18,961	47	1	
Padre Las Casas	25,881	42,777	50	1	2
Peralta	12,847	21,234	59		1
Sabana Yegua	10,732	17,738	62	1	
Tabara Arriba	14,621	24,166	76		
Estebania	5,958	9,848	75		
Pueblo Viejo	21,549	35,617	67		
(Sub-total)	194,209	320,996	64	3	4
Barahona					
Santa Cruz de Barahona	66,145	82,387	81		
Vicente Noble	17,937	24,687	47	1	1
Cabral	12,576	17,309	80		
El Penon	7,639	10,514	84		
Fundacion	7,242	10,514	86		
(Sub-total)	111,539	145,411	76	1	1
Bahoruco					
Neyba	19,132	58,225	64	1	1
Galvan	13,834	21,050	34		1
Tamayo	18,912	28,777	64		
Uvilla	14,613	22,235	57		1
(Sub-total)	66,491	130,287	58	1	3
San Juan					
San Juan De La Maguana	129,167	145,430	59	4	
Bohechio	9,417	10,598	38		1
Juan De Herrera	16,825	18,943	42		1
Vallejuelo	14,091	15,865	52	1	
(Sub-total)	169,500	190,836	55	5	2
Total	541,739	787,530		10	10

Cuadro 4.6.2 Proyecto Identificados de Hidroelectricas

Project	River or Canal	Present Status	Potential Installed Capacity (MW)	Averge Power Generation (GWh/year)	Source	Remarks
Dam projects						
Hondo Valle	San Juan	F/S	13.5	48.0	NORPLAN, 1991	Hondo valle projects
La Higuera	San Juan	F/S	15.0 *1	54.7	NORPLAN, 1991	was given first priority
Los Jaiminez	San Juan	F/S	6.4 *1	23.8	NORPLAN, 1991	in this report
San Pedro-Avispas	San Pedro	Pre F/S	9.3	55.9	NORPLAN, 1990	
Los Guanos	Arroyo Limon	Pre F/S	10.2	34.5	NORPLAN, 1990	
Palomino	Del Midio	Pre F/S	98.8	242.5	SWECO, 1989	(Phase I)
Boca de los Rios	Yaque del Sur	Identification	20.5 *2	79.8 *2	NORPLAN, 1984	(not feasible)
El Picacho	Yaque del Sur	Identification	21.2 *2	46.4 *2	NORPLAN, 1984	(not feasible)
El Mogote	Del Midio river	Pre F/S	13.0 *2	36.4 *2	NORPLAN, 1984	
El Yayal	Mijo	F/S	2.0	24.1	INITEC, 1985	
Los Rulos	Arroyo Grande	F/S	0.9	9.0	INITEC, 1985	
Los Argüeyes	Del Medio	Identification	33.4	86.0	PNORHI,1995	
Las Piedra Colorada	Las Cuevas	Identification	15.2	24.5	PNORHI,1995	
El Cigual	Las Cuevas	Identification	20.7	43.6	PNORHI,1995	
La Marcelino	Las Cuevas	Identification	21.4	59.6	PNORHI,1995	
Los Guayuyos	A Limón	Identification	5.5	9.3	PNORHI,1995	
La Angostura	Arroyo Grande	Identification	28.5	66.2	PNORHI,1995	
El Pino	Mijo	Identification	13.0	24.2	PNORHI,1995	
Loma	La Maguana	Identification	3.7	4.1	PNORHI,1995	
Fondo Negro	Mijo	Identification	32.3	62.0	PNORHI,1995	
Mini-hydropower projects						
José Joaquín Puello	J.J.P canal	Preliminary Design	3.6	28.2 *2	INDRHI, 1995	
Santana	Santana canal	Preliminary Design	1.0	7.4	PNORHI, 1993	
Los Toros	Ysura canal	Under implementatio	9.6	57.3	INDRHI, 1997	
Magueyas	-	Identification	16.0	109.0	PNORHI,1995	
Los Bancos	Ysura canal	Identification	8.0	70.0	PNORHI,1995	
Magueyal	Ysura canal	Identification	2.6 *3	22.0 *3	PNORHI,1995	under reformulation

Note; *1; Pre F/S by NORPLAN, 1984
*2; INDRHI
*3; JICA study team

Cuadro 4.6.3 Estudio de Comparacion Preliminar de los Esquemas de Mini-hidroelectricas

		Santana		J. J. Puello		Magueyal
		Original Plan	Present Study	Original Plan	Present Study	
Designed Discharge for Generator	(m3/sec)	18	11	8.4	6.5	8
Effective Head	(m)	6	6	58	58	40
Generated Output (Installtion capacity	(kW)	940	574	3,900	3,000	2,600
Annual Possible Power Generation	(GWh)	6.9	4.1	28	21	22
Direct Construction Cost	(million RD$)	18.5 (in 1989)		118.8 (in 1994)		
Direct Construction Cost	(million RD$)	68.45 (present value)	40.33	237.6 (present value)	190	156 (JICA Study)
Cost per power (50 years)	(RD$/kWh)	0.26	0.27	0.23	0.24	0.19

Cuadro 4.7.1 Demanda de Agua para Riego

Unit : MCM

Irrigation Zone & System	Nov.	Dec.	Jan.	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
San Juan Zone													
J.J.Puello	4.37	11.87	19.01	10.18	2.80	2.43	7.06	13.75	11.72	10.24	6.16	4.06	103.67
San Juan	3.02	10.68	18.56	10.53	3.14	1.54	6.80	13.84	13.53	11.33	7.77	4.63	105.38
Hato del Padre	0.59	2.36	4.35	2.52	0.94	0.62	2.26	4.22	3.91	3.53	2.58	1.47	29.36
Guanito S. Juan	0.44	1.76	3.19	1.63	0.23	2.03	3.07	4.72	3.90	2.72	1.29	0.47	25.44
Other small system*	0.72	2.83	5.20	2.90	0.86	0.55	2.75	5.24	4.95	4.36	3.13	1.79	35.28
Mijo	2.68	3.51	5.20	3.07	1.29	1.09	3.19	5.80	7.17	5.55	4.20	3.08	45.86
Vallejuelo	0.90	0.96	0.40	0.14	0.17	0.26	0.24	0.51	0.48	0.28	0.11	0.08	4.54
Total	11.83	33.01	55.52	30.81	9.27	8.27	25.12	47.57	45.18	37.74	25.14	15.51	349.98
Azua Zone													
Area from YSURA H.R	1.46	2.16	2.69	2.25	1.81	1.65	1.33	1.83	2.60	1.91	1.32	0.85	21.88
Amiama Gomez & Biafara	2.80	3.38	3.59	3.84	4.28	3.95	3.01	3.82	5.06	3.72	2.49	1.61	41.54
YSURA include extension	13.04	19.43	20.39	19.29	17.33	17.80	14.52	17.73	19.26	13.51	8.78	5.59	185.68
Total	17.29	24.96	26.67	25.38	23.41	23.40	18.87	23.37	26.92	19.17	12.59	8.06	250.10
Barahona-Neiba Zone													
Area A1 (Azua Zone)	4.13	5.94	7.26	7.28	6.72	4.84	3.77	5.17	7.68	5.86	3.92	2.46	65.02
Area B1	5.61	6.18	7.03	7.02	8.45	7.90	6.55	7.11	9.72	7.80	6.31	5.28	84.96
Aguacatico	1.52	1.65	1.87	1.84	2.21	2.10	1.76	1.91	2.52	1.99	1.66	1.41	22.47
Area B2	23.10	26.74	28.62	22.33	20.77	20.06	20.67	25.53	35.88	31.51	29.74	21.97	306.93
Area B3	5.76	6.35	7.22	7.19	8.63	8.08	6.70	7.24	9.86	7.93	6.47	5.43	86.86
Area B4	0.74	0.82	0.93	0.93	1.12	1.04	0.87	0.94	1.29	1.03	0.84	0.71	11.26
Area B5	3.33	3.65	4.11	4.05	4.82	4.46	3.66	3.98	5.47	4.46	3.70	3.16	48.85
Area B6	5.80	6.28	6.98	6.83	8.15	7.56	6.20	6.78	9.36	7.71	6.49	5.58	83.74
Total	49.99	57.61	64.03	57.47	60.87	56.05	50.19	58.65	81.78	68.29	59.12	46.03	710.09
Total	79.11	115.59	146.22	113.67	93.56	87.72	94.18	129.59	153.88	125.21	96.85	69.59	1305.17

*: served by the San Juan river

Area from YSURA H.R : a group of small areas directly derived water from YSURA Head Race by private pipes.

Area A1 : irrigation area in the reaches from Villar Pando to Los Guiros up

Area B1 : irrigation area in the reaches from Los Guiros to Santana upstream

Area B2 : Santana irrigation area

Area B3 : irrigation area in the reaches from Santana downstream to Tomate-Mena upstream

Area B4 : irrigation area in the Tomate-Mena system

Area B5 : irrigation area in the reaches from Tomate-Mena downstream to Palo Alto upstream

Area B6 : irrigation area in the reaches from Palo Alto

Cuadro 4.7.2 Simulacion de Balance de Agua por Bloque de Riego (Bloque de San Juan)

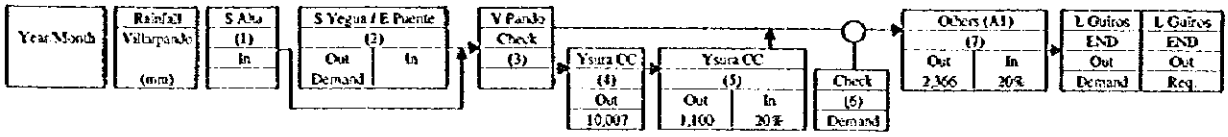
Proposed condition (with project)

Year M.a.S	Rainfall San Juan	Subcuenca (1) Out Demand	El Pedio (2) Out(ha) 10,510	El Pedio (2) In/Res 12%	Canal San Juan (3) Out(ha) 4,000	Canal San Juan (3) In/Res 30%	Res. 12%	San Juan (4) Out(ha) 5,536	San Juan (4) In 30%	Rato del Padre (5) Out(ha) 2,269	Rato del Padre (5) In 30%	Los Sara (6) River Q Actual	Los Sara (6) Out(ha) 495	Los Sara (6) In/Res 30%	Mijo (7) River Q Actual	Mijo (7) Out(ha) 2,390	Mijo (7) In/Res 30%	Check	Others (8) Out(ha) 1,143	Others (8) In/Res 30%	S_Alto END Out Estimated	S_Alto END Out Actual
(unit)	(mm)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)
1981	1269.8	187.2	103.7	24.8	25.4	56.2	62.9	104.2	31.3	29.3	8.8	28.1	4.5	25.0	214.7	45.8	182.7	529.3	35.2	504.6	504.5	758.8
1982	733.8	264.7	103.7	30.6	25.4	52.8	32.6	104.2	31.3	29.3	8.8	18.4	4.5	15.3	150.9	45.8	128.8	329.9	35.2	305.3	305.3	467.4
1983	1010.8	198.9	103.7	62.7	25.4	44.9	43.6	104.2	31.3	29.3	8.8	31.0	4.5	7.8	108.7	45.8	76.7	319.9	35.2	295.2	295.2	294.2
1984	903.8	196.0	103.7	67.8	25.4	50.0	42.6	104.2	31.3	29.3	8.8	14.3	4.4	11.2	110.3	45.6	86.4	328.3	35.2	303.6	303.6	-
1985	768.5	210.9	103.7	52.9	25.4	35.1	27.7	104.2	31.3	29.3	8.8	13.5	4.5	10.3	125.9	45.7	93.9	268.3	35.2	243.7	243.7	-
1986	883.9	202.5	103.7	59.8	25.4	41.2	40.4	104.2	31.3	29.3	8.8	17.3	4.5	14.1	112.7	45.8	83.5	315.7	35.2	291.1	291.1	385.9
1987	1123.7	184.0	103.7	82.8	25.4	65.8	56.9	104.2	31.3	29.3	8.8	11.7	4.5	8.6	138.8	44.9	107.3	410.7	35.2	386.0	386.9	384.5
1988	1015.9	193.8	103.7	72.5	25.4	54.8	45.4	104.2	31.3	29.3	8.8	14.6	4.5	11.5	133.3	45.8	105.3	356.2	35.2	321.6	321.6	497.4
1989	1030.2	190.7	103.7	75.5	25.4	57.7	49.6	104.2	31.3	29.3	8.8	17.1	4.5	13.9	159.9	45.8	127.0	404.0	35.2	379.3	379.3	463.2
1990	905.0	201.8	103.7	67.8	25.4	49.4	42.4	104.2	31.3	29.3	8.8	24.9	4.4	21.8	112.4	45.8	80.3	331.9	35.2	307.2	307.2	410.3
1991	512.3	219.1	103.7	49.8	25.4	32.0	38.5	104.2	31.3	29.3	8.8	10.0	4.1	7.1	126.0	45.8	95.9	224.1	35.2	199.5	199.5	240.2
1992	1267.9	191.1	103.7	72.3	25.4	54.3	59.8	104.2	31.3	29.3	8.8	5.8	2.3	3.4	133.4	44.2	102.5	413.5	35.1	388.9	388.9	625.3
1993	968.5	193.9	103.7	79.7	25.4	62.0	45.7	104.2	31.3	29.3	8.8	21.8	4.5	18.7	138.2	45.8	106.1	369.8	35.2	344.7	344.7	-
1994	654.6	211.5	103.7	51.4	25.4	33.6	25.8	104.2	31.3	29.3	8.8	28.6	4.5	25.4	119.4	45.5	85.1	266.9	35.2	242.3	242.3	-
Mean	934.1	199.0	103.7	67.0	25.4	49.2	42.4	104.2	31.3	29.3	8.8	16.9	4.3	13.9	133.9	45.6	104.0	347.7	35.2	323.1	323.1	-

Note: MCM: Million cubic meter
Out: Water extraction from the source (irrigation area in hectare in the above)
In: Return flow to the source (return flow rate in percent in the above)
In/Res: Return flow, inflow from the residual catchment and the remaining flow to the downstream
Actual: Actual discharge in the records
Estimated: Estimated discharge by the simulation

Cuadro 4.7.3 Simulacion de Balance de Agua por Bloque de Riego (Bloque de Azua)

Proposed condition (with project)

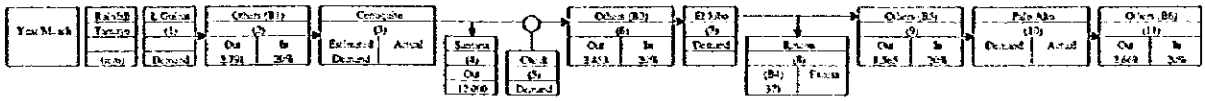


	(unit)	(mm)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)
1981		584.3	504.6	283.6		721.7	250.6	21.9	4.4	471.2	65.2	13.0	428.8	441.8
1982		415.2	305.3	506.5		897.7	250.6	21.9	4.4	557.1	65.2	13.0	514.1	527.1
1983		665.6	295.2	569.2		848.8	250.6	21.9	4.4	598.2	65.2	13.0	560.0	573.0
1984		409.1	303.6	552.3		853.7	250.6	21.9	4.4	603.2	65.2	13.0	563.7	576.7
1985		444.6	243.7	576.0		805.6	250.6	21.9	4.4	555.1	65.2	13.0	512.4	525.4
1986		475.2	291.1	443.4		722.6	250.6	21.9	4.4	472.0	65.2	13.0	430.1	443.1
1987		584.4	356.0	443.7		815.4	250.6	21.9	4.4	564.9	65.2	13.0	523.9	536.9
1988		551.2	331.6	479.5		793.8	250.6	21.9	4.4	543.3	65.2	13.0	504.1	517.1
1989		746.5	379.3	493.1		837.3	250.6	21.9	4.4	586.7	65.2	13.0	550.5	563.5
1990		514.9	307.2	549.0		821.1	250.6	21.9	4.4	570.6	65.2	13.0	535.0	548.0
1991		447.1	199.5	641.2		840.7	250.6	21.9	4.4	590.1	65.2	13.0	558.5	571.5
1992		313.1	388.9	480.1		835.8	250.6	21.9	4.4	585.2	65.2	13.0	548.2	561.3
1993		617.3	344.7	458.7		791.6	250.6	21.9	4.4	541.0	65.2	13.0	502.9	515.9
1994		670.6	242.3	540.3		778.0	250.6	21.9	4.4	527.5	65.2	13.0	491.1	504.1
Mean		531.4	323.1	501.9	-	805.3	250.6	21.9	4.4	554.7	65.2	13.0	515.9	529.0

Note: MCM; Million cubic meter
Out; Water extraction from the source (irrigation area in hectare in the above)
In; Return flow to the source (return flow rate in percent in the above)
In/Res.; Return flow, inflow from the residual catchment and the remaining flow to the downstream
Actual; Actual discharge in the records
Estimated; Estimated discharge by the simulation

Cuadro 4.7.4 Simulacion de Balance de Agua por Bloque de Riego (Bloque de Barahona)

Proposed condition (with project)



	(unit)	(mm)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)
1951		481.7	441.8	107.5	21.5	334.0	-	306.7	183.5	86.9	17.4	96.6	11.3	-	48.9	9.8	53.9	924.4	83.8	16.8
1952		234.5	527.6	107.5	21.5	419.7	-	306.7	233.6	86.9	17.4	126.3	11.3	-	48.9	9.8	64.0	381.8	83.8	16.8
1953		341.8	573.0	107.5	21.5	465.6	-	306.7	198.1	86.9	17.4	111.2	11.3	-	48.9	9.8	68.5	-	83.8	16.8
1954		248.7	576.7	107.5	21.5	469.2	583.6	306.7	199.1	86.9	17.4	112.2	11.3	-	48.9	9.8	69.4	181.7	83.8	16.8
1955		655.3	525.4	107.5	21.5	419.0	412.8	306.7	195.6	86.9	17.4	108.7	11.3	-	48.9	9.8	66.0	218.1	83.8	16.8
1956		348.8	443.1	107.5	21.5	335.7	-	306.7	189.5	86.9	17.4	102.6	11.3	-	48.9	9.8	59.8	422.0	83.8	16.8
1957		476.9	536.9	107.5	21.5	429.5	513.6	306.7	195.6	86.9	17.4	108.7	11.3	-	48.9	9.8	65.9	-	83.8	16.8
1958		258.4	517.6	107.5	21.5	479.7	867.4	306.7	194.5	86.9	17.4	107.6	11.3	-	48.9	9.8	64.8	-	83.8	16.8
1959		303.6	563.5	107.5	21.5	456.1	-	306.7	197.6	86.9	17.4	110.7	11.3	-	48.9	9.8	67.9	-	83.8	16.8
1960		354.1	548.0	107.5	21.5	440.6	-	306.7	196.5	86.9	17.4	109.7	11.3	-	48.9	9.8	66.9	-	83.8	16.8
1961		187.8	571.5	107.5	21.5	454.1	666.9	306.7	199.1	86.9	17.4	112.2	11.3	-	48.9	9.8	69.4	-	83.8	16.8
1962		497.2	561.3	107.5	21.5	453.8	-	306.7	198.1	86.9	17.4	110.2	11.3	-	48.9	9.8	67.5	-	83.8	16.8
1963		449.6	545.9	107.5	21.5	438.5	-	306.7	194.3	86.9	17.4	107.5	11.3	-	48.9	9.8	64.7	-	83.8	16.8
1964		557.4	504.4	107.5	21.5	396.9	-	306.7	193.8	86.9	17.4	106.9	11.3	-	48.9	9.8	64.2	-	83.8	16.8
Mean		385.6	529.0	107.5	21.5	421.5	-	306.7	194.8	86.9	17.4	108.0	11.3	-	48.9	9.8	65.2	-	83.8	16.8

Note: MCM: Million cubic meter
Out: Water extraction from the source (irrigation area in hectare in the above)
In: Return flow to the source (return flow rate in percent in the above)
Ex/Res: Return flow, inflow from the residual catchment and the remaining flow to the downstream
Actual: Actual discharge in the records
Estimated: Estimated discharge by the simulation

Cuadro 4.7.5 Areas de Riego en el Bloquede San Juan (1/2)

(1) J.J. Puello (SAN JUAN) Irrigation area = 10,986 ha unit:ha

Irrigable area / Crop	Present (Statistics)		Present (Irrigable)		Future (Irrigable)		Increase	
	1st	2nd	1st	2nd	1st	2nd	1st	2nd
Beans	3,650	0	3,650	0	4,738	0	1,088	0
Rice	0	1,681	0	1,681	0	1,681	0	0
Sweet Potato 1	190	0	190	0	247	0	57	0
Sweet Potato 2	0	450	0	450	0	1,699	0	1,249
Corn/Sorghum	0	260	0	260	0	982	0	722
Plantain	35	35	35	35	45	45	10	10
Banana	120	120	120	120	120	120		
Papaya	100	100	100	100	130	130		
Others	469	770	469	770	608	1,000	139	230
Total	4,564	3,416	4,564	3,416	5,888	5,657	1,324	2,241

(2) San Juan (SAN JUAN) Irrigation area = 5,526 ha (present) + 3,000 ha unit:ha

Irrigable area / Crop	Present (Statistics)		Present (Irrigable)		Future (Irrigable)		Increase	
	1st	2nd	1st	2nd	1st	2nd	1st	2nd
Beans	2,200	0	2,200	0	4,870	0	2,670	0
Rice 1	0	2,215	0	2,215	0	2,215	0	0
Rice 2	90	0	90	0	90	0	0	0
Sweet Potato 1	180	0	180	0	398	0	218	0
Sweet Potato 2	0	437	0	437	0	967	0	530
Corn/Sorghum	0	820	0	820	0	1,815	0	995
Plantain	134	134	134	134	297	297	163	163
Others	257	285	257	285	288	320	31	35
Total	2,861	3,891	2,861	3,891	5,943	5,614	3,082	1,723

(3) Hato del Padre (SAN JUAN) Irrigation area = 2,056 ha unit:ha

Irrigable area / Crop	Present (Statistics)		Present (Irrigable)		Future (Irrigable)		Increase	
	1st	2nd	1st	2nd	1st	2nd	1st	2nd
Beans	866	0	866	0	1,095	0	229	0
Rice 1	0	772	0	772	0	772	0	0
Rice 2	62	0	62	0	62	0	0	0
Sweet Potato 1	90	0	90	0	114	0	24	0
Sweet Potato 2	0	246	0	246	0	311	0	65
Corn/Sorghum	0	55	0	55	0	70	0	15
Plantain	10	10	10	10	13	13	3	3
Banana	5	5	5	5	5	5		
Others	55	61	55	61	70	78	15	17
Total	1,088	1,149	1,088	1,149	1,359	1,249	271	100

Cuadro 4.7.5 Areas de Riego en el Bloquede San Juan (2/2)

(4) Guanito San Juan (SAN JUAN) Irrigation area = 1,000 ha unit:ha

Crop \ Irrigable area	Present (Statistics)		Present (Irrigable)		Future (Irrigable)		Increase	
	1st	2nd	1st	2nd	1st	2nd	1st	2nd
Beans	370	0	370	0	935	0	565	0
Rice 1	0	736	0	736	0	736	0	0
Rice 2	14	0	14	0	14	0	0	0
Sweet Potato	14	20	14	20	35	49	21	29
Corn/Sorghum	0	5	0	5	0	196	0	191
Others	8	11	8	11	21	27	13	16
Total	406	772	406	772	1,005	1,008	599	236

(5) Mijo (SAN JUAN) Irrigation area = 2,390 ha unit:ha

Crop \ Irrigable area	Present (Statistics)		Present (Irrigable)		Future (Irrigable)		Increase	
	1st	2nd	1st	2nd	1st	2nd	1st	2nd
Beans	843	0	684	0	1,182	0	498	0
Rice	0	1,250	0	1,014	0	1,250	0	236
Sweet Potato 1	70		57	0	98	0	41	0
Sweet Potato 2	0	130	0	105	0	182	0	77
Corn/Sorghum	0	200	0	162	0	281	0	119
Banana	30	30	24	24	30	30		
Papaya	15	15	12	12	21	21	9	9
Others	276	316	224	256	388	443	164	187
Total	1,234	1,941	1,001	1,573	1,719	2,207	718	634

(6) Vallejuelo (SAN JUAN) Irrigation area = 495 ha unit:ha

Crop \ Irrigable area	Present (Statistics)		Present (Irrigable)		Future (Irrigable)		Increase	
	1st	2nd	1st	2nd	1st	2nd	1st	2nd
Beans	195	0	195	0	361	0	166	0
Corn 1	0	75	0	75	0	139	0	64
Corn 2	75	0	75	0	139	0	64	0
Onion 1	0	50	0	50	0	93	0	43
Onion 2	50	0	50	0	93	0	43	0
Pigeon Pea 1	0	25	0	25	0	46	0	21
Pigeon Pea 2	0	25	0	25	0	46	0	21
Sweet Potato	0	15	0	15	0	28	0	13
Cassava	0	10	0	10	0	19	0	9
Total	320	200	320	200	593	371	273	171

(7) Others (SAN JUAN) Irrigation area = 1,848 ha unit:ha

Crop \ Irrigable area	Present (Statistics)		Present (Irrigable)		Future (Irrigable)		Increase	
	1st	2nd	1st	2nd	1st	2nd	1st	2nd
Beans	925	0	925	0	1,378		453	0
Rice 1	0	1,108	0	1,108		1,108	0	0
Rice2	45	0	45	0	45		0	0
Sweet Potato 1	75	0	75	0	112		37	0
Sweet Potato 2	0	170	0	170		253	0	83
Corn&Sorghum	0	260	0	260		387	0	127
Plantain	35	35	35	35	52	52	17	17
Banana	9	9	9	9	9	9	0	0
Others	31	54	31	54	46	80	15	26
Sub-total	1,120	1,636	1,120	1,636	1,642	1,889	522	253

	11,593	13,005	11,360	12,637	18,149	17,995	6,789	5,358
		24,598		23,997		36,144		12,147

Cuadro 4.7.6 Areas de Riego en el Bloque de Azua (1/2)

(1) Ysura Head Race (AZUA) Irrigation area = 1,100 ha unit : ha

Crop \ Irrigable area	Present (Statistics)		Present (Irrigable)		Future (Irrigable)		Increase	
	1st	2nd	1st	2nd	1st	2nd	1st	2nd
Plantain	310	310	310	310	470	470	160	160
Banana	43	43	43	43	43	43	0	0
Papaya	24	24	24	24	37	37	13	13
Corn&Sorghum	0	145	0	145	0	220	0	75
Cassava	0	60	0	60	0	92	0	32
Pigeon Pea	0	26	0	26	0	78	0	52
Sweet Potato	14	0	14	0	21	0	7	0
Beans	279	0	279	0	423	0	144	0
Tobacco	12	0	12	0	18	0	6	0
Others	0	6	0	6	0	9	0	3
Total	682	614	682	614	1,012	949	330	335

(2) A1 (Yaque del Sur, AZUA) Irrigation area = 2,366 ha unit : ha

Crop \ Irrigable area	Present (Statistics)		Present (Irrigable)		Future (Irrigable)		Increase	
	1st	2nd	1st	2nd	1st	2nd	1st	2nd
Plantain	600	600	455	455	847	847	392	392
Banana	160	160	121	121	160	160	39	39
Papaya	52	52	39	39	73	73	34	34
Corn/Sorghum	0	312	0	236	0	440	0	204
Cassava	0	130	0	98	0	183	0	85
Pigeon Pea	0	55	0	42	0	78	0	36
Sweet Potato	30	0	23	0	42	0	19	0
Beans	600	0	455	0	847	0	392	0
Tobacco	25	0	19	0	35	0	16	0
Rice	0	5	0	4	0	7	0	3
Others	0.2	8.1	0.2	6.2	0.3	11.5	0	5
Total	1,467	1,322	1,112	1,001	2,004	1,800	537	477

(3) Azua + Extension (AZUA) Irrigation area = 8,870 ha unit : ha

Crop \ Irrigable area	Present (Statistics)		Present (Irrigable)		Future (Irrigable)		Increase	
	1st	2nd	1st	2nd	1st	2nd	1st	2nd
Plantain	2,893	2,893	2,893	2,893	3,407	3,407	514	514
Banana	543	543	543	543	543	543	0	0
Papaya	51	51	51	51	60	60	9	9
Tomato	2,958	0	2,958	0	3,482	0	524	0
Corn/Sorghum	1,268	0	1,268	0	1,492	0	224	0
Rice	0	45	0	45	0	45	0	0
Others	576	932	576	932	678	1,098	102	166
Total	8,289	4,464	8,289	4,464	9,662	5,153	1,373	689

Cuadro 4.7.6 Areas de Riego en el Bloque de Azua (2/2)

(4) Extension (AZUA) — Irrigation area = 1,138 ha — unit : ha

Crop \ Irrigable area	Present (Statistics)		Present (Irrigable)		Future (Irrigable)		Increase	
	1st	2nd	1st	2nd	1st	2nd	1st	2nd
Plantain	200	200	200	200	236	236	36	36
Banana	40	40	40	40	40	40	0	0
Papaya	5	5	5	5	6	6	1	1
Tomato	208	0	208	0	244	0	36	0
Corn/Sorghum	68	0	68	0	79	0	11	0
Rice	0	45	0	45	0	45	0	0
Others	93	119	93	119	109	141	16	22
Total	614	409	614	409	714	468	100	59

(5) Andama Gomes, Biafara (AZUA) — Irrigation area = 2,160 ha — unit : ha

Crop \ Irrigable area	Present (Statistics)		Present (Irrigable)		Future (Irrigable)		Increase	
	1st	2nd	1st	2nd	1st	2nd	1st	2nd
Plantain/Bnana	0	0	0	0	1,080	1,080	1,080	1,080
Papaya	0	0	0	0	42	42	42	42
Corn/Sorghum	0	0	0	0	0	215	0	215
Cassava	0	0	0	0	0	65	0	65
Pigeon Pea	0	0	0	0	0	86	0	86
Sweet Potato 1	0	0	0	0	65	0	65	0
Sweet Potato 2	0	0	0	0	0	65	0	65
Tomato	0	0	0	0	45	0	45	0
Tobaco	0	0	0	0	68	0	68	0
Vegetables	0	0	0	0	215	215	215	215
Total	0	0	0	0	1,515	1,768	1,515	1,768

Cuadro 4.7.7 Areas de Riego en el Bloque de Barahona (1/2)

(1) Aguacatico (BARAHONA) — Irrigation area = 750 ha — unit : ha

Irrigable area / Crop	Present 0 ha 1st	Present 0 ha 2nd	Modified 0 ha 1st	Modified 0 ha 2nd	Future 750 ha 1st	Future 750 ha 2nd	Increase 1st	Increase 2nd
Plantain/Banana	0	0	0	0	443	443	443	443
Fruit trees	0	0	0	0	225	225	225	225
Corn/Sorghum 1	0	0	0	0	0	18	0	18
Corn/Sorghum 2	0	0	0	0	18	0	18	0
Pigeon Pea	0	0	0	0	0	88	0	88
Melon	0	0	0	0	12	0	12	0
Tomato	0	0	0	0	18	0	18	0
Vegetables	0	0	0	0	24	18	24	18
Total	0	0	0	0	740	792	740	792

(2) Los Guiros - Santana HW (B1, BARAHONA) — Irrigation area = 2,791 ha — unit : ha

Irrigable area / Crop	Present (Statistics) 1st	Present (Statistics) 2nd	Present (Irrigable) 1st	Present (Irrigable) 2nd	Future (Irrigable) 1st	Future (Irrigable) 2nd	Increase 1st	Increase 2nd
Plantain	1,890	1,890	1,436	1,436	2,080	2,080	644	644
Banana	470	470	357	357	470	470		
Coconut	80	80	61	61	88	88	27	27
Corn/Sorghum	0	40	0	30	0	44	0	14
Rice	0	10	0	8	0	10	0	2
Beans	20	0	15	0	22	0	7	0
Others	60	85	46	64	66	93	20	29
Total	2,520	2,575	1,915	1,956	2,726	2,785	811	829

(3) Santana Area (B2, BARAHONA) — Irrigation area = 12,000 ha — unit : ha

Irrigable area / Crop	Present (Statistics) 1st	Present (Statistics) 2nd	Present (Irrigable) 1st	Present (Irrigable) 2nd	Future (Irrigable) 1st	Future (Irrigable) 2nd	Increase 1st	Increase 2nd
Sugarcane	7,660	7,660	5,813	5,813	3,240	3,240	-2,573	-2,573
Plantain	85	85	64	64	2,786	2,786	2,722	2,722
Banana	21	21	21	21	21	21	0	0
Rice	0	13	0	10	0	13	0	3
Beans	30	0	23	0	983	0	960	0
Corn/Sorghum	0	80	0	61	0	2,622	0	2,561
Others	81	122	61	93	2,655	3,999	2,594	3,906
Total	7,877	7,931	5,982	6,062	9,685	12,681	3,703	6,619

(4) Santana HW - Tomate (B3, BARAHONA) — Irrigation area = 2,853 ha — unit : ha

Irrigable area / Crop	Present (Statistics) 1st	Present (Statistics) 2nd	Present (Irrigable) 1st	Present (Irrigable) 2nd	Future (Irrigable) 1st	Future (Irrigable) 2nd	Increase 1st	Increase 2nd
Plantain	1,840	1,840	1,398	1,398	2,131	2,131	733	733
Banana	464	464	353	353	464	464		
Coconut	85	85	65	65	98	98	33	33
Corn/Sorghum	0	30	0	23	0	35	0	12
Rice	0	10	0	8	0	10	0	2
Beans	25	0	19	0	29	0	10	0
Others	66	94	50	71	76	108	26	37
Total	2,480	2,523	1,885	1,918	2,798	2,846	913	928

Cuadro 4.7.7 Areas de Riego en el Bloque de Barahona (2/2)

(5) Tomate - Mena (B4, BARAHONA) Irrigation area = 371 ha unit : ha

Crop \ Irrigable area	Present (Statistics)		Present (Irrigable)		Future (Irrigable)		Increase	
	1st	2nd	1st	2nd	1st	2nd	1st	2nd
Plantain	250	250	190	190	266	266	76	76
Banana	60	60	46	46	60	60	14	14
Coconut	20	20	15	15	21	21	6	6
Corn/Sorghum	0	4	0	3	0	4	0	1
Rice	0	2	0	2	0	2	0	0
Beans	2	0	2	0	2	0	0	0
Others	10	15	8	11	11	16	3	5
Total	342	351	261	267	360	369	99	102

(6) Tomate - Palo Alto (B5a, BARAHONA) Irrigation area = 1,565 ha unit : ha

Crop \ Irrigable area	Present (Statistics)		Present (Irrigable)		Future (Irrigable)		Increase	
	1st	2nd	1st	2nd	1st	2nd	1st	2nd
Sugarcane	580	580	441	441	200	200	-241	-241
Plantain	415	415	315	315	1,139	1,139	824	824
Banana	105	105	80	80	105	105	25	25
Coconut	20	20	15	15	55	55	40	40
Corn/Sorghum	0	4	0	3	0	11	0	8
Rice	0	6	0	5	0	6	0	1
Beans	5	0	4	0	14	0	10	0
Others	16	17	12	13	44	46	32	33
Total	1,141	1,147	867	872	1,557	1,562	690	690

(7) Palo Alto - Carribean Sea (B6, BARAHONA) Irrigation area = 2,669 ha unit : ha

Crop \ Irrigable area	Present (Statistics)		Present (Irrigable)		Future (Irrigable)		Increase	
	1st	2nd	1st	2nd	1st	2nd	1st	2nd
Sugarcane	560	560	426	426	560	560	134	134
Plantain	1,260	1,260	958	958	1,597	1,597	639	639
Banana	320	320	243	243	320	320	77	77
Coconut	60	60	46	46	76	76	30	30
Corn/Sorghum	0	20	0	15	0	25	0	10
Rice	0	5	0	4	0	5	0	1
Beans	10	0	7	0	13	0	6	0
Others	43	64	32	49	54	81	22	32
Total	2,253	2,289	1,712	1,741	2,620	2,661	908	923

Cuadro 4.8.1 Costos Preliminares del Proyecto de Desarrollo de los Recursos de Agua y los Estudios

Name of Projects	Specifications (Estimated or assumed)	Cost in '000 US$
1 Jose Joaquin Puello Dam development Project		
1 Preparatory works		460
2 Embankment (Rock-fill type)	Volume =668,400 m^3	7,352
3 Spillway and other concrete works	Design Q = 200 m^3/sec	380
4 Other civil works		1,470
5 Miscellaneous		97
Total		9,759
2 Sabana Yegua Dam Rehabilitation Project		
1 Civil works		21,200
2 Miscellaneous		5,300
Total		26,500
3 Justification Study on Water Resources Development Project		
1 Foreign Consultants	2 x 12 men months	430
2 Local Consultants	5 x 12 men months	214
3 Survey / Investigations	geological boring, topo survey, etc.	70
4 Miscellaneous		71
Total		785
4 Rincon Lagoon Aquasphere Resources Study		
1 Foreign Consultants	1 x 12 men months	215
2 Local Consultants	2 x 12 men months	85
3 Survey / Investigations	environmental survey, bathymetric survey, etc.	70
5 Miscellaneous		37
Total		407

Cuadro 4.10.1 Condiciones del Area y Caracteristicas del Proyecto (1/3)

Project Title	Condition of Project Area	Project Features
1) YSURA Extension Area Development Project	The project area is the extension area of YSURA canal. The area is utilized for agricultural purpose. Wet paddy fields and the farms planted by plantain, corn and sorghum are distributed.	The YSURA main canal is improved with full lining of concrete. Lateral canals and distribution canal networks are largely constructed or partly improved with the provision of night storage ponds commanding an irrigation area of 400 ha to 800 ha. Drainage canals are also constructed. For O&M, a water users' organization will be set up under the YSURA Irrigation Committee.
2) Night Storage Pond Project, 3) Guanito San Juan Irrigation System Improvement project, 4) YSURA Area Irrigation Improvement Project, 5) YSURA Headrace Small Irrigation System Improvement Project	Project areas are J.J.Puello, San Juan, Ganito San Juan and Mijo in San Juan Valley and YSURA irrigation system in Azua Valley Irrigation Zones. Agricultural farms are mainly distributed.	Provision of night storage ponds commanding an irrigation area of 400 ha to 800 ha. Enlargement of canals existing in the downstream of the proposed ponds, if the capacity is insufficient to convey water only during the daytime, corresponding to the water demands.
6) Yaque del Sur Small Gravity Irrigation System Improvement Project	The project areas are irrigation areas served by small gravity irrigation systems diverting water from the Yaque del Sur river and the YSURA head race. Most of small gravity irrigation systems have only a free intake at their heads and earthen canals. The area is occupied by agricultural lands mainly planted by plantain and corn.	Major works are the provision of a gated intake structure at the head of the irrigation systems and the improvement of the major irrigation canals. The implementation of the improvement works should be subject to O&M executed by beneficiaries themselves through the setting-up of water users organization and payment water fees.
7) Yaque del Sur Lower Reaches Irrigation and Drainage Project	Irrigation areas commanded by the Santana headworks and other systems located astride the Yaque del Sur River in the downstream of the Santana. Mainly plantain and sugar cane plantation are distributed in the project area.	Major works are the improvement of Santana headworks, unification of small irrigation systems, construction of main canals from the Santana and night storage ponds.
8) Sabana Yegua Dam Rehabilitation Project	Sabana Yegua dam is located on Yaque del Sur river.	Major works are reconstruction of the spillway with lower crest elevation to discharge larger volume than that of original design flood, and provision of flood alerting system.
9) Jose Joaquin Puello Dam Development Plan	The proposed site is located near the Jose Joaquin Puello irrigation canal. The area is occupied by bush. There is no communities, houses and farm land.	The proposed dam height is about 40 m and the reservoir area is about 100 ha large.
10) Galvan Groundwater Development Project, 11) Galvan Groundwater Irrigation Project	In the area, groundwater is comparatively abundant, and people use it mainly for domestic purpose. Agricultural farms planted plantain are distributed.	The total groundwater potential is estimated at 50 MCM which will be exploited by deep tubewells. Yield per tubewell is expected at 20 to 25 liter/sec. Irrigation area per tubewell is estimated at 25 to 30 ha. Proper distance between wells is considered to be 1 km.

Cuadro 4.10.1 Condiciones del Area y Caracteristicas del Proyecto (2/3)

Project Title	Condition of Project Area	Project Features
12) Azua Groundwater Development Project	The extension area of YSURA irrigation system located to the west of Azua city. A large agricultural farm is extended. Main products are tomato and plantain.	Groundwater will be exploited by deep tubewells. Yield per tubewell is expected at 20 to 25 liter/sec. Irrigation area per tubewell is estimated at 25 to 30 ha. The groundwater is to be used conjunctively with surface water to maintain the groundwater table properly.
13) Plan of Villarpando Water Management Center	The center will cover the entire basin of the Yaque del Sur river and Azua irrigation area. The Villarpando Headworks exist on Yaque del Sur River.	The water management center will control and operate Sabaneta dam, Sabana Yegua dam, Villarpando headworks to realize equal and efficient water distribution of the Yaque del Sur River. Replace existing gates with new ones in the Villarpando and newly provide a gated sluice at the left end of the existing overflow weir section so as to supply water to the Yaque del Sur lower reaches on the same condition as the intake to the YSURA canal in Villarpando.
14) Magueyal Mini-Hydropower Project	There are 3 project areas which are on the Jose Joaquin Puello canal, on the Santana canal, and on the YSURA headrace canal (Magueyal). Around the canal, bush is mainly distributed, and some agricultural farm exist near the YSURA canal.	Project consists of construction of 1) Inlet channel, 2) Inlet structure, 3) Pipeline, 4) Power house including electrical facilities, 4) Outlet structure and 5) connection to the existing transmission line. For J.J.Puello and Santana schemes, discharge of water for power generation is depending on the irrigation water in the canals, while the river water after power generation at Magueyal is to be returned to the Yaque del Sur river.
15) Rural Water Supply Plan	Project will cover all study area, especially near the villages.	Rural water supply project may include rehabilitation of the existing water supply facilities of INAPA and construction of new system in the isolated areas. Rehabilitation scheme consists of repair and replacement of pipeline and related facilities. Construction of new system consists of water supply networks, water resource development, surface water or groundwater, and water treatment facilities, if necessary.
16) Other Social Infrastructure Improvement Plan	Project will cover all study area, especially near the villages.	Project consists of construction of the social infrastructure such as community hall, etc. (project component has not been specified)
17) Rural Road Improvement Plan	Project will cover all study area, especially near the villages.	Rehabilitation of rural roads will consist of grading of road surface, additional embankment, simple pavement and repair / installation of small structures, such as culvert drain ditch, etc.
18) Plan for Agricultural Cooperatives, 19) Plan for Seed Multiplication	Project will cover the all study area.	Strengthen cooperatives and agricultural organizations as well as other rural organization such as youth and women. Increase managerial and technical capabilities for farmers. Make cooperatives sustainable financially and technically.
20) Plan for Credit Services	Project will cover all study area.	Develop a credit program by providing funding the rural poor through NGOs, farmers organization or government agencies.
21) Plan for Marketing Information System	Project will cover all study area.	Establishment of a market information system through farmers associations, NGOs and the extension agents. It will include computerized information and linkages to important market outlets. "Two-way street" information system to obtain feedback from producers and the market.
22) Plan for Strengthening CIAZA Research Center, 23) Plan for Strengthening Extension Services	CIAZA is located in Azua and an experimental farm is located in Barahona	Strengthen the capacity of CIAZA to do research. Include new equipment and strengthening the technical capacity of researchers. New management to include the active participation the private sector and farmers within the research process .

Cuadro 4.10.1 Condiciones del Area y Caracteristicas del Proyecto (3/3)

Project Title	Condition of Project Area	Project Features
24) Coffee Production Improvement Project	The project will benefit small and medium scale coffee farmers with farm size varying from 2 to 6 ha. There is an estimated total number of 1,400 beneficiary households, with a total population of about 8000 people to be directly beneficiaries of the project. Majority of coffee farmers in the project areas are very poor, and the only source of income is from agriculture. Within the project areas there are not industries other than agriculture production.	The project consists of the improvement of coffee production by replanting of old/deteriorated coffee areas that are located in lands suitable for coffee production, multiplication of coffee seedlings, introduction of high yielding coffee varieties, improvement of farming practice for coffee production, including fertilization, improvement of post-harvest processing, improvement of existing access roads, provision of drinking water supply for some rural communities.
25) Reforestation in the Upper Watershed Areas of Grande River	The area is along Arroyo Limon River, a tributary of Grande River and is around 24,000 ha. large. The grade of inclination is generally very high, which is 32 to 40 degree. Annual rainfall is 800 to 1000mm. Several communities (paraje) exist in the area. People practice shifting cultivation in the area.	The project include nursery construction, seedling production, improvement access road, tree planting, and monitoring. Totally 720 ha will be reforested in the project period of 5 years.
26) Wildlife Conservation in Rincon Lagoon	The Rincon Lagoon is covered by the national park of 47 km2. Several kind of valuable wildlife exist. Recently the fluctuation of water level and lack of water are considered to affect the wildlife existence.	Long term monitoring concerning wildlife is conducted in order to judge whether the water introduction to the lagoon is necessary or not.

Cuadro 4.10.2 Impactos Ambientales y Medidas Compensatorias(1/3)

Project Title	Environmental Impacts	Countermeasures	EIA is required or not?
1) YSURA Extension Area Development Project	Disturbance to the crop fields during the construction stage may occur. Infiltration of water from the canals and ponds may cause the groundwater rising and waterlogging, which may result in the soil salinization. Night storage ponds give the possibility of increase of mosquitoes and snails carrying malaria and schistosomiasis. The project affects the present condition of water rights. As the result of the project, the use of agrochemical and fertilizer will increase.	Careful planning and construction work so as not to disturb to the fields is necessary. The ponds and the canals should be provided with an impervious lining. The ponds have to be periodically kept empty to remove mosquitoes and snails. Importation of fishes as the natural enemies is also one of the countermeasures. Careful planing for the water right and agrochemical use is necessary.	No
2) Night Storage Pond Project, 3)Guanito San Juan Irrigation System Improvement project, 4) YSURA Area Irrigation Improvement Project, 5) YSURA Headrace Small Irrigation System Improvement Project	A little impacts of disturbance of farms in the construction stage is foreseen. Seepage losses from the night storage pond cause the groundwater-rising around the ponds, which often becomes a trigger of soil salinization. Night storage ponds give the possibility of increase of mosquitoes and snails carrying malaria and schistosomiasis. The project affects the present condition of water rights.	The ponds should be provided with an impervious lining inside the pond or a drainage canal surrounding the pond to avoid the groundwater-rising. The ponds have to be periodically kept empty to remove mosquitoes and snails. Importation of fishes as the natural enemies is also one of the countermeasures. Careful planing for the water right is necessary.	No
6) Yaque del Sur Small Gravity Irrigation System Improvement Project	A little impacts of disturbance of farms during the construction stage are foreseen. Some impacts for social and economic conditions of rural communities as the result of the creation of new water right and the user's fee.	Present beneficiaries have no water rights and do not pay any water fees. The implementation of the improvement works should be subject to O&M executed by beneficiaries themselves through the setting-up of water users organization and payment water fees.	No
7) Yaque del Sur Lower Reaches Irrigation and Drainage Project	Dispute in land acquisition may occur. Disturbance of present irrigation water supply and turbidity of river water during the construction is foreseen. Infiltration of water from the canals and ponds may cause the groundwater rising and waterlogging, which may result in the soil salinization may occur. By the improvement of drainage canal networks to remove salt contained in the soil layer and maintain the salt content low, drained water will contain much more salt than before. The night storage ponds may cause the increase of mosquito and snails carrying malaria and schistosomiasis. As the result of the project, the use of agrochemical and fertilizer will increase. The project affects the present condition of water rights. The set up of water users organization affects lifestyle of local people.	It is important to obtain a consensus from the farmers about the crop compensation and the land possession prior to the implementation of the project. Execute construction works not to disturb the present irrigation water supply and not to cause the turbidity. In order to mitigate the seepage and salt concentration, provide an impervious lining inside the major canals and the ponds. The ponds have to be periodically kept empty to restrain the propagation and get rid of them. Fish breeding is also effective. The implementation of the project works should be subject to the setting-up of water users organization being responsibility for and executing O&M works. Careful planing is necessary not to affect rural society.	Yes

Cuadro 4.10.2 Impactos Ambientales y Medidas Compensatorias(2/3)

Project Title	Environmental Impacts	Countermeasures	EIAis required or not?
8) Sabana Yegua Dam Rehabilitation Project	Flood damage by the spilled water may occur. A little impact of turbidity of river water during the construction stage.	Flood alerting system should be facilitated from the dam site to the downstream.	No
9) Jose Joaquin Puello Dam Development Plan	Some forest areas will be inundated. Water pollution during construction stage occur. The soil erosion will cause sedimentation in the reservoir. Water born diseases might appear. Water conflict might occur between irrigation systems covered by Sabaneta dam.	Appropriate construction management should be conducted to avoid water pollution. Water users' committee should be organized to avoid the conflict on water use. Survey in inundation area is necessary to evaluate the existing value of landuse. Careful monitoring for water born diseases.	Yes
10) Galvan Groundwater Development Project, 11) Galvan Groundwater Irrigation Project	An impact for the water volume of wells used by local people will occur. Salinization will occur. As the result of the project, the use of agrochemical and fertilizer will increase. Disturbance of farm might occur due to irrigation construction.	Careful examination about water volume in Feasibility Study is necessary. Control and monitoring for agrochemical use. Compensation for farm land.	Yes
12) Azua Groundwater Development Project	Salt water intrusion from sea, and ground subsidence are occur in case of over exploitation. Interference to existing wells occur because of uncontrolled development of wells. Problem of soil salinization might occur. The project might affect the present condition of water right. Water born diseases might appear.	Preparation of inventory of existing wells covering number and location of wells, discharge, groundwater table, structure is necessary. Conjunctive use of surface water and groundwater is recommended. Monitoring of water quality is necessary. Careful planing not to cause the problem of water right and water born diseases.	No
13) Plan of Villarpando Water Management Center	The revised water right will affect the agricultural system and social system of the communities. Disturbance of present irrigation water supply and turbidity of river water caused by construction may occur.	Careful planning and implementation not to affect the present agricultural and social system of the communities. Execute construction works not to disturb the present irrigation water supply and not to make river water turbid.	No
14) Mini Hydropower Development Project	A little areas of deforestation and farm disturbance may occur for the pipeline and power house construction.	Executive construction works so as not to make river water turbidity should be done.	No
15) Rural Water Supply Plan	Generally, water supply project is effective for improving health condition and human life. In case of construction of new water supply system, consideration should be taken to some negative effects due to the construction works. Some clearing of forest may occur due to pipeline and access road construction.	Careful planning so as not to cut the forest in large scale is necessary.	No
16) Other Social Infrastructure Development	No negative impact is foreseen.	none	No

Cuadro 4.10.2 Impactos Ambientales y Medidas Compensatorias(3/3)

Project Title	Environmental Impacts	Countermeasures	EIA is required or not?
17) Rural Road Improvement Plan	Generally this project is only rehabilitation of the existing road, hence no considerable negative environmental impact is foreseen. However, attention should be paid to avoid deforestation and water pollution during construction stage.	Executive construction works should be done to avoid deforestation and water pollution.	No
18) Plan for Agricultural Cooperatives Plan for Agricultural Cooperatives, 19) Plan for Seed Multiplication	Increase of economic deference between riches and poor in a community might occur.	Careful planning to assist the poorer class so as not to increase the economic difference.	No
20) Plan for Credit Services	Increase of economic deference between riches and poor in a community might occur.	Careful planning to assist the poorer class so as not to increase the economic difference.	No
21) Plan for Marketing Information System	No environmental impact expected.	none	No
22) Plan for Strengthening CIAZA Research Center, 23) Plan for Strengthening Extension Services	No environmental impact expected.	none	No
24) Coffee Production Improvement Project	During the construction of access road, turbidity of river water may occur. The post-harvesting process of a larger volume of coffee may increase pollution of some small water courses. Agrochemical use will increase.	Careful construction work not to cause the turbidity should be done. Some countermeasures to avoid water pollution, for example collocation of small pond before rivers.	No
25) Reforestation in the Upper Watershed Areas of Grande River	A small impact concerning river water pollution in construction stage of the access road improvement. Turbidity of river water would occur.	Careful construction so as not to cause the turbidity is required.	No
26) Wildlife Conservation in Rincon Lagoon	This is a just monitoring plan, so that no environmental impact will occur.	none	No