Table C.2.1 Proposed Upland Rice Cultivation for the Project Area

1) Variety to be used	
IDSA 10	90 - 100 days, potential Yield:3,000 kg/ha
IDSA 46	90 - 100 days, potential Yield:3,000 kg/ha
WAB 56-50	90 - 100 days, potential Yield:3,000 kg/ha
WAB 56-104	90 - 100 days, potential Yield:3,000 kg/ha
WAB 56-125	90 - 100 days, potential Yield:3,000 kg/ha
WAB 96-1-1	90 - 100 days, potential Yield:3,000 kg/ha
2) Amount of seeds to be sown	
50 kg/ha	
3) Sowing time and harvesting time	
Sowing time: Early April	
Harvesting time: July	
4) Land preparation	
Plowing by manual with DABA	
5) Application of fertilizer	
Basal: Apply 150 kg/ha of NPK(10-20-20) before plowing and mixed with soil	
Top-dressing: Apply 75 kg/ha of Urea(46N) at just before 2nd weeding	
6) Weeding	
-1st weeding: Weed and earth at around 15 days after sowing	
-2nd weeding: Weed and earth at around 30 days after sowing	
7) Expected yield: 3,000 kg/ha	

Table C.2.2 Estimated Income and Costs of the Proposed Upland Rice Cultivatio

Items	Details	Cost (FCAF/ha)	
		Materials	Labor
1) Materials cost			
-Seed cost	50 kg/ha x 300 F/kg	15,000	
-Fertilizer cost	NPK: 150 kg/ha(10-20-20) x 246 F/kg	36,900	
	Urea: 75 kg/ha(46N) x 209 F/kg	15,675	
2) Labor cost			
(1) Land preparation			
-Plowing	30 mens/ha x 1,000		30,000
-Sowing	3 mens/ha x 1,000		3,000
(2) Fetilizer application			
- Basal:	1 man/ha x 1,000		1,000
-Top dressing:	2 mens/ha x 1,000		2,000
(3) Weeding			
-Manual weeding	20 mens/ha x 1,000 x 2 times		40,000
(4) Harvesting	20 mens/ha x 1,000		20,000
(5) Threshing(Man-power)	5 mens/ha x 1,000		5,000
(6) Bird control	15 mens/ha x 1,000		15,000
Total		67,575	116,000
Production cost			183,575
Gross income	3,000 kg/ha x 159		477,000
Net income			293,425

Table C.2.3 Proposed Maize Cultivation for the Project Area

(1) Recommended Variety
IRAT 83(Duratyion: 100 to 105 days, Yield: 4,000 t/ha)
(2) Amount of Seeds to be sown
25 kg/ha
(3) Sowing time and harvesting time
Sowing: March to April
Harvesting: July to August
(4) Land preparation: By manual
(5) Sowing:
-Direct sowing with hill sowing along contour line:
Space: 0.8 m between lines and 0.4 m between hills, 2 to 4 grains per hill
-Direct sowing with line sowing along contour line:
Space: 0.8 m between lines, 3 to 4 grains on line each 1 m
(6) Fertilizer application
-Basal application: Apply 200 kg/ha of NPK(10-20-20) at plowing time.
-Top dressing: Apply 100 kg/ha of Urea(46N) between 30 to 40 days after sowing.
(7) Weeding
-1st weeding: Weed and earth at the stage between15 to 20 days after sowing
-2nd weeding: Weed and earth at the stage between 30 to 40 days after sowing with top-dressing.
(8) Expected yield: 3,500 to 4,000 kg/ha

Table C.2.4 Estimated Income and Costs of the Proposed Maize Cultivation

Farm Operation	Details	Labor requirement (man day/ha)	Cost (FCFA/ha)
1) Material cost			
-Seed cost	25 kg x 300 F/kg		7,500
-Fertilizer cost	NPK: 200 kg (10-20-20) x 246 F/kg		49,200
	Urea: 100 kg(46N) x 209 F/kg		20,900
2) Labor cost			
-Land preparation	30 mens/ha x 1,000	30	30,000
-Fetilizer application			
Basal:	1 man/ha x 1,000	1	1,000
Top dressing:	2 mens/ha x 1,000	2	2,000
-Weeding	20 mens/ha x 1,000 x 2 times	40	40,000
-Harvesting	20 mens/ha x 1,000	20	20,000
Total		93	170,600
Gross income	3,500 kg/ha x 104 F/kg		364,000
Production cost			170,600
Net income			193,400

Note: 1)Variety to be used: IRAT 83(Duration: 100 to 105 days, Yield potential: 4,000 kg/ha)
2)Fertilizer cost was applied KR II price in 1997

Table C.3.1 Proposed Transplanting Rice Cultivation for the Irrigated Lowlan

(1) Variety to be used
WITA 7(128 days, RYMV:5, Yield potential: 8.3 t/ha, 1000 G.W: 25.3 g)
WITA 8(125 days, RYMV:3, Yield potential: 8.6 t/ha, 1000 G.W: 27.6 g)
WITA 9(120 days, RYMV:3, Yield potential: 7.1 t/ha, 1000 G.W: 24.7 g)
(2) Sowing and Harvesting
1st Crop: Sowing- 3/20 to 5/04, Harvesting- 7/26 to 9/09 (128 days variety)
Sowing- 3/20 to 5/04, Harvesting- 7/23 to 9/06 (125 days variety)
Sowing- 3/20 to 5/04, Harvesting- 7/18 to 9/01 (120 days variety)
2nd Crop: Sowing- 9/10 to 10/25, Harvesting- 1/16 to 3/02 (128 days variety)
Sowing- 9/10 to 10/25, Harvesting-1/13 to 2/27 (125 days variety)
Sowing- 9/10 to 10/25, Harvesting-1/08 to 2/22 (120 days variety)
(3) Irrigation to nursery and main field: 20 days before sowing. After irrigation, keep field under submarged condition.
(4) 1st plowing of nursery plot and main field: 15 days before sowing
(5) Preparation of nursery:
Net area of seed bed: 1.7 m x 10 m x 20 beds = 340 m2/ha
2nd plowing and making bed
Basal application of fertilizer: 8 kg of NPK(10-20-20) to 340 m2
Application of herbicide: 4 L/ha of Ronstar 25 EC at before sowing
Amount of seeds to be sown (Selected seeds with salt): 35 kg/ha
(6) Top-dressing: Apply 5 kg of Urea to 340m² of seed bed at 15 days after sowing
(7) Land preparation of main field : One day before transplanting
Basal application of fertilizer: Apply 200 kg /ha of NPK(10-20-20) before plowing
Application of herbicide: 4 L/ha of Ronstar 25 EC at before sowing
(8) Transplanting:
Use 20 to 25 days seedlings
Planting density: 20 cm x 25 cm (20 hills/m2)
Number of seedlings to be transplanted per hill: 3 seedlings/hill
(9) 1st top-dressing: Apply 50 kg/ha of Urea at 25 days after transplanting
(10) 2nd weeding: Take immediately after 1st top-dressing by manual
(11) 2nd top-dressing: Apply 50 kg/ha of Urea at 25 days before heading or(Panicle initiation stage)
The 25 days before heading is differed by varieties as below;
WITA 7: around 52 days after transplanting
WITA 8: around 47 days after transplanting
WITA 9: around 42 days after transplanting
(12) Disease and Pest control
If necessary, application method is followed by ANADER direction
(13) In field water management
Keep 2 to 3 inches of water depth during the growing period of paddy until 10 days before harvesting, and drain water at 10 days before harvesting
(14) Expected Yield
5.5 tons/ha in paddy

Table C.3.2 Proposed Direct-Sowing Rice Cultivation for the Irrigated Lowland

(1) Variety to be used
WITA 7(128 days, RYMV:5, Yield potential: 8.3 t/ha, 1000 G.W: 25.3 g)
WITA 8(125 days, RYMV:3, Yield potential: 8.6 t/ha, 1000 G.W: 27.6 g)
WITA 9(120 days, RYMV:3, Yield potential: 7.1 t/ha, 1000 G.W: 24.7 g)
* Note: Above the growing periods are shortened by around 5 days by direct sowing
(2) Sowing and harvesting
1st Crop: Sowing- 3/20 to 5/04, Harvesting- 7/21 to 9/04 (WITA 7)
Sowing- 3/20 to 5/04, Hrvesting- 7/18 to 9/01 (WITA 8)
Sowing- 3/20 to 5/04, Hrvesting- 7/13 to 8/27 (WITA 9)
2nd Crop: Sowing-9/10 to 10/25, Harvesting- 1/11 to 2/25 (WITA7)
Sowing-9/10 to 10/25. Harvesting- 1/08 to 2/22 (WITA8)
Sowing-9/10 to 10/25. Harvesting- 1/03 to 2/17 (WITA9)
(3) Irrigation: Same as transplanting fields (20 days before nursery sowing)
(4) Land preparation
1st plowing: 5 days after irrigation
2nd plowing(Puddling and levelling): 19 days after irrigation under shallow submarged conditions.
(5) Basal application of fertilizer: Apply 200 kg/ha of NPK(10-20-20) before 2nd plowing
(6) Drain water in the field
(7) Application of herbicide: 5 L/ha of Ronstar 25 EC at afer 2nd plowing
(8) Sowing:
Seed rate: 60 kg/ha in clean seeds
Use pre-greminated seeds (Soak seeds in the water for 24 hours, than after keep seeds in moist condition for around one day until seeds germinate to 2mm)
Sow seeds uniformly with broad casting under wet soil condition of the field.
Guard from birds after sowing
(9) Water management
Keep wet soil condition for 3 to 4 days after sowing, then after keep shallow water around 1 inch for around 10 days, then after keep water in 2 to 3 inches until 10 days before harvesting.
Drain water in the field at 10 days before harvesting.
(10) 2nd weed control: Apply Ronstar PL or Garil EC or Basagran PL 2B EC by 4 to 6 L/ha at 15 to 20 days after sowing
(11) 1st top-dressing: Apply 50 kg/ha of Urea at 30 days after sowing.
(12) 2nd top-dressing: Apply 50 kg/ha of Urea at 25days before heading. 25 days before heading is differed by variety as below
WITA 7: around 68 days after sowing
WITA 8: around 65 days after sowing
WITA 9: around 60 days after sowing
(13) Disease and Pest control
If necessary, application method is followed by ANADER's direction
(14) Expected Yield
4.5 tons/ha in paddy

Table C.3.3 Estimated Income and Costs of the Proposed Rice Production

	Transplanting Rice Cultivation				Direct-Sowing Rice Cultivation			
	Item	Details	Cost (FCAF/ha)		Item	Details	Cost (FCAF/ha)	
			Materials*	Labor			Materials*	Labor
Material Cost	Seed cost	35 kg/ha x 300 F/kg	10,500		Seed	60 kg/ha x 300 F/kg	18,000	
	Fertilizer cost				Fertilizer	NPK: 200 kg(10-20-20) x 190 F/kg	38,000	
	For nursery	NPK: 8kg(10-20-20) x 190 F/kg	1,520			Urea: 100 kg(N46) x 170 F/kg	17,000	
		Urea: 5 kg(N46) x 170 F/kg	850					
	For main field	NPK: 200 kg(10-20-20) x 190 F/kg	38,000					
		Urea: 100 kg(N46) x 170 F/kg	17,000					
	Herbicide cost	Ronstar 7,000 F/L x 4 L	28,000		Herbicide	1st appli: Ronstar 7,000 F/L x 5 L	35,000	
						2nd: Basagran PL 2B EC 5,500 F/L x 5 L/ha	27,500	
	Insecticide cost**(If necessary)	Furadan 5G: 1,800 F/kg x 28 kg/ha	(50,400)		Insecticide (If necessary)	Furadan 5G: 1,800 F/kg x 28 kg/ha	-50,400	
	Power tiller cost				Plowing by power tiller		65,100	
	For nursery	2 round, including operator charge	3,300					
	For main field	" "	65,100					
Labor Cost	1st plowing	1.5men x 1,100 F/day		1,650	1st plowing	1.5men x 1,100 F/day		1,650
	Nursery preparation	2men x 1,100 F/day		2,200	2nd plowing	1.5man x 1,100 F/day		1,650
	Sowing	1 man x 1,100 F/day		1,100	Sowing	3 man x 1,100 F/day		3,300
	Top-dressing to nursery	0.7 man x 1,100 F/day		770	Fertilizer application	For basal: 2men x 1,100 F/day		2,200
	Basal fertilizer to main field	2men x 1,100 F/day		2,200		For top-1: 1 man x 1,100 F/day		1,100
	2nd plowing	1.5man x 1,100 F/day		1,650		For top-2: 1 man x 1,100 F/day		1,100
	Transplanting	40 men x 1,500 F/day		60,000	Weeding	Application of herbicide: 2men x 1,100 F/day x 2		4,400
	Application of herbicide	2men x 1,100 F/day		2,200	Bird control	3men x 25days x 750 F/day		56,250
	1st top-dressing to main field	2men x 1,100 F/day		2,200	Harvesting	40 men x 1,100 F/day		44,000
	Manual weeding	10men x 1,100 F/day		11,000	Thresing	10 men x 1,100 F/day		11,000
	Insecticide application	4men x 1,800 F/day		7,200				
	2nd top-dressing to main field	1man x 1,100 F/day		1,100				
	Bird control	3men x 25days x 750 F/day		56,250				
	Harvesting	40 men x 1,100 F/day		44,000				
	Thresing	10 men x 1,100 F/day		11,000				
Water charge		50,000 F/ha/season		50,000	Water charge	50,000 F/ha/season		50,000
Total			164,270	254,520	Total		200,600	176,650
Production cost			418,790		Production cost		377,250	
Gross income		5,500 kg/ha x 157 F/ha	863,500		Gross income	4,500 kg/ha x 157 F/ha	706,500	
Net income			444,710		Net income		329,250	

Tbale C.3.4 Estimated Income and Costs of the Proposed Tomato and Lettuce Cultivation

	Tomato Cultivation				Lettuce Cultivation			
	Item	Details	Cost (FCAF/ha)		Item	Details	Cost (FCAF/ha)	
			Materials*	Labor			Materials*	Labor
Materials Cost	Seed (Variety: SODEFO)	300g/ha x 133 F/g	40,000		Seeds		45,000	
	Fertilizer	NPK: 500 kg(10-20-20) x 190 F/kg	95,000		Fertilizer		76,500	
		Urea: 200 kg(N46) x 170 F/kg	34,000					
		Chloride potash: 400 kg/ha x 140 F/kg	56,000					
	Fungicide	Manebu: 5,000 F/kg x 24 kg/ha	120,000		Chemical		66,000	
	Insecticide	Decis: 6 L/ha x 4,000 F/L	24,000					
	Sprayer	1 unit	50,000		Sprayer	1 unit	50,000	
	Watering can (Local)	3,500 x 1	35,000		Watering can (Local)	3,500 x 1	3,500	
	Rake	2,000 x 2	4,000		Rake	2,000 x 2	4,000	
	Hoe	2000 x 5	10,000		Hoe	2000 x 5	10,000	
	Balance(10 kg)	15,000 x 1	15,000		Balance(10 kg)	15,000 x 1	15,000	
	Barrow(Single wheel)	35,000 x 1	35,000		Barrow(Single wheel)	35,000 x 1	35,000	
	Plastic for packing		150,000					
Labor Cost	Plowing by power tiller			65,100	Plowing by power tiller			65,100
	Land preparation	30 men x 1,100 F/day		22,000	Land preparation	20 men x 1,100 F/day		22,000
	Transplanting	30 men x 1,100 F/day		22,000	Transplanting	30 men x 1,100 F/day		33,000
	Weeding	30 men x 1,100 F/day		22,000	Weeding	30 men x 1,100 F/day		33,000
	Fertilizer application	2men x 3 x 1,100 F/day		6,600	Fertilizer application	2 men x 3 x 1,100 F/day		6,600
	Plant protection	4 men x 6 x 1,400 F/day		33,600	Plant protection	3 men x 6 x 1,400 F/day		25,200
	Watering	1 man x 25 x 1,100 F/day		27,500	Watering	1 man x 25 x 1,100 F/day		27,500
	Harvesting	2 men x 10 x 1,100 F/day		22,000	Harvesting	2 men x 10 x 1,100 F/day		22,000
	Packing	2 man x 10 x 1,100 F/day		22,000	Packing	2 man x 10 x 1,100 F/day		22,000
	Water charge	50,000 F/ha/season	50,000		Water charge	50,000 F/ha/season	50,000	
Total			718,000	242,800	Total		355,000	256,400
Production cost			960,800		Production cost		611,400	
Gross income		20,000kg/ha x 700 F/kg	14,000,000		Gross income	20,000kg/ha x 100 F/kg	2,000,000	
Net income			13,039,200		Net income		1,388,600	

1) Production cost: Quoted IDESSA data

2) Material costs: KR II price in 1998

3) Unit price of product: Average wholesale price(SODEFO) at San-Pedro in 1998

Table C.3.5 Land Preparation Cost with Power Tiller

Item	CFAF/hour	CFAF/ha	Details
1) Fixed Charge (with in-field Wheels and trailer)	1,875	30,000	(3,000,000 F/1,600 hours) x 16 hours/ha
・Cost of power tiller			3,000,000 F*
・Durable hours			1,600 hours
・Working efficiency			16 hours/ha (8 hours/ha x 2 round)
2) Variable Charge			
(1) Petrol charge	418	6,688	0.12 x 14 x 249** F/L = 418 F/hour = 6,688 F/ha
(2) Oil charge	119	1,904	0.12 x 0.045 x 14 x 1,575** F/L= 119 F/hour = 1,904 F/ha
(3) Reparing charges	1,406	22,500	3,000,000 F x 0.75 / 1,600 hours = 1,406 F/hour = 22,500 F/ha
(4) Operator charge	250	4,000	4,000 F/ha
Plowing Cost	4,068	65,092	

Note: * Cost of power tiller was applied KR-II price in 1998
** As of Aug., 1998

Table C.3.6 Important Spare Parts of Power Tiller

1. Engine Parts

Parts No.	Name of parts	Durable length
No.1	Joint de Culasse	6 months (Every season)
No.22	Piston Ring	6 seasons
No.23	Coussinet de Biel	6 seasons
	Oil Filter	6 months (Every season)
No.32	Oil Pump	10 seasons
No.-a	Pistion de Pompe a Injection	6 seasons Maximum
No.-b	Pointeau	6 months
No.-c	Nez d' Injection	6 seasons

2. Other Parts of Power Tiller

	Name of Parts	Observation
Fraise		Check 4 years after
	Daba	Change after 4 seasons
	Roulement	Change after 1 year
	Joints Speed	Change after 2 seasons
Boite a Vitesse		
	Boite a embrayage	Change oil. 200 hours after
	Courroie de transmission	Change after 6 months to 1 year
	Disque d' embryage	Change after 6 months to 1 year

Table C.4.1 Regional Farm Household Economy

Department		Sassandra	Soubre	San-Pédro	Tabou	Average		Production /ha	Labour/ha**	Input /ha	Price***	Labour/ha	IP*	Price/kg	Income
Farm/household		6.4	7.1	6.1	8.2	6.9 ha	ha	ton	man-day	F.CFA	ton	man-day	CFA	F.CFA	F.CFA
Cacao		42	63	68	64	59.6 %	4.1	0.4	50	12,000	1.65	206	49,423	364	550,238
Coffee		30	10	14	7	14.6 %	1.0	0.4	48	5,500	0.40	48	5,549	416	162,328
Oil palm		4	2	0	16	6.1 %	0.4	5.7	n.a.	n.a.	2.43	-	-	20	47,411
Coconuts*		2	0	2	0	0.9 %	0.06	1.5	n.a.	n.a.	0.09	-	-	110	10,238
Paddy	irrigated	0.4	0.9	0.2	0.0	0.4 %	0.03	2.5	210	18,000	0.06	5	456	100	5,884
	marsh	1	1	3	0.2	1.2 %	0.1	1.6	180	0	0.13	15	0	100	13,296
	up-land	14	18	8	9	12.2 %	0.8	1.6	180	0	0.38	152	0	100	38,466
Maize		7	5	5	4	5.2 %	0.4	2.2	110		0.47	39		40	18,631
		100	100	100	100	100 %	6.9					466			846,492

*:coprah **: < max. 200*3.6=720 ***:-auto consumption; (@upland paddy:100kg/0.66+maize:50kg)*6.4

Source: AISA, ibid, 1994

Table C.4.2 Farm-Economy of An Average Household in the Project Area
(Satellite Farm)

Average household: Family size is six and economically active member are three

(1) Unit (ha/season) Cost and Income with Transplanting Method

Unit yield is 5.5 ton/ha, and unit farm gate price is 157 F.CFA/kg

(Unit: F.CFA)

Production Cost		Sale	
Hire Charge of Cultivator*2	98,400	Paddy	863,500
Seed	10,500		
Fertilizer + Herbicide	85,370		
Labour for canal O&M	204,520		
Water charge	50,000		
Total Cost	448,790	Net Income	414,710
Notes:		Net Income*1	619,230

*1:Labor fully managed by family and COOP.
*2 Depreciation cost of cultivator (30,000 F.CFA/ha) is included

(2) Unit (/ household) Cashflow from Paddy Double Cropping

Assumption : Harvest area 1.5 ha, production 16.5 ton/year and self-consumption 0.2 ton/head/year (1.2 ton/year/household), then marketable paddy is estimated at 15.3 ton/year/household

(Unit: F.CFA)

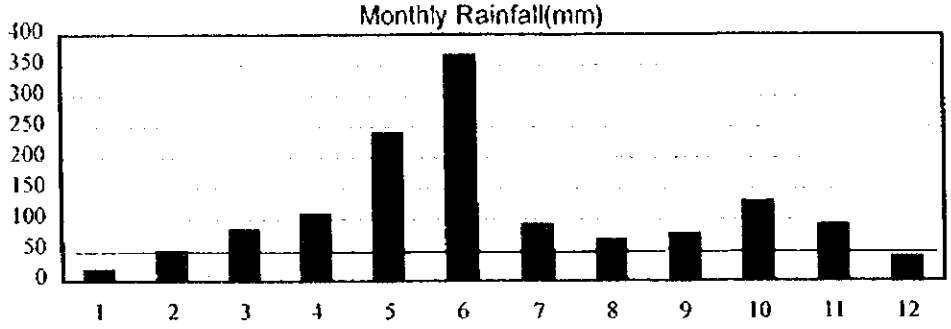
Sale Paddy	15.3	ton
Gross Income = Sale	2,402,100	CFA franc
Production Cost =1.5ha x (448,790 – 204,520)	-732,810	
Irrigation Water Rate*	-8,000	
Co-op Membership Fee/year	-12,000	
Co-op Commission (1 % of Sale)	-24,021	
Net Farm Income	1,625,269	CFA franc
Amortization (15 Years) =(3,000,000 x 0.9)/15	180,000	
Interest Payment (2%/year)	54,000	(First Year)
Debt Service of Housing Loan	234,000	14%
Saving (10% of Net Farm Income)	162,527	10%
Annual Disposable Income	1,228,742	76%

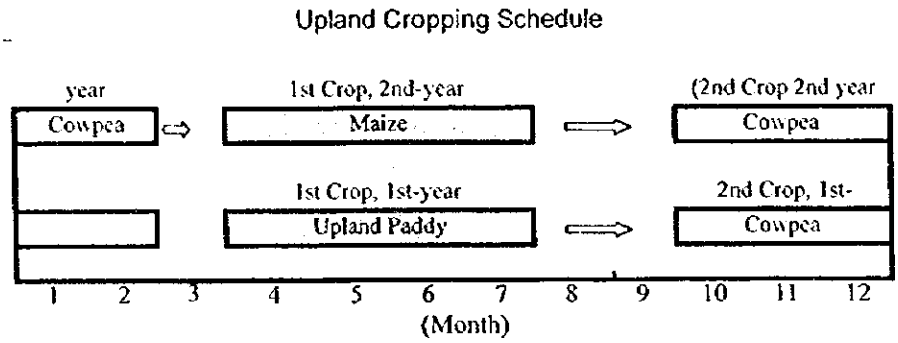
Notes : *: =10bil(dam) X 1%(of useful life) X 5%(allocated for irrigation) X 60.5% (=575/950:area ratio) /384(households)

Monthly Meteorological Data of the Study Area

	Jan.	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Total/Ave
Rainfall(mm)	17.5	48.3	82.9	108.0	239.7	366.0	91.4	66.5	76.2	128.4	90.3	38.8	1,354
Temp.(Ave)	26.5	27.2	27.7	27.5	27.0	25.7	24.8	24.7	25.4	25.7	26.4	26.3	26.2
Humidity(%)*	81.0	81.9	81.8	83.1	85.3	87.2	85.6	87.7	87.6	86.4	85.7	83.3	84.7
Sunshine(hour)*	4.9	5.5	5.3	6.1	5.2	3.3	3.5	3.1	3.7	5.9	6.3	4.9	4.8

Source: IDEFOR, San-Pedro Station and San-Pedro Airport( )*





Estimated Income and Outgo of the Upland Cropping

Cropping year	Crop	Production (kg/ha)	Production Cost (F/ha)	Gross Income (F/ha)	Net Income (F/ha)
1st Year	Upland rice	3,000	183,575	477,000	293,425
	Cowpea/GN	1,000	(52,500)	200,000	147,500
2nd Year	Maize	3,500	170,600	364,000	193,400
	Cowpea/GN	1,000	(52,500)	200,000	147,500
Average Net Income Per Year		4,250	177,088	620,500	390,913

( ) Estimated

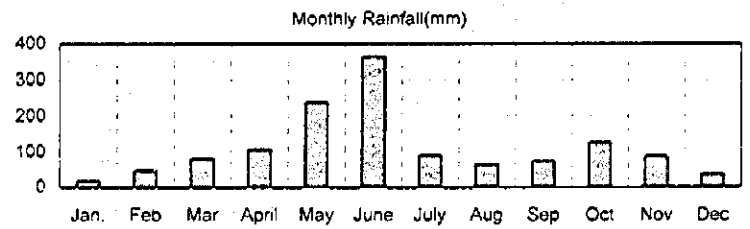
GN: Groundnut

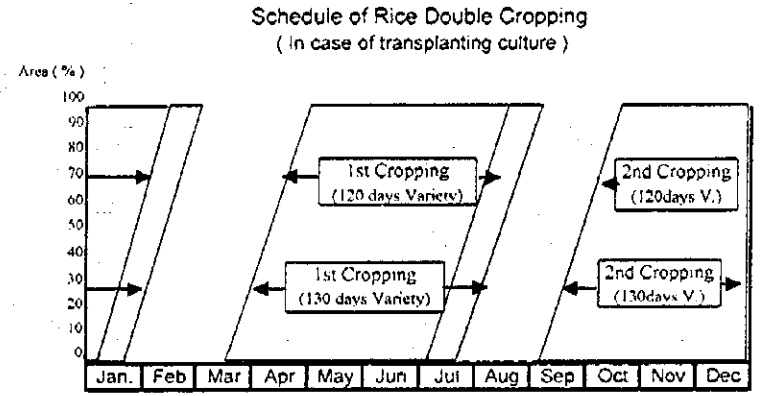
Fig. C.2.1 Proposed Upland Cropping Schedule for the Project Area

Monthly Meteorological Data of the Study Area

	Jan.	Feb	Mar	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Total/Ave.
Rainfall(mm)	17.5	48.3	82.9	108.0	239.7	366.0	91.4	66.5	76.2	128.4	90.3	38.8	1,354
Temp.(Ave)	26.5	27.2	27.7	27.5	27.0	25.7	24.8	24.7	25.4	25.7	26.4	26.3	26.2
Humidity(%)*	81.0	81.9	81.8	83.1	85.3	87.2	85.6	87.7	87.6	86.4	85.7	83.3	84.7
Sunshine(hour)	4.9	5.5	5.3	6.1	5.2	3.3	3.5	3.1	3.7	5.9	6.3	4.9	4.8

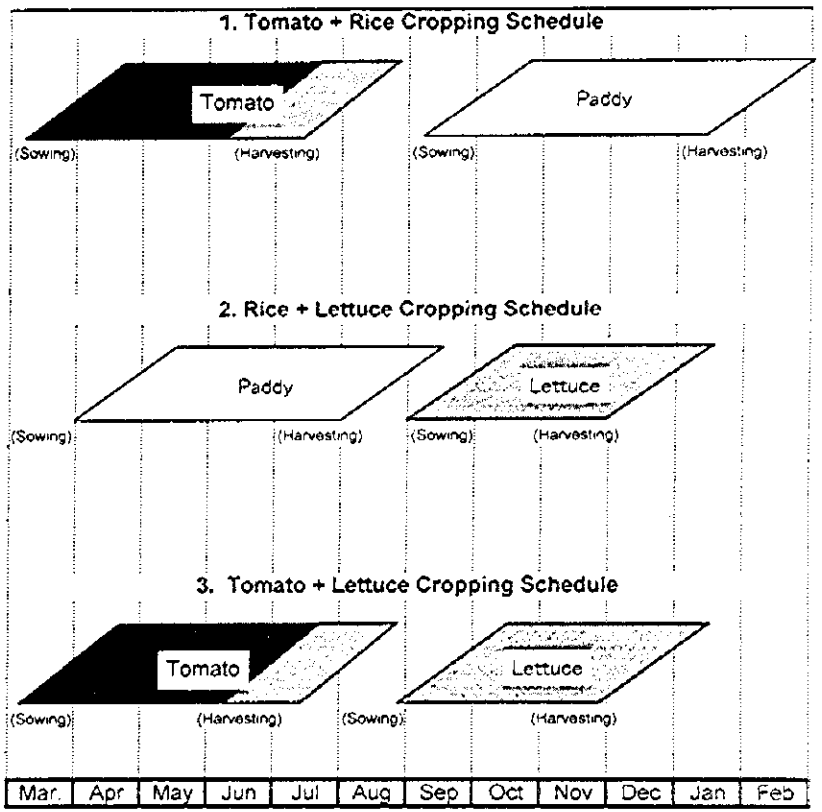
Source: IDEFOR, San-Pedro Station and San-Pedro Airport( )*





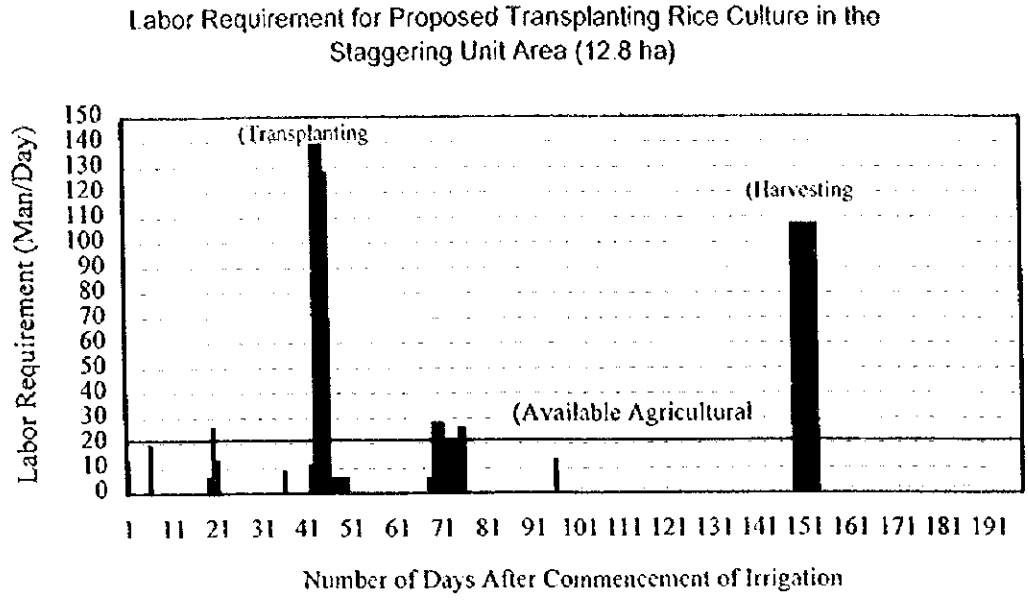
Cultivation Method	Variety to be used (No. of days)	1st Cropping Sowing	1st Cropping Harvesting	Fllow Period	2nd Cropping Sowing	2nd Cropping Harvesting	Fllow Period
Trans-planting	WITA 7(128)	3/20-5/04	7/26-9/09	46 days	9/10-10/25	1/16-3/02	63 days
	WITA 8(125)	3/20-5/04	7/23-9/06	49 days	9/10-10/25	1/13-2/27	66 days
	WITA 9(120)	3/20-5/04	7/18-9/01	54 days	9/10-10/25	1/08-2/22	71 days
Direct-Sowing	WITA 7(123)	3/20-5/04	7/21-9/04	51 days	9/10-10/25	1/11-2/25	68 days
	WITA 8(120)	3/20-5/04	7/18-9/01	54 days	9/10-10/25	1/08-2/22	71 days
	WITA 9(115)	3/20-5/04	7/13-8/27	59 days	9/10-10/25	1/03-2/17	76 days

Fig. C.3.1 Proposed Rice Double Cropping Schedule In the Project Area



Cropping	Variety to be Use		1st Cropping Sowing	1st Cropping Harvesting	2nd Cropping Sowing	2nd Cropping Harvesting
Rice + Rice	WITA 7	WITA 7	3/20-5/04	7/26-9/09	9/10-10/25	1/16-3/02
Tomato + Rice	SODEFO	WITA 7	3/10-4/24	6/10-8/31	9/10-10/25	1/16-3/02
Rice + Lettuce	WITA 7	-	3/20-5/04	7/26-9/09	9/01-10/15	11/30-1/14
Tomato + Lettuce	SODEFO	-	3/10-4/24	6/10-8/31	9/01-10/15	11/30-1/14

Fig. C.3.2 Proposed Rice and Vegetable Cropping Schedule for the Project Area



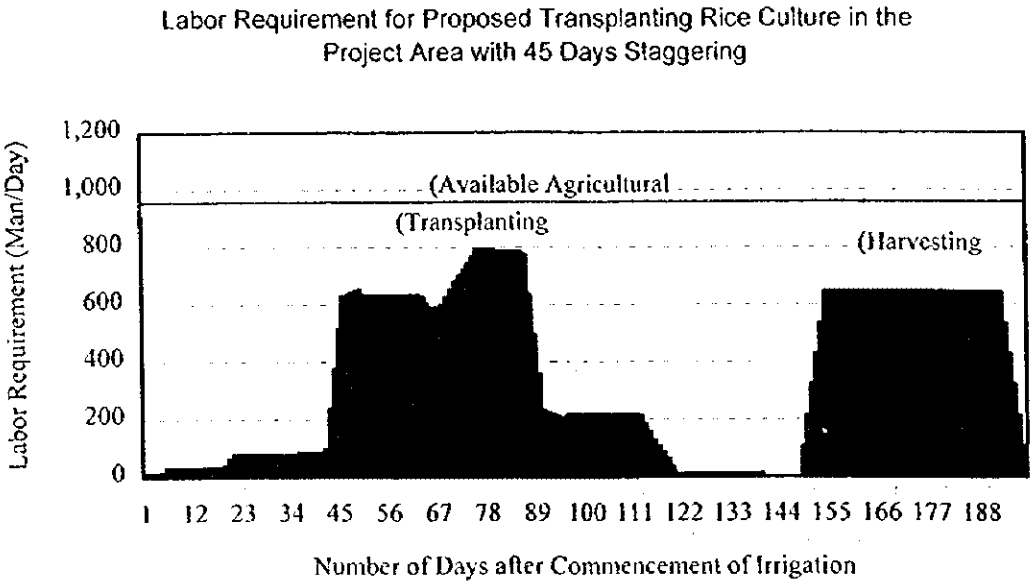


Fig. C.3.3 Labor Requirement for Proposed Transplanting Rice Cultivati and Availavle Labor in the Project Area

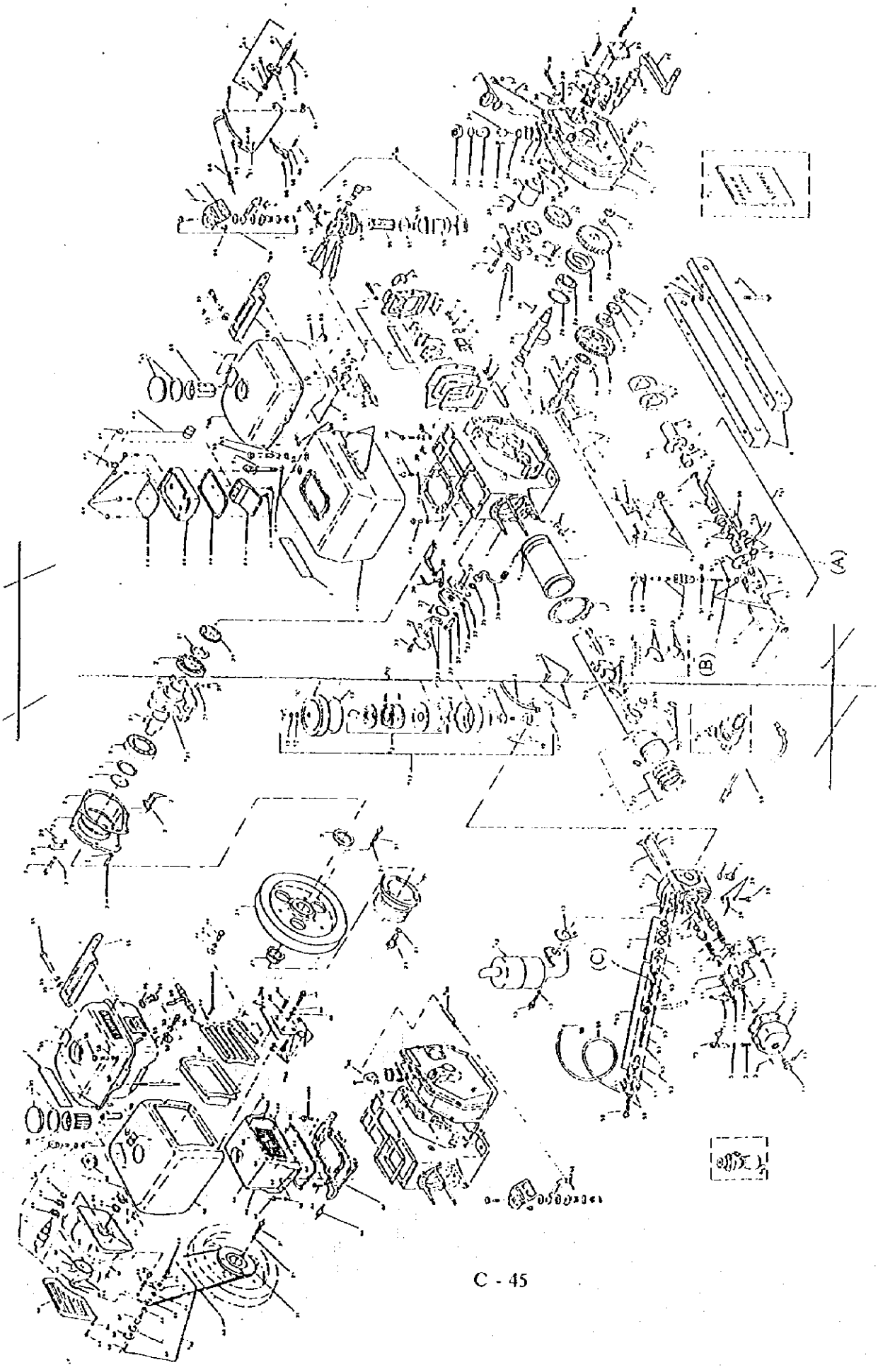


Fig. C.3.4 Important Spare Parts of Power Tiller

D : FARMERS' ORGANIZATION AND AGRICULTURAL SUPPORTING

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D : FARMERS' ORGANIZATION AND AGRICULTURAL SUPPORT

D.1 Farmers' Organization

D.1.1 General

'*Organisation Professionelle Agricole*' (OPA) is a term to represent any rural farmers' organizations, in Côte d'Ivoire and used to express as a concept to counterbalance the private enterprises in agricultural sector. The most active and significant organization among them is the '*Groupements à Vocation Coopérative*' (GVC). The socio-economic aspects of rural development in Côte d'Ivoire have been revolved around GVC. It is a form of organization defined by the cooperative law promulgated in 1977, the statute of which is allowed to include relaxed condition in some aspects of the accounting procedures in order to facilitate the formation of GVC by the farmers.

Therefore, people have begun to feel that the old cooperative law, which had been valid for 20 years, was due for revision, and it was abrogated by the new cooperative law promulgated on 23rd December 1997 in order to fill some loopholes and to adjust itself to the socio-economic change of the business world in Côte d'Ivoire. With this change, all the so far registered GVC shall have been re-registered under the new law by 23rd December, 1999 with possible extension of another year. This change implies the necessary upgrade of accounting standard and usage on the part of GVC.

D.1.2 Farmer's Organization in the Study Area

(1) Present GVCs

In the Study Area, there are 24 officially recognized GVCs of which 18 GVCs for tree crop marketing and 6 for food crop production & marketing. These types of GVCs have different characters or functions as shown in the table below:

	GVC for tree crops (coffee/cacao : C/C GVCs)	GVC for food crops (irrigated paddy : I/R GVCs)
Funds raising / Input supply	Loans for purchase of trucks for GVCs from processing or exportation companies / Loans for individual inputs not available from GVCs	All inputs provided free or on credit for GVCs by GOCI or private companies / Members are obliged to repay GVC the amount of debt according to individual planted acreage
Production	Individual / There cases to borrow implements from GVCs	In Group / Planned cropping
Marketing	In group	In group / Obliged to deliver the whole harvest
Communication / Training	Lack of communication and exchange of information among members due to their scattered plots / no training by GVCs	Easy communication and exchange of information and skills among members due to contiguous plots / training given by GVCs
Other activity	Mutual aid system	Maintenance of joint production facilities / Mutual aid system
Other outlet	To traders or middlemen in cash payment on the spot	Home consumption or to local market
Merits for members	To withstand unfair trade by middlemen / to ensure transportation of products by GVCs	Full support and control in whole process by GVCs / Indispensable to join GVCs in the case of irrigated paddy cultivation
Size of GVCs	12 -- 189 members	13- 24 members

Naturally, I/R GVCs are required to have greater management skills and organizing abilities since these organizations take part in all over the activities that include supply of inputs, cultivation

techniques and marketing of products. Each member is also equally required to assimilate with and practice new ideas which are not seen in the traditional agricultural practice e.g. conversion of shifting cultivation to intensive farming, fair distribution of resources such as land, water etc. among members and planned cropping pattern in cooperation with others.

The problems common to both types of GVCs are as follows:

1) Unfair money management by administrative committees of GVCs attributed to lack of their abilities in financial affairs.
2) GVCs cannot immediately pay their members for their delivered products due to lack of liquid funds in GVCs.

Factor 1) is considered as the principal reason for the disruption or breakdown of GVCs. Since farmers are in need of cash at harvesting time, they want to have cash from their products as soon as possible. Therefore factor 2) is one of the biggest weakness for GVCs in competing with middlemen. This situation discourages farmers from joining GVCs, and this in turn decreases GVCs' abilities to deliver enough quantity of products thus ultimately decreasing their abilities to obtain a loan from companies. On the other hand, factor 2) forces I/R GVCs to sell rice even when the price is low.

In addition to these two factors, there is another problem i.e. organizing of immigrant society. In the beginning, single multiethnic C/C GVC was established in each main village. But in many cases at present, it has been divided into some smaller GVCs usually composed of same ethnic members. According to the members, the principal reason for the disruption is factor 1) "Money problem", but it is understood that, in the behind, the mutual distrust among members, in particular between different ethnic groups, made the problems more serious ultimately bringing GVC to disrupt. Additionally, an organization can be hardly run in a democratic way and maintaining the organization becomes also difficult when indigenous people join it. While waiting for the growing 2nd generation of immigrants who are more assimilated to the new society, organizing the people with similar ideas, in other words, in ethnic or religious groups seems more cohesive and practical for the time being.

(2) Other Related OPAs

There are various kinds of OPAs as shown below:

a) Contact groups of CAs of ANADER are the unit of receivers at the time of technical transfer;
b) Water committees for the management of semi-deep well for drinking water;
c) Young farmers' organizations; and
d) Other organizations such as for maintaining primary schools and religious services.

(3) Women's Organization

One of the characteristics of women's organization in Côte d'Ivoire is represented by a well-known term of Market Mama, which has a modern scent of commercial transactions. In some places of the rural west Africa, a reminiscent of women's secret society which maintains traditional values adds another flavor. Its range of activity not only covers marketing but also extends itself to vegetable growing. The individual member's wish underlying any organization's

activities is the will of protecting and safeguarding her household by all means from the severe economic world at large, and of covering the shortcomings of its male head.

D.1.3 Farmer's Organization in the San-Pédro Paddy Project Area

In 1992, 12 GVCs in San-Pédro Paddy Development Project Area were unified into 4 GVCs based on the irrigation blocks of each main canal. Government stopped the supply of fuel in 1992, resulting in ceasing the operation of water pumps. Thereafter 4 GVCs formed a union in an effort to raise fund for their operation (Table D.1.1). In 1993, a private company OCTID tried to enter by funding an experimental cultivation plot, but withdrew after one planting season due to boycott by leading farmers. Though 4 GVCs were recognized as official organizations by the government in 1995, no activity is being carried out as GVCs at present. In low land across the road from paddy project site, irrigated paddy cultivation has been carried out since 1975, where its own GVC Lycée Professional was formed in 1985 by the farmers who left the project. Though, joint marketing has not been carried out since stop of operation of water pumps, members are carrying out rain-fed paddy cultivation with their own planting schedule, using jointly owned tractors.

In 1995 after ceasing irrigated paddy cultivation, the first officially recognized women's farmer-organization GVC-FCA was founded in Cité Agricole with financial aid given from FNUAP, aiming at helping their husbands who lost sources of income as well as their self-confidence. In its activities, members cultivate maize or paddy in the wet season and vegetables in the dry season, and income from harvest goes to each member after paying certain portion of the sale calculated per acreage to GVC. Pooled money is aimed at being used for mutual-help activities such as loans to the members for ceremonial occasions, school fees, etc., although no such activities have been carried out so far due to insufficient income obtained caused by lack of rainfall and limited arable land acreage. In 1998, members who withdrew from FCA founded unofficial organization GVC Femme. Members of this new organization are cultivating paddy in the wet season and vegetables and cassava in the dry season. Ethnic problem lies behind the separation of women's group. GVC Femme mainly consists of Yacouba and GVC-FCA consists of Sénoufo.

D.1.4 Establishment of Farmers' Organization

As shown in Fig. D.1.1 , in the Master plan of Integrated Rural Development in San Pedro, the reinforcement of OPA is one of the two pillars of better agricultural usage in the food production sub-sector. The other is stabilization of physical environment that allows farmers to follow technically stable agriculture as an occupation. The Government of Côte d'Voire has promulgated a new cooperative law in December 1997 in order to upgrade the quality of GVCs. The plan of formulation and reinforcement of GVCs for food-crops shall be developed observing the law as a benchmark. Article 5 of the law, for example, clearly writes that the objective of COOPs shall always contribute to promote the economy of the members. And an applicant for forming COOP is required to submit a technical and financial feasibility study of the project for which it is to be organized. This up-grading efforts of the standard of financial institutions, thus, have two references; of the final goal of satisfying the objective, and of the practical guide map, which is to be made by the members themselves, to reach the goal. The effort will start from helping them to conduct a feasibility study while keep reminding them of the objective of COOPs that they are organizing.

In the Study Area the formulation of organization across the different ethnicity has been found very difficult. First, therefore, as a counter-measure, a unit COOP would be organized based on

the farmers sharing something common such as residential area, irrigation block etc., if enough members can be recruited, then gradually induce them to form a union of COOP at the village level. Second, at the initial stage, the scope of a project would be as narrow as possible so that even the uninitiated could easily fathom the meaning, as are the cases with existing GVCs for production of Cacao and Coffee, whose activities are mostly limited to transporting and selling of the produce.

Then attention is directed to the division of labour in an organization, as poor management and unclear cash transaction seem to be an everyday occurrence. In the first instance, a clear-cut job description is to be written with an intention of rectifying the above mentioned constraints. They will be eventually best solved by letting the treasury section be independent from the secretariat section. The zone office of ANADER may supervise the process. It is to be asked to modify its system so that it will be able to provide accountants to co-ops and to educate their novices or recruits at the same time. The COOP concerned shall include the cost of remuneration to the accountants they have chartered in their budget.

The process of producing food crops for market starts from preparation of farmland and ends with selling the produce. This span may roughly be divided into processes of cultivation, after-harvest processing, and marketing, and each could further be sub-divided into segments. One can allocate required cost to each segment and estimate the corresponding financial benefits. So, a financial feasibility study could be conducted for any project that covers a certain part of the total process. The narrower is one's coverage of the span, the simpler is the structure of an OPA, but the more numbers of OPA are required to cover the total span. The optimal initial setup of each OPA depends on its natural, social and economic circumstances. They differ from a case to another.

Since farmers have been used to small groups such as GVCs, they are, first of all required to innovate their old way of thinking before their forming of huge cooperatives (Coop). The farmers understand that their GVCs will be replaced by one Coop, but they do not see the differences between GVC and Coop, especially the merits of Coop in comparison with GVC. Therefore they desire to have some training on cooperative for all the farmers in order to learn about their new organization. Moreover, the farmers hope to establish the system in which the farmers themselves, as members of Coop will be able to check the works done by the administrators and the account, so that they, most of the young farmers particularly, wish to receive a training for management of Coop.

D.1.5 Proposed Organizational Structure and Functions of Farmers' Organization

With the promulgation of the law of 97-721 relating to the cooperatives, the old law of 77-332 was abrogated on which the juristic persons of the present GVCs are based. A transitional period of three years will have been passed by December 2000. The proposed new cooperative must fully conform to the new law. Taking the prospect of having about 400 households in the Project Area into account, then considering the size favorable to negotiate a loan with a third party or to be the guarantor of the members who want to loan money into account, a single COOP for the entire Project Area may produce an optimum situation. Every participant of the Project shall be its member. In the final established stage, the organization of the COOP of Cité Agricole would look like an example given in Fig. D.1.2, though future circumstances surrounding the Project may dictate a certain necessary compromise here and there within room provided by the COOP law.

1) Basis of livelihood

The entirety of the COOP will consist of four or six (when the two bigger blocks are divided into two each) basic functional units, which are formed of between 60 and 90 owners of paddy fields located along the main canals of the Project. A formation of sub-units shall be required to facilitate fair distribution of water along the length of the tertiary canal network and to make the teamwork in a unit area, which is created due to a staggering period of farming calendar. Original residents who have been persevering with the farming will form the nucleus of the new unit to guide immigrants, making use of their experience as well as their tenacity.

Six committees are proposed to be set up to secure smooth operation of a rice double cropping. Each of them shall deal with affairs on irrigation, paddy farming, machinery, agricultural input, marketing and arbitration. Each committee handles both internal and external affairs (responsibility of negotiation with any third party rests upon vice president in charge) relating to its subjects. At unit level committee members shall be equal in number at first, and every member shall belong to one of them. At COOP level, each two elected members from the one at unit level from each of committees. Each committee elects chairman to represent itself in the directors' board. Each committee deals with daily affairs which are under its jurisdiction approved by the general assembly.

a) **IRRIGATION COMMITTEE**: It will establish the rules on the use of water aiming at its fair distribution, rights and responsibilities of users; they include providing the manual of O&M of the canals (including the Grand Canal), setting the irrigation water rate and pre-fixed O&M cost, and oversee their collection and O/M works, regular and contingent, coordinating labor requirement with the farming committee.
b) **FARMING COMMITTEE**: The committee will be responsible for organizing the contact groups for ANADER, propagating necessary farming information acquired through ANADER and CNRA or members, and encouraging research and development activities among members. It will manage a mutual labor exchange at the time of transplanting and harvesting, coordinating labor requirement with the Irrigation Committee.
c) **MACHINERY COMMITTEE**: This is a transitional set up to help the negotiation between 55 to 60 members of the COOP who will be owners of cultivators and the dealers smoothly under the PNR supervision in buying cultivators through KR-II channel. To provide owners with a part time job of repair and maintenance of machines may at first be carried out under its guidance to augment the dealers' aftercare service.
d) **INPUT COMMITTEE**: An existence of a COOP of almost 400 membership with almost 600 ha of paddy field under rice double cropping has corresponding negotiating power over the purchase of agricultural inputs. If inputs be bought by the arrangement of KR-II, the PNR would be instrumental to get a favorable deferred term. Purchase in bulk involves repackaging and warehousing. This service with created discount price, which is to be overseen by the committee, would surely entitle the management of the COOP to get commission from the members.
e) **MARKETING COMMITTEE**: It will negotiate the sale of paddy with established national mill operators, which usually join forces with transporters, and wholesalers. Destiny of the committee will depend on the marketing strategy which will be taken by the COOP. The committee could promote the positive course to be taken by the COOP.
f) **ARBITRATION COMMITTEE**: It will give verdict to enforce internal regulations stipulated by the statutes of the COOP or internal rules approved by the general assembly, such as on the compulsory minimum sales volume to the COOP by the members. It advises the executives

to take a step to follow it, as a judge in a trial by jury does. The decision may sometimes involve the exclusion of any offended member from the COOP; in that case, the article 27 of the COOP law is to be referred to.

2) Welfare of community

Voluntary groups are formed within the COOP and registered as such to the secretariat of the COOP. Through their activities, it is hoped that they will increase the feeling of amenity in the village life and mitigate the tension in a multi-ethnic society.

3) Council of administration (COA) = Directors' Board

Fig. D.1.2 gives the gist of the COA. It consists of four blocks, the executives, chairmen of six committees, representatives from the voluntary groups and the auditor cum legal advisor. Four executives are elected directly by the general assembly. The article 15 dictates that president and a vice president (VP) in charge of daily affairs are again elected by the COA members. Another VP is in charge of accounting and the third VP in charge of external affairs. Voluntary groups will be represented by three COA members, one of whom, at least, is a woman. The functions, duty and corresponding power of the board is clear-cut, as prescribed in the COOP law. Though the article 14 of the COOP law prescribes that the functions of administrators be without a fee, actual time spent for the execution of his duty would be compensated on cash terms. A professional accountant and a professional secretary will be employed. Remuneration for auditor cum legal advisor shall be budgeted.

(1) Preparatory Committee of Founding COOP (PCFC)

The Project Office shall work for formulation of the Preparatory Committee of Founding COOP (PCFC) for the Project in the early stage of the Project implementation, and during the construction period of the Project execute a special series of training of the new settlers and farmers who will take an active part in the farming practice in irrigated paddy field.

Besides its original objectives, matters of utmost concern of the PCFC include the formulation of a Water Users Association (WUA) of the Grand Canal with the other interested parties along it under the supervision of the government concerned, as it is obviously a lifeline to the villagers. The association will provide the legal foundation to define the rights and duties of the parties concerned on which collaboration and cost sharing with each other on the O&M of the Grand Canal will be negotiated.

D.2 Agricultural Research Institutions

Technology development for agriculture is carried out by eight (8) institutes; namely IDEFOR, IDESSA, CIRT, CIRES, I2T, LANADA, SODEXAN and WARDA. The main activities of some important institutes are as follows:

IDEFOR (*Institut des Forêts*)

IDEFOR is an organization in charge of agronomic research in forestry zone, belonging to National Center for Agricultural Research (CNRA) under the Ministry of High Education, Research and Technical Innovation. The main research activities are selection and improvement of variety, development of production and post-harvest technologies on the tree crops of coffee, cacao, cola, oil palm, coconut, rubber and fruits. In addition, research activities on forestry and

forestry agriculture are carried out. There are five departments, i.e., coffee and cacao (DCC), forestry, fruits and citrus fruits, rubber plants and oil palm plants. DCC has six (6) research stations. One of them, the San-Pédro Research Station is located in the Study Area with an area of 717 ha.

IDESSA (*Institut des Savanes*)
IDESSA is only one research and technology development organization in Côte d'Ivoire responsible for food crops, livestock and fishery, belonging to CNRA. The institute consists of four departments, i.e., food crop, livestock, industrial crop and fishery. The Food Crop Department deals with both lowland and upland rice, maize, sorghum, millet, yam, manioc, vegetables, soybean and groundnut. The Livestock Department and the Industrial Crop Department deal with sheep, goat, cattle, poultry, pasture and others, and sugarcane and cotton, respectively. The Food Crop Department has five regional centers in Bouake, Gagnoa, Man, Korhoga and Abidjan.

CIRT (Ivorian Center for Technological Research)
CIRT is also an organization for technology development, belonging to CNRA together with IDEFOR and IDESSA under the Ministry of High Education, Research and Technical Innovation. At present, these institutes are under restructuring of the organizations as a semi-government agency with a government share of 35 % capital.

WARDA (West Africa Rice Development Association)
WARDA is an international research organization under the Consultative Group for International Agricultural Research (CGIAR) dealing with scientific and technological development of rice production, which is located in Bouaké. The organization has contributed to the increased rice production in Côte d'Ivoire through the development of new varieties, which are adaptable to various ecological conditions and resistant to disease, pest and physiological problems.

D.3 Agricultural Extension Services

D.3.1 Institutional Frame work

"*Agence National d'Appui au Développment Rural* (ANADER)" was established in accordance with "*Le Programme National d'Appui aux Services Agricoles (PNASA)-Phase I*" in 1994 as a successor of CIDV, SATMACI, and SODEPRA. It has the sole objective of contributing to the welfare of the rural area as a whole by building up the professional agriculturists, be they farmers, foresters, animal breeders, fish growers, or fishermen. Its strategies are integral and its activities are versatile. It plans and executes a system of developing qualities of producers by:

- gives technical assistance to '*Organisations Professionelles Agricoles* (OPA)';
- collects and distributes useful information;
- does practical application of the achievements of research and technology development;
- feeds information to researches to help keep them in perspective;
- identifies the constraints that hinder rural development;
- identifies the relevant and competent government bodies to remove them; and
- participates in all the programs/ projects of rural development.

It has five directorates at the national level besides that for general affairs. They are 1) agricultural extension, 2) R&D, 3) supporting OPA, 4) development and management of human resources, and 5) financial and accounting matters. At the regional level, it has five technical services for the corresponding directorates at the center, except for the facts that 1) and 2) at the national level are

combined and that for follow-up and evaluation is included. The latter has the corresponding unit under the general directorate at the national level. It has further decentralized its function into the departmental level to satisfy the specific needs of individual agriculturists.. In pursuit of bringing up the rural families both in the food crop production and in the industrial crop production, the second phase of PNASA is going to be implemented in continuation to the first phase, while ANADER itself has been restructured.

ANADER has its office under the head of the zone (CZ) at the departmental level. In the physio-social environment of the field, the ideas and techniques which are brought by extension workers (CA) supported by the products of R&D and education interact with the ambivalent thought of individual agriculturists of all age. Its organization chart is given in Fig. D.3.1. CZ coordinates and controls several supervisors who subsequently assist and supervise CAs under them. CZ is assisted by several numbers of specialized technicians (TS) and specialists of the '*Organisation Professionelle Agricole*' (OPA) in his/her decision making process. CAs work with about 15 contact groups, each consists of 15 to 20 members. TS are responsible for maintaining the technical standard of CAs in the specific fields, and for finding the ways of adapting certain technique to the specific field condition. SOPs' principal concern is development of the '*Organisations Professionelle Agricole*' (OPAs) by bringing up their members, leaders and staff.

ANADER works in the field in cooperation with various organizations such as:

a) The government organizations such as regional offices (RO) of the administration, RO of MINAGRA, *direction de l'organisation professionnelle et du crédit*, and OCPV;
b) The chambers of agriculture ;
c) The Federations of OPA such as UNECA-CI, URECOS-CI, COOPAG-CI, CEACI, IPRAVI and UACI;
d) Government agencies such as CIDT and SODEFOR;
e) NGOs;
f) Financial organizations such as CREP/ COOPEC, commercial banks, social funds and guarantee funds; and
g) The development projects.

The new technologies and varieties developed by institutes/organizations are handed over to ANADER zone offices after adaptability tests which are carried out by the joint works between the institute and the regional ANADER offices at their observation fields. After the tests, the technologies are diffused to the farmers by the extension workers. Prior to the diffusion of the technologies, the extension workers undergo training about the new technologies from the staffs of the institute, the regional ANADER and the specialists of ANADER zone offices.

At present, nine (9) extension workers and one supervisor have been assigned in the San-Pédro zone unit in which the Study Area is included. In the zone unit, 67 villages with 2,470 farmers are located. So that, each extension worker takes care of 274 farmers on average. It is scheduled that the extension workers undergo training from the specialists of ANADER zone office on the 1st Friday and have meeting on the 2nd Friday in every month, and visit the same farmers' group at least twice a month to spread recommended technologies and to meet the farmers' technical problems. About the problems which can not be settled at the site level, the problems are sent to the specialists of ANADER zone office. If the solution is difficult at ANADER zone office, the problems are sent to the regional office or to the institute concerned. The urgent and biggest problem in the extension activities is the insufficient fuel budget for visiting farmers.

D.3.2 Agricultural Extension Services as a Development Component in San Pédro Paddy Irrigation Project

(1) Supply of Agricultural Equipment and Inputs

The following agricultural equipment with spare parts and inputs shall be purchased for the project through KR-II and ANADER:

- Power tiller (14 CV) : 60 units
- Spare parts: lump sum
- Sprayer: 366 units (383 farmers – 17 farmers)
- NPK (10:20:20): 120 tons (210 kg/ha x 575 ha)
- Urea : 60 tons (105 kg/ha x 575 ha)
- Herbicide: 5,750 lit. (5 lit/ha x 2 x 575 ha)
- WITA 7: 9.6 tons (50 kg/ha x 192 ha)
- WITA 8: 9.6 tons (50 kg/ha x 192 ha)
- WITA 9: 9.6 tons (50 kg/ha x 192 ha)
-

It is proposed that the arrangement of the above rice seeds is left to ANADER, San-Pedro, that is, ANADER produces the necessary amounts of seeds at the training and demonstration fields combining with farmer's training.

(2) Training and Demonstration

ANADER is considered to be the sole organization capable of providing the agricultural extension services to the farmers in Côte d'Ivoire. Therefore ANADER is expected to take responsibility on the technology extension services in paddy farming and tree crop farming to the farmers, the most important activities in the Project.

1) Farmers/Immigrants Training

Training of farmers / immigrants (384 persons) is to be carried out in a 30 ha a training farm, with pump irrigation facilities, during the period from February 2002 to February 2003 before the completion of field preparation of the Project Area as described below:

Training will consist of field practices and brief site lectures. Each trainee can get experience of recommended rice cultivation techniques throughout a whole rice-growing period in the assigned paddy field of 0.15 ha. The costs of necessary inputs for the rice cultivation such as fertilizer, herbicide, pesticide and land preparation by power tiller are to be paid by the trainee themselves after harvesting the paddy. The product obtained from the 0.15 ha lot belongs to the trainees. The main practices to be trained are as follows:

- Preparation of quality seed (selection of seed, pre-germination of seed, disinfection of seed)
- Establishment of nursery
- Raising of seedling
- Land preparation (plowing and puddling)
- Transplanting
- Application of fertilizer
- Weed control
- Disease and pest control

- In-field water management
- Harvesting, threshing and drying of harvested grains

The main lectures include;

- knowledge of scheduled rice double cropping ,
- Mutual use of agricultural labor,
- Irrigation system in the Project Area, and
- Scientific explanation of each farm practice.

Technical direction for cultivation practices and brief site lectures for rice cultivation technology are to be carried out by two (2) extension workers of ANADER, San-Pédro specially trained at CFMADG. The training schedule is given below:

Batch	No. of trainees to be received	Period of training	Cropping season
1	48	March/16 – July/28 (135 days)	1st season
2	48	April/01 – Aug/13 (135 days))	1st season
3	48	April/16 – Aug/28 (135 days)	1st season
4	48	May/01 – Sep/12 (135 days)	1st season
5	48	Sep/16 – Jan/28 (135 days)	2nd season
6	48	Oct/01 – Feb/12 (135 days)	2nd season
7	48	Oct/16 – Feb/27 (135 days)	2nd season
8	47	Nov/01 – March/15 (135 days)	2nd season
Total	383	March/16, 2002 – March/15, 2003	

2) Training of Extension Workers

At least two persons are needed to works as full time agricultural extension workers in charge of the Project Area are needed. Therefore, prior to the above farmers /immigrants training, two extension workers of NDER, San-Pedro are to be selected and specially trained at CFMAG on theoretical and practical aspects of mechanized irrigated rice cultivation.

(3) Demonstration of Developed Technologies

The demonstration is to be performed using the actual farmer's farmland in the Project Area as follows:

Scale	Demonstration
1 plot for each field lot of 0.3 ha	Rice double cropping by transplanting
1 plot for each field lot of 0.3 ha	Rice double cropping by direct sowing
1 plot for each field lot of 0.1 ha	Vegetables(tomato for the 1st season and lettuce for the 2nd season)

The demonstration activities for vegetable cultivation have to be carried out carefully with technical support of CNRA.

(4) Technology Assistance from Overseas Rice Expert

Technology transfer to immigrants, who have scarcely any or no experience to irrigated rice cultivation, is very important to the success of this Project. Through the demonstration of high-yielding crop situations and best farm management practices such as land preparation and weed control by the establishment of demonstration plots, appropriate technology will be transferred to

them. In order to succeed with the farmer's training and the demonstration activities, effective support of Japanese rice experts on regular basis and JOCV fulltime work tied up to the experts might be required.

D.4 Farmers Credit and Loan

D.4.1 Financial Institutions

(1) Farmers Credits

For the individual farmers and *Organisation Professionelle Agricole* (OPA), after *Banque Nationale pour le Développment Agricole* (BNDA) was liquidated, only two savings and credit cooperatives have been available nationwide. One is the *Caisse Rurals d'Epargne et de Prêts* (CREP) and the other is *Coopérative d'Epargne et de Crédit* (COOPEC). In general, as the name suggests, CREP's market is rural area and COOPEC for the urban and suburban area. But as is the case with San-Pédro city, where there is no branch office of CREP in its neighborhood, COOPEC welcomes the rural residents to join. As of Jan.1996, CREP consists of 56,000 members with savings of F.CFA 4 billion; and as of June 1998, COOPEC had 34,000 members with savings of F.CFA 2 billion. As of the same date, San-Pédro branch of COOPEC has 700 members with savings of F.CFA 43 million. The savings do not bear interest. COFECI (*Cooperative de Financement et d'Epargne de Cote d'Ivoire*) is an agent of COOPEC in Gabiadji adjacent to the Study Area.

Activity of COOPEC San-Pédro, as of June 23,1999

	member #	Saving a/c #	Amount CFA franc	average CFA franc
San Pedro	691	778	42,565,794	54,712
Côte d'Ivoire	34,215	25,826	1,937,873,350	75,036

Source: San Pedro Branch, COOPEC
Minimum saving = F.CFA 2,500, Minimum membership = F.CFA 10,000

After the 1994's denomination, four funds related to agriculture have been created by the Government. They are:

a) Supporting fund for facilities and activities for young agriculturists;
b) Fund to develop animal production (for animal husbandry and fishery);
c) Fund for crop diversification and export promotion (for producers and exporters of newly introduced crop, and for producers and processors of newly introduced food crop); and
d) Fund for rebuilding of coffee production.

Among them the most related fund to the integrated rural development is a) Supporting fund for facilities and activities for young agriculturists. Part of San-Pédro Paddy Project, which founded Cité Agricole Village, are realized by mobilizing the young modern farmers. The fund, however, has no basic reserved fund. It relies on the promoter of a development project for the principal. ANADER organizes the recruit and education of the young farmers to see to it that they will establish themselves as a member of healthy OPA, for which finance is another important factor along with the human resources.

A few tiny scale mutual financing association (local name: *tonchin*) of around 20 members are founded among women's organization in the Study Area. A Catholic NGO in San-Pédro city runs

a public safe which opens seven days a week for the convenience of the farmers in the Study Area. There are a few NGOs, which have been running small-scale credit operation among the farmers in the Study Area.

(2) Rural Finance

For the building of rural social infrastructures such as school buildings, rural roads and other agricultural production facilities, *Fond pour Rehabilitation de L'Area Rural* (FRAR) has been allocated in the national development budget. As of the end of 1996, a sum of F.CFA 85.9 billion had been invested to 9,127 projects out of 15,648 proposed plans (9.4 million on average, ratio of realization: 58.3%). 83% went to school buildings, 11% were invested to rural roads and the rest went to various types of agricultural production facilities. The money allocated by FRAR covers between 75 and 78 % of the total project costs and the rest are shouldered by the concerned federation of communes (Table D.4.1).

D.4.2 Agricultural Credit

Agricultural credit can be sub-divided into credit to industrial crops and that to food crops. The first has been handled by commercial banks, but the latter has not attracted them, though there have been a lot of demand for it in the Study Area. There have been two obstacles in the business of rural credit. The first one is financial costs with which the commercial banks have been burdened. They have exceeded the income expected from the interest to be received. The second is that, in many cases, the farmland could not be placed as collateral, because of the lack of liquidity.

On the other hand, any OPA that has no previous record of credit worthiness at its initial stage of project planning shall have no choice but to make an effort to show them its potential to repay an expected loan by exhibiting the feasibility of the plan and keeping the account open to the lenders.

Prior to implementation of the priority San Pédro Paddy Project, at least the following farming funds shall be arranged:

Item	Quantity	Unit Rate	Cost (F.CFA)	Remarks
Power tiller (14 CV)	60 units	3,000,000	180,000,000	Cost w/o spare parts
Manual sprayer	366 units	35,000	12,810,000	
NPK (10:20:20)	120 tons	190,000	22,800,000	
Urea	60 tons	170,000	10,200,000	
Herbicide	5,750 lit.	6,000	34,500,000	
Total			260,310,000	

Notes : Repayment period Power tiller (14 CV): 5 years (F.CFA 600,000/year/unit x 5 years)
Others: 6 months to 1 year.

D.4.3 Initial Farming Fund for New Settlers

Before starting the rice farming in Cité Agricole as farmers, all the new settlers have to have their own house to live, a few scores of farmers have to buy cultivators at their own risk, and all of them have to buy agricultural input before the first trial. The first two cost them in the order of three million CFA franc each, and the third around hundred thousand. It is obvious that few could afford to do without relying on loan. Yet, to begin with, they must have some hundred thousand CFA franc for down payment to house, water rate and contribution to create a COOP, which will act as their main guarantor, before lenders are invited to negotiate. Here is a sketch for three aspects of future cash flow of those who will cast in their lots with the priority Project.

(1) Capital Formation by Self-help

Construction works for the Project are estimated to involve about 83 thousand unskilled labour during the period of two years (114 man-day on average for 730 days). A net daily wage is estimated at F.CFA 2,850, which is around three times more than ordinary agricultural wage. If one saves two thirds of one's daily wage, an accumulated amount of saving would reach F.CFA 300,000 after 158 days of labor. On the other hand, at a rough estimate, if all the 384 members of the COOP give a laborer each to the construction works for 158 days, 73 % of the total un-skilled labor would be allocated to the major future beneficiaries, which looks reasonable.

(2) Agricultural Machinery

One in seven immigrant households is required to have a cultivator to create an optimum situation in coping with the paddy farming schedule, having taken its capacity and price into account. As is the case with building of accommodation, among the selected relatively well-off immigrants who have savings or pensions and those who have supports from relatives of his/her original town will be entitled to be one of the '*Paysant avec Motoculture* (PPM)' by buying the cultivators through the arrangement of the KR-II. The majority will need funds to buy them. The PNR, which has been managing the process of distribution, could be of instrumental to their negotiation.

Those who do not need to spend the saved 300 thousand F.CFA for their housing purposes, mostly the present residents of Cité Agricole, could be candidates to be the owners of cultivator. By rendering service of plowing to six satellite farmers, the owner can claim 1.08 million F.CFA a year. Half of it will go to installment, and the other half for depreciation. Interest aside, with adding 120 thousand from their own pocket, they will be able to pay back the debt in five years time, while the redemption fund will be ready at the same time for trading a new ones. From that time onward, all the money earned by extracting useful life from the cultivator will be net profit to them.

(3) Agricultural Input

During the initial years of the Project, input will have to be bought either on credit or using a low-interest input loan. As major part of input can be bought through the arrangement of the KR II, the PNR, which has been managing the process of distribution, could also be helpful to their negotiation.

Then some of private sector initiatives are found even now in lending short term money to agriculturists. One of them is *'Fonds Ivorien de Developpment et D'Investissement (FIDI)'*. The conditions of the loan are as follows:

i)	the minimum amount	: F.CFA 50,000,
ii)	interest rate	: 15% per year,
iii)	term of the loan	: 4 months, and
iv)	with guarantee.	

Table D.1.1 Farmers' Organizations and Other Groups in the Project Area

Group	Status	No. of Members	Age group	Creation	Support	Objectives	Activities	Way of Working	Common Equipment	Funds	Problems	Plan for Project	Expected Training
GVC FCA	official	18	24-45	1994	UNFPA	To help the men in difficulties after the failure in last irrigated paddy project	Market gardening (in dry season) Food crops (in rainy season)	Individual In group	Sprays and all kind of tools	Mutual aid fund Contribution according to cropped area	Lack of available / suitable land for maize Lack of fund	Having common plot in the Area to cultivate rice and vegetables	Rice culture Market gardening Breeding Read and write Sewing
GVC Femmes	unofficial	31	18-55	1998	DES WFP	To support school canteen	Rice Cassava Market gardening	In group Individual In project	Using FCA's equipment	Contribution for each cropping cycle	Lack of fund Lack of technical support	Mutual aid fund Fish raising Having common plot in the Area	Read and write Market gardening Breeding Family economy
Pupils' Association	official	177	5-14		PTA	To experience farming works To raise funds for its activities	Market gardening Contract works	In group	Nothing Brought by each one	All profits going to association's funds	Lack of farm tool No fixed plot	Helping parents	
Young farmers group	unofficial	15	15-34	1998	-	To help each other in work To have mutual aid fund	Contract works Maize	In group	Nothing Brought by each one	Common fund pooling profits from contract works	Lack of farming techniques Plot on lease	Market gardening Poultry Sports activities	Irrigated rice Organization management
GVC Nord Sud Centre Ouest	official	13 27 18 15		1991 / 1995	-	To find new sources of funds or credits	(irrigated rice) No activity for now		Nothing	No fund No credit	No irrigation water No fund	Resumption of irrigated rice cultivation	Retraining on irrigated rice Market gardening Machine operation
Lyceé Prof.		24		1985	-	To get input & machines in credit	Rainfed rice Market gardening	Partially in group Individual	2 moto-culteurs	"	"	"	"

Relations between GVCs and external conditions during/after the former project

	1976 - 1985	1985 - 1991	1991-
Coordination unit	Meeting of representatives of 13 GVCs	CCGR (Comité Central de Gestion et Redressement)	Union of GVCs (4GVC s by bloc)
Its president	-	Primary : S/O , Secondly : farmer (1989 -)	Representative of farmers
Cropping calendar	Given by supporting organization (S/O)	Proposed by supporting organization	Programmed by Union, approved by S/O
Water management	Controlled by Taiwanese expert	Managed by Ivorien stuff from the supporting organization and watching group of farmers	
Source of funds	Subsidy from the State (until '92) / Loan from BNDA (until '88)	Direct acquisition of input on credit from the manufactures	
Payment of loan	Joint responsibility in the GVC	Joint responsibility in the CCGR	Individual responsibility (CCGR-farmer)

Table D.4.1 Required Villagers Contribution under FRAR (*REGIONAL FUND FOR RURAL DEVELOPMENTS*)

San-Pédro as of 1998

Category	Village Contribution	
	Center	Satellite
I - PRODUCTIVE		
1.1 - Agriculture		
Agro-pastotal Center	35	35
Clearing (low-land, cultivation plot)	35	35
Improvement of cropping plot	35	35
Polyvalent water reservoir	35	35
hydro-pastoral improvement	35	35
Hydro-agricultural improvement	35	35
windbreak	35	35
Storage	35	35
Agricultural material	35	35
Installation production of seed	35	35
Cadastre (Readjustment of village plot)	35	35
Plantation village's forest	35	35
Existing forest improvement	35	35
Firebreak	35	35
Erosion control	35	35
Food crop packaging-unit	35	35
Agricultural products transformation-unit	35	35
Small agricultural exploitation	35	35
1.2 - Livestock		
Breeding center (building + Fence)	35	35
Cattle yard	35	35
Main breeding	35	35
Installation of feeding-place	35	35
Pastoral category	35	35
Slaughter house	35	35
Rural Slaughter house	35	35
Manufacturing unit of cattle food	35	35

Category	Village Contribution	
	Center	Satellite
1.3 – Fishculture		
Fishculture bed	35	35
Fishes packaging unit	35	35
Aquaculture box	35	35
Manufacturing of fishes' food	35	35
1.4 – Marketing		
Market with 4 rows	35	35
Market with 6 rows	35	35
Cattle market	35	35
Kiosk	35	35
Rural butcher's shop	35	35
Cold storage	35	35
Cooperative shop	35	35
Craftsmen center	35	35
Tourist site development	35	35
Village hotel	35	35
Bus station	35	35
1.5 - Others		
Cooperative workshop	35	35
Rural sawmill	35	35
Craftsmen center	35	35
Tourist site development	35	35
Village hotel	35	35
Bus station	35	35
II – COUNCILOR'S CHARGE		
Housing estate	35	35
Construction of roads	35	35
Construction yard for houses	35	35
Sanitation	35	35

Table D.4.1 Required Villagers Contribution under FRAR (*REGIONAL FUND FOR RURAL DEVELOPMENTS*)

Category	Village Contribution	
	Center	Satellite
Public Toilet/latrines	35	35
III - EDUCATION		
Extension three-rooms school	45	45
Creation three-rooms school	45	45
Extension two-rooms school	45	45
Creation two-rooms school	45	45
School master houses	45	45
School repairing	45	45
Reconstruction of school	45	45
School equipment	45	45
School electrification	45	45
Repairing class room	45	45
Houses' electrification	45	45
School canteen	45	45
School sanitary	45	45
House's sanitary	45	45
School's fence	45	45
School garden	45	-
House of school-garden teacher	45	-
Garden's fence	45	-
Rural culture center	45	-
IV – HEALTH		
Rural dispensary	35	-
Rural maternity hospital	35	-
Health center	35	-
Maternity hospital accommodation	35	-
Maternity shelter	35	-
Hospitalization room	35	-
Health-center's fence	35	-
Health-center equipment	35	-
Electrification of health-center	35	-
Nurse's house	35	-
Midwife's house	35	-
House electrification	35	-
Water tower for Health-center	35	-
Sanitation for Health-center	35	-
Pharmacy	35	35
V- WELL DRILLING (HV)		
Drilling	50	50
Tank	50	50
Pump repartition	50	50
Watering place	50	50
VI - HVA		
Water supply	50	50
Water distribution	50	
VII - ENERGIE		
Installation of generator	10	10
Renewable energy	10	10
Connection into the network	10	10
VIII - OTHERS		
8.1 – Postage		
Rural telephone	50	50
Rural distribution center	50	50
8.2 - Communication		
Construction of farm's road	50	50
Farm's road development	50	50
Bridge and small bridge	50	50
8.3 Youth And Sport/Social Affairs/Women Promotion		
Polyvalent center	50	50
Cultural center	50	-
Social centers	50	-
Equipment/Facilities for center/special school	50	-
Electrocution for center/special school	50	-
Special school for women	50	-
Special school for youth	50	-
P.M.I (Women and infant protection)	50	-
Sports yard	50	50

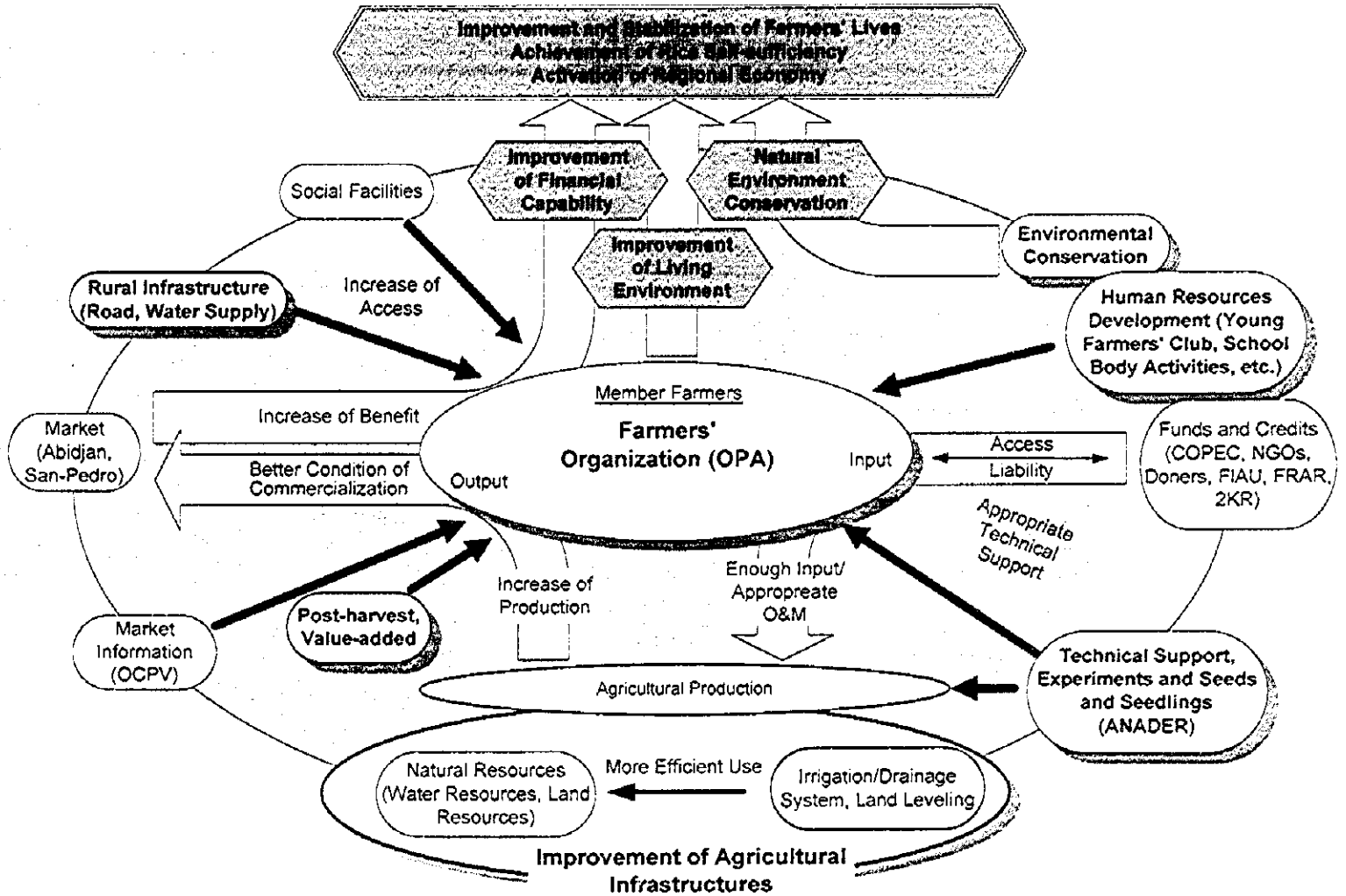


Fig. D.1.1 Farmers' Organization (OPA) in Rural Development

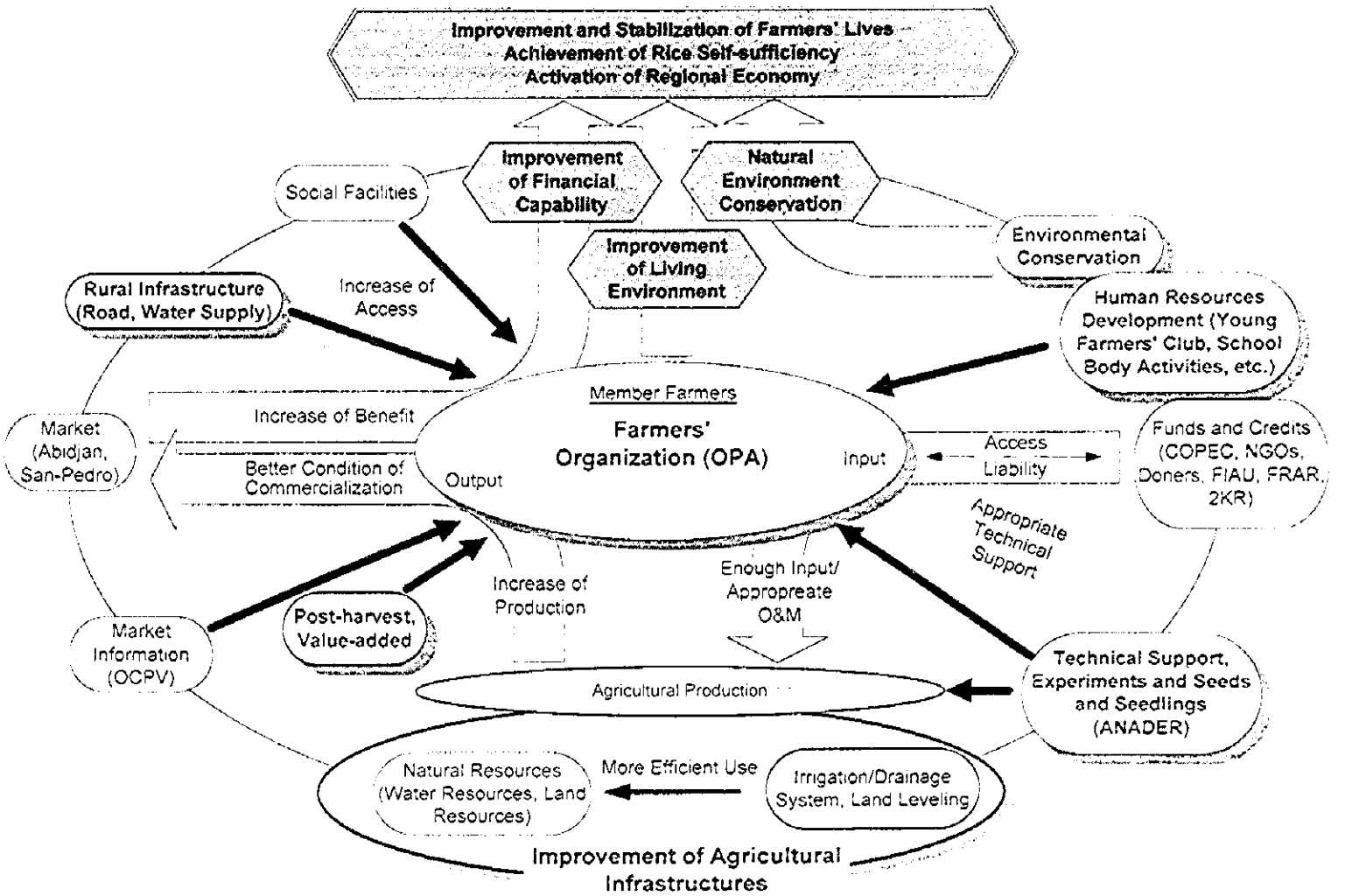
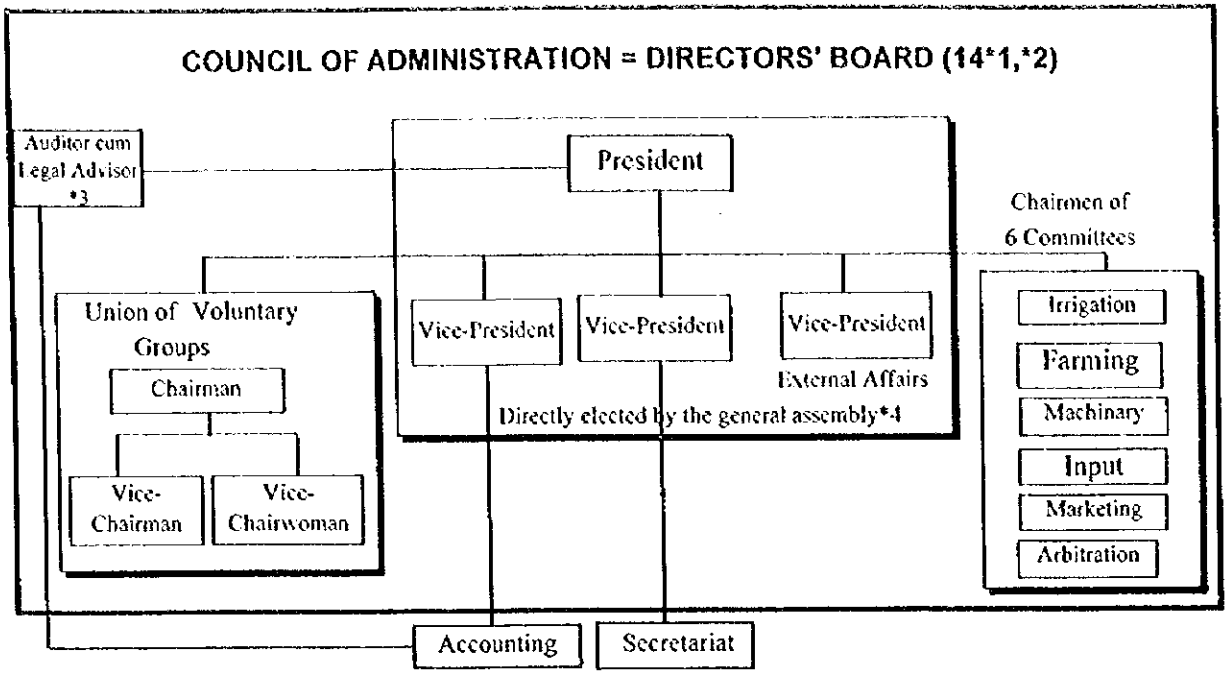
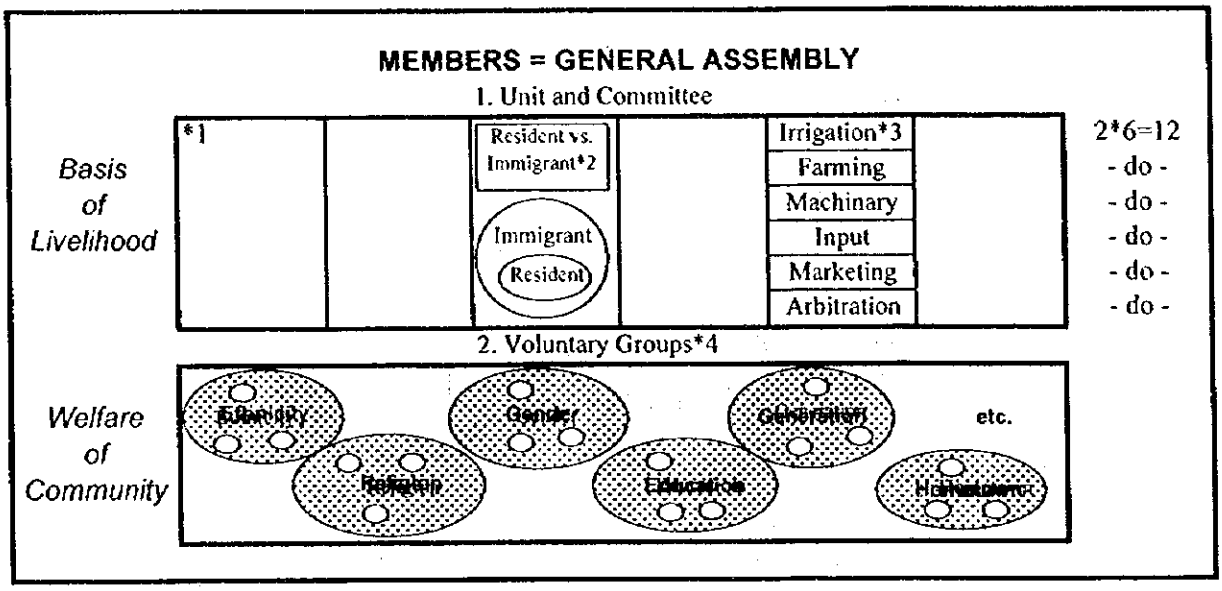


Fig. D.1.1 Farmers' Organization (OPA) in Rural Development



*1: () =quorum
*2: each post cannot be held concurrently.
*3: nominated by the general assembly from outside the members.(article 22, Co-op law)
*4: minimum quorum is three. (article 13, Co-op law)



*1: 4 or 6 units along the main canals, 60 to 90 households/unit.
*2:Residents form the nucleus of each unit.
*3: the committee consists of 2 members each from sub-committees at unit level.
*4: an example of genres of group. They are registered at the secretariat.

Fig. D.1.2 Proposed Farmers' Organization for the Project

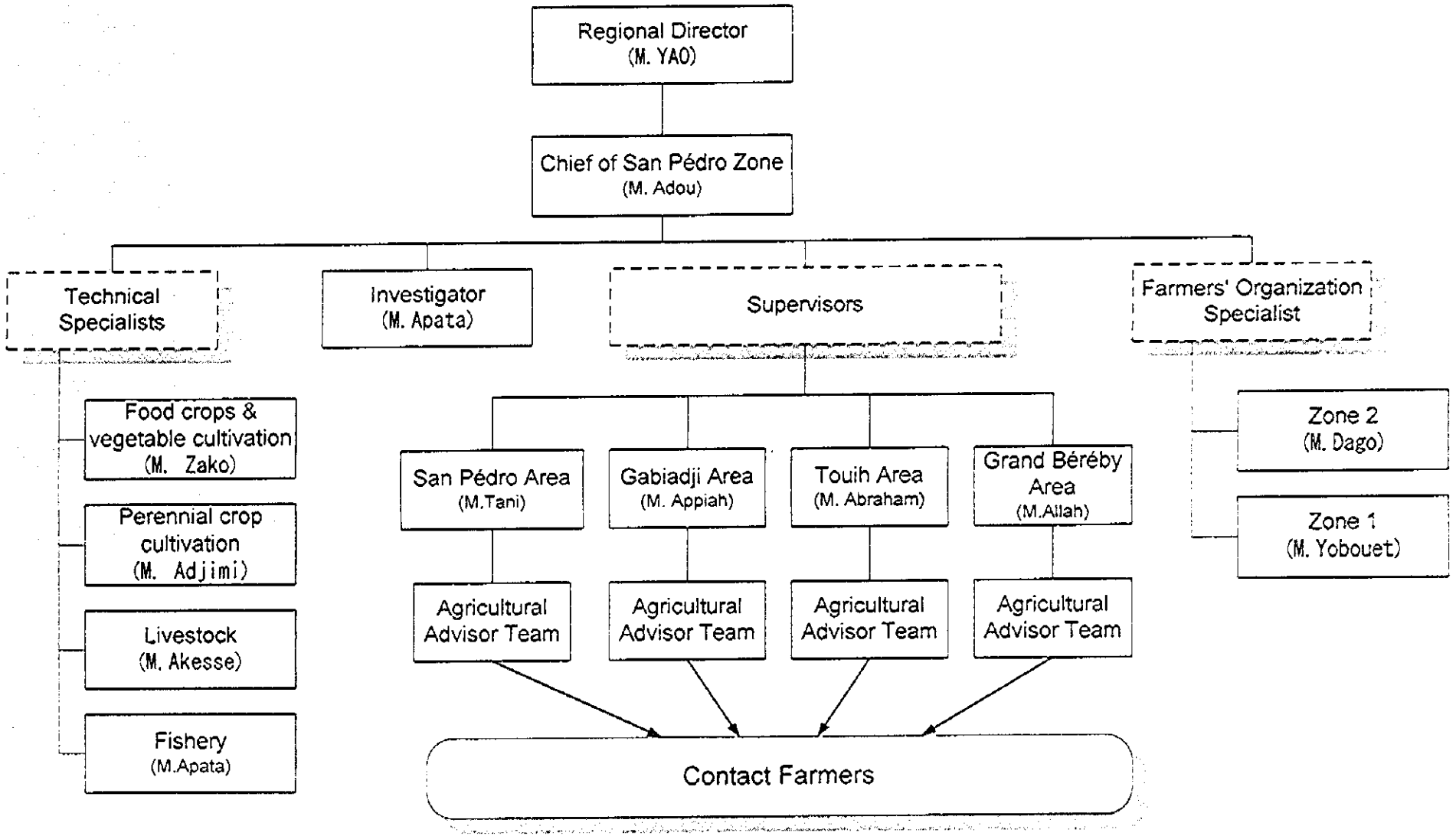


Fig. D.3.1 ANADER San-Pédro Zone Office

E : AGRO-INDUSTRY AND MARKETING

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E : AGRO-INDUSTRY AND MARKETING

E.1 Agro-Industry

E.1.1 Rice based Agro-industry

Among the post-harvest processing of the food crops in Côte d'Ivoire, scale-merit expected from industrialization is counted only for that of paddy/rice; at present, the local maize production has no competition with imported ones, and wheat is not grown in Côte d'Ivoire.

In recent past, AGRIVOIRE used to build and run ten big scale rice mills of 44,000 ton processing capacity a year in average with silos of 10,000 ton/unit around the country. And MOTOGARI controlled the mechanization process of the agriculture when the government bodies controlled the whole range of industries before they are privatized. After privatization, some of them were relocated according to the new owners' commercialization strategy. One in San-Pédro, a port city, for example, was dismantled and transported to the production centers, as the imported rice are mostly polished. There are about 3,000 small-scale mills in Côte d'Ivoire.

In the Study Area, there used to be a rice mill with a stock capacity of 10,000 tons built by AGROPAC at 2.5 km on San-Pédro - Soubré road. The facility had not been utilized properly partly because of lack of modern transportation and partly because of insufficient running costs according to AISSA report. It was sold to OCTIDES Industries at the time of privatization. OCTIDES tried to re-generate irrigated paddy cultivation in the village of Cité Agricole, but left after a trial of single crop because the participant farmers declined to continue. It was then changed hand to Jean Abile Gal, a big cacao-coffee exporter, which relocated the mill to one of its operation center in Bonguanou, located in the central east part of Côte d'Ivoire. The remaining silo is now used to keep cacao and coffee beans, which it has collected from the private growers of the surrounding area. A rice mill with dry-yard was installed by CIDV at the northeast corner of the Cité Agricole Campus II in early 1990s. It was functioning any more at present. Another silo in the port is owned by Grand Moulin, Abidjan. It is used to keep imported wheat. Flour units of mill is attached to the silo.

Imported rice does not require any industry to polish but warehouses. Local rice produced around the area is quantitatively not much, and very small-scale polishing machine can do the job, which are found at the back of the San-Pédro market. In the Study Area, there are two rice mills now; one in Petit Pédro owned by a GVC, the other in Cité Agricole owned by a private hand, which does a job of milling for the nearby farmers at the rate of F.CFA 20 /kg.

E.1.2 Development Perspectives

In the Master Plan for integrated rural development establishment of *Organisation Professionalle Agricole* (OPA) for agro-industry is conceptualized and these OPAs are expected to behave themselves like business-minded concerns and take part in any necessary agro-industry to improve the quality of their produce.

In the feasibility study on San-Pédro Paddy Project Area, Post Harvest Improvement Program is envisaged. Activities on post-harvest improvement program start from drying and storing of the crops before entering into further processing. Appropriate OPA could be formed to provide the space with or without roof for members' use. Improvement in quality during these processes will contribute to fetch a correspondingly higher price. Then actual processing will begin. In the

food-crops sub-sector, there are the processes of threshing and polishing of paddy, and flour milling of maize and cassava. Parboiling of paddy creates not only a higher value-added product, but also produces nutritionally enriched foodstuff for farmers' household use; and could be brought into this process. The process, which so far carried out by individual farmers, could be managed by any OPA. Then stocking of the produce is very important part of the process, as OPA could keep the produce until market is favorable to the seller, if they can financially afford to do so. To increase this type of affordability is an ultimate aim of the program, and the market information is obtainable through OCPV. Furthermore making an investment in more efficient mill than those used at present would be another important move in this process. Investment program of this activity is crucial to raise the overall productivity.

It is proposed to establish communal concrete drying yard, grain storage and rice milling facility in San-Pedro Paddy Area because the large amount of harvested paddy, around 4,500 tons/season in the area or around 15 tons/household/season. The grain storage and the rice milling facility turn to farmers' advantage for the marketing. The details are as below:

a) Concrete yard: 2,000 m^2 (25 m x 40 m x 2)
b) Storage: For 2,530 ton of paddy
c) Rice milling machine: Capacity- 1 ton of paddy / hour x 2 units

There always exists tendency of over-investing in drying and storing, because all the year round the facilities are idle except for the twice a year peak periods. In the investment plan, removable arrangement or alternative use be planned so that it can be used by other purposes when the lot is vacant, like drying tree crops or storing agricultural inputs.

E.2 Agricultural Marketing

E.2.1 Present Status of Agricultural Marketing Channels

In Côte d'voire, the marketing of the food crops is very much dispersed, on the contrary to that of cash crops that is handled by a score of specialized establishments. Generic marketing of food crops starts with the visits of middlemen to farmers' fields, where contracts are bound at the spot, and the produce is transported to the designated market place. The middlemen have the upper hand over the farmers in this situation. The latter have been trying to make the situation an even bargain by organizing themselves in the form of, at least, "*Groupement Informel* (GI)" or, better still, "*Groupement à Vocation Coopérative* (GVC)" with the help of government agencies.

"*Office d'Aide pour Commercialization des Produits Vivriers* (OCPV)", was established in the Ministry of Commerce in 1994 by a policy of achieving self-sufficiency of food to assist to raise efficiency in the marketing system of the food crop production. It spreads such economic and commercial information on food crops as prices, quantity, timetable, area of production, etc; upgrades infrastructures of markets in question to such a degree to fit into the level of its national network; and supports the commercial transactions between producers, wholesalers, transporters, retailers and consumers.

In the Study Area, SCAF, Fahé, as well as Gabiadji, have a daily market. A weekly village market, where barter transactions also take place, opens on Fridays at Petit Pédro, and on Sundays at Blaou and Cpt. Colonel. Cpt. Bernard is too close to the San-Pédro market to hold a weekly market. Small-scale vegetable cultivation such as tomatoes and eggplants are found in many villages. They have been trying to penetrate into the San-Pédro market.

In the San Pédro Paddy Irrigation Project Area, there are no specific agricultural marketing activities either. During the dry season, a few immigrants grow vegetables along a network of drains in the area, and sell the produce at the nearby local markets. A sheltered market place was installed in front of the primary school grounds in Campus II of Cité Agricole.

E.2.2 Market Price of Agricultural Commodities

The monthly market price of food crops and vegetables are given in Table E.2.1 and E.2.2 for the year 1997 and 1998 respectively. By and large, the commodity prices in 1998 are higher than that of the previous year. Moreover, seasonal fluctuations in both wholesale and retail prices are observed in all staple foods and vegetables. Regarding the market price of imported rice, t he Government has set an indicative sale price to the imported rice according to its quality. On the other hand, for the domestic paddy production, the Government set an indicative farm gate price of paddy at F.CFA 110 /kg before devaluation. As of 1997, paddy was normally sold between F.CFA 130 and F.CFA 150 at the farm gate. Among the prices of agricultural machinery and inputs, even the price of certified seeds are being decontrolled. Nor agriculture sector has any privilege of asking special discount rate in using fuel comparing to other sectors, as the price itself is being liberalized.

E.2.3 Development Perspectives

In the Mater Plan for Integrated Rural Development, both improvement of market access and Improvement of market information are envisioned with OPAs taking active role in marketing activities as a business enterprise. In general, as a business enterprise, OPAs are proposed to take part in marketing activities including collection of up-to-date market information. At the moment OCPV provides some of them.

In the improvement of marketing system for paddy, the final scope is to establish its own brand-name in polished rice market, like 'SUN' of Australia, for example. It requires good planning, excellent quality control and targeting the niche market. Therefore it is still too early to have a control unit of production in the Marketing Committee. The commodity of the sale being paddy in bulk, it is recommended that the COOP concentrate its effort to raise and stabilize the quality of paddy by regulating/controlling the drying process and storing process as the first step. Probable strategy may be to approach big scale buyers on blanket contract with as much volume as possible. Its contract had better be pre-arranged by assessing the quality at the paddy field when it is ripen. Meanwhile, small-scale local mill operators can meet the demand for threshing and polishing for domestic use. Good roads and passable transportation equipment are two other indispensable means to retain the quality of their produce as close as the level of finished products just after the processing, though they are out of bound of this marketing program.

Table E.2.1 Market Prices of Agricultural Products in San-Pédro (1997)

Unit: CFA/kg

WHOLESALE																	Year of 1997		RETAIL															
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	No.	Average	Max. (A)	Min. (B)	A/B			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	No.	Average	Max. (A)	Min. (B)	A/B
225	237	250	250	250	250	267	300	275	275	275	275	12	261	300	225	1.3	Rice	local	250	262	275	275	275	275	292	325	300	300	300	300	12	286	325	250	1.3
-	-	218	219	220	220	228	240	240	240	240	240	10	231	240	218	1.1	Rice	imported	-	-	246	247	250	250	258	275	275	275	275	275	10	263	275	246	1.1
65	75	75	75	75	100	125	125	125	-	-	100	10	94	125	65	1.9	Yam	Bete-Bete	75	100	100	100	100	125	150	150	150	-	-	125	10	118	150	75	2.0
65	75	75	75	75	100	125	125	125	-	-	100	10	94	125	65	1.9	Yam	Florido	75	100	100	100	100	125	150	150	150	-	-	125	10	118	150	75	2.0
130	125	110	118	172	-	-	-	-	-	-	225	6	147	225	110	2.0	Yam	Kingle	155	150	150	164	225	-	-	-	-	-	-	250	6	182	250	150	1.7
142	-	-	-	-	-	-	278	200	175	187	225	6	201	278	142	2.0	Yam	Kponan	167	-	-	-	-	-	-	328	250	200	212	250	6	235	328	167	2.0
100	-	-	-	-	-	-	205	150	125	144	200	6	154	205	100	2.1	Yam	Assawa	125	-	-	-	-	-	-	255	200	150	169	225	6	187	255	125	2.0
-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	*Cassava*	sweet	75	80	78	73	76	74	74	75	77	85	75	80	12	77	85	73	1.2
308	320	240	273	282	275	287	280	430	308	265	320	12	299	430	240	1.8	Potato		400	400	325	350	350	350	350	350	500	420	400	400	12	383	500	325	1.5
-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	*Banana*	plantain	81	87	75	98	119	145	180	194	145	131	124	114	12	124	194	75	2.6
118	112	110	115	144	156	153	110	109	97	106	105	12	120	156	97	1.6	Maiz		160	162	150	150	183	200	200	150	150	142	150	140	12	161	200	140	1.4
276	262	250	225	225	225	225	225	225	225	225	219	12	234	276	219	1.3	Millet		300	287	275	250	250	250	250	250	250	250	250	250	12	259	300	250	1.2
225	225	212	200	200	200	200	200	200	200	200	200	12	205	225	200	1.1	Sorgham		250	250	237	225	225	225	225	225	225	225	225	225	12	230	250	225	1.1
159	142	102	84	91	113	119	106	86	91	118	115	12	111	159	84	1.9	Palm	grain	267	254	199	186	191	228	230	195	188	189	220	219	12	214	267	186	1.4
379	387	412	450	517	537	517	475	405	410	436	432	12	446	537	379	1.4	Groundnu	husked	450	450	475	494	567	600	600	550	500	500	500	500	12	516	600	450	1.3
-	-	-	-	-	67	-	-	-	-	65	-	2	66	67	65	1.0	Avocado		132	140	161	133	107	99	108	143	138	128	135	151	12	131	161	99	1.6
200	150	175	250	250	237	233	300	275	270	250	230	12	235	300	150	2.0	Ginger		250	200	225	300	300	287	283	350	350	320	300	280	12	287	350	200	1.8
128	156	288	286	311	284	98	92	46	69	77	84	12	160	311	46	6.8	Tomato	standard	263	329	445	470	511	500	274	176	207	219	235	221	12	320	511	176	2.9
350	550	550	433	514	750	733	687	300	210	325	637	12	503	750	210	3.6	Tomato	ODEFO	453	660	664	579	623	901	769	804	402	339	464	775	12	619	901	339	2.7
94	147	178	214	143	116	123	123	176	134	84	84	12	135	214	84	2.5	Egg plant		192	269	320	397	312	277	247	272	283	254	194	190	12	267	397	190	2.1
178	163	259	257	165	147	133	210	164	231	168	60	12	178	259	60	4.3	Okra	fresh	290	306	387	388	298	270	248	379	316	366	313	159	12	310	388	159	2.4
313	208	250	329	189	100	144	152	302	208	183	170	12	212	329	100	3.3	Capsicum	fresh	426	299	361	455	308	239	251	313	432	338	302	275	12	333	455	239	1.9
-	-	-	-	-	-	-	-	-	-	-	378	1	378	378	378	1.0	Cabbage	green	443	352	381	343	540	546	488	404	298	361	405	406	12	414	546	298	1.8
-	-	-	-	-	-	-	121	-	-	-	-	1	121	121	121	1.0	Cucumber		182	204	207	214	182	232	260	248	172	154	136	176	12	197	260	136	1.9
900	700	-	-	-	-	700	800	775	725	675	733	8	751	900	675	1.3	Carrot		####	877	-	-	-	800	882	900	900	850	829	876	9	880	1,009	800	1.3
367	367	400	500	389	460	425	236	437	270	256	375	12	374	500	236	2.1	Haricot	green	446	507	494	626	528	571	650	335	577	418	398	489	12	503	650	335	1.9
-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	*Lettuce*		276	270	375	491	462	499	516	341	226	320	389	430	12	383	516	226	2.3
333	300	283	322	300	300	300	350	300	-	-	300	10	309	350	283	1.2	Shallot		400	350	333	372	350	350	350	400	400	-	-	350	10	366	400	333	1.2
308	310	210	204	227	220	237	237	310	276	320	340	12	267	340	204	1.7	Onion		370	375	375	300	300	300	300	300	375	350	387	400	12	344	400	300	1.3
-	-	-	-	-	-	-	77	60	36	33	-	4	52	77	33	2.3	Orange		83	100	182	112	84	78	81	116	94	76	68	69	12	95	182	68	2.7
-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	*Mango*	KENT	-	-	-	192	189	132	-	-	-	-	-	-	3	171	192	132	1.5
-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	*Mango*		-	-	244	204	184	112	-	-	-	-	-	-	4	186	244	112	2.2
-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	*Lime*	green	192	-	195	127	154	263	145	140	113	106	153	138	11	157	263	106	2.5

Source: OCPV, San Pedro

Name: No wholesale markets

Name: Wholesale markets are established only in a few months

Table E.2.1 Market Prices of Agricultural Products in San-Pédro (1997)

Unit: CFA/kg

WHOLESALE																	Year of 1997		RETAIL															
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	No	Average	Max (A)	Min (B)	A/B			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	No	Average	Max (A)	Min (B)	A/B
225	237	250	250	250	250	267	300	275	275	275	275	12	261	300	225	1.3	Rice	local	250	262	275	275	275	275	292	325	300	300	300	300	12	286	325	250	1.3
-	-	218	219	220	220	228	240	240	240	240	240	10	231	240	218	1.1	Rice	imported	-	-	246	247	250	250	258	275	275	275	275	275	10	263	275	246	1.1
65	75	75	75	75	100	125	125	125	-	-	100	10	94	125	65	1.9	Yam	Bete-Bete	75	100	100	100	100	125	150	150	150	-	-	125	10	118	150	75	2.0
65	75	75	75	75	100	125	125	125	-	-	100	10	94	125	65	1.9	Yam	Florido	75	100	100	100	100	125	150	150	150	-	-	125	10	118	150	75	2.0
130	125	110	118	172	-	-	-	-	-	-	225	6	147	225	110	2.0	Yam	Kingle	155	150	150	164	225	-	-	-	-	-	-	250	6	182	250	150	1.7
142	-	-	-	-	-	-	278	200	175	187	225	6	201	278	142	2.0	Yam	Kponan	167	-	-	-	-	-	-	328	250	200	212	250	6	235	328	167	2.0
100	-	-	-	-	-	-	205	150	125	144	200	6	154	205	100	2.1	Yam	Assawa	125	-	-	-	-	-	-	255	200	150	169	225	6	187	255	125	2.0
-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	*Cassava*	sweet	75	80	78	73	76	74	74	75	77	85	75	80	12	77	85	73	1.2
308	320	240	273	282	275	287	280	430	308	265	320	12	299	430	240	1.8	Potato		400	400	325	350	350	350	350	350	500	420	400	400	12	383	500	325	1.5
-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	*Banana*	plantain	81	87	75	98	119	145	180	194	145	131	124	114	12	124	194	75	2.6
118	112	110	115	144	156	153	110	109	97	106	105	12	120	156	97	1.6	Maiz		160	162	150	150	183	200	200	150	150	142	150	140	12	161	200	140	1.4
276	262	250	225	225	225	225	225	225	225	225	219	12	234	276	219	1.3	Millet		300	287	275	250	250	250	250	250	250	250	250	250	12	259	300	250	1.2
225	225	212	200	200	200	200	200	200	200	200	200	12	205	225	200	1.1	Sorgham		250	250	237	225	225	225	225	225	225	225	225	225	12	230	250	225	1.1
159	142	102	84	91	113	119	106	86	91	118	115	12	111	159	84	1.9	Palm	grain	267	254	199	186	191	228	230	195	188	189	220	219	12	214	267	186	1.4
379	387	412	450	517	537	517	475	405	410	436	432	12	446	537	379	1.4	Groundnu	husked	450	450	475	494	567	600	600	550	500	500	500	500	12	516	600	450	1.3
-	-	-	-	-	67	-	-	-	-	65	-	2	66	67	65	1.0	Avocado		132	140	161	133	107	99	108	143	138	128	135	151	12	131	161	99	1.6
200	150	175	250	250	237	233	300	275	270	250	230	12	235	300	150	2.0	Ginger		250	200	225	300	300	287	285	350	350	320	300	280	12	287	350	200	1.8
128	**156**	**288**	**286**	**311**	**284**	**98**	**92**	**46**	**69**	**77**	**84**	**12**	**160**	**311**	**46**	**6.8**	**Tomato**	**standard**	**263**	**329**	**445**	**470**	**511**	**500**	**274**	**176**	**201**	**219**	**235**	**221**	**12**	**320**	**511**	**176**	**2.9**
350	**550**	**550**	**433**	**514**	**750**	**733**	**687**	**300**	**210**	**325**	**637**	**12**	**503**	**750**	**210**	**3.6**	**Tomato**	**ODEFO**	**453**	**660**	**664**	**579**	**623**	**901**	**769**	**804**	**402**	**339**	**464**	**775**	**12**	**619**	**901**	**339**	**2.7**
94	147	178	214	143	116	123	123	176	134	84	84	12	135	214	84	2.5	Egg plant		192	269	320	397	312	277	247	272	283	254	194	190	12	267	397	190	2.1
178	163	259	257	165	147	133	210	164	231	168	60	12	178	259	60	4.3	Okra	fresh	290	306	387	388	298	270	248	379	316	366	313	159	12	310	388	159	2.4
313	208	250	329	189	100	144	152	302	208	183	170	12	212	329	100	3.3	Capsicum	fresh	426	299	361	455	308	239	251	313	432	338	302	275	12	333	455	239	1.9
-	-	-	-	-	-	-	-	-	-	-	378	1	378	378	378	1.0	Cabbage	green	443	352	381	343	540	546	488	404	298	361	405	406	12	414	546	298	1.8
-	-	-	-	-	-	-	121	-	-	-	-	1	121	121	121	1.0	Cucumber		182	204	207	214	182	232	260	248	172	154	136	176	12	197	260	136	1.9
900	700	-	-	-	-	700	800	775	725	675	733	8	751	900	675	1.3	Carrot		####	877	-	-	-	800	882	900	900	850	829	876	9	880	1,009	800	1.3
367	367	400	500	389	460	425	236	437	270	256	375	12	374	500	236	2.1	Haricot	green	446	507	494	626	528	571	650	335	577	418	398	489	12	503	650	335	1.9
-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	*Lettuce*		276	270	375	491	462	499	516	341	226	320	389	430	12	383	516	226	2.3
333	300	283	322	300	300	300	350	300	-	-	300	10	309	350	283	1.2	Shallot		400	350	333	372	350	350	350	400	400	-	-	350	10	366	400	333	1.2
308	310	210	204	227	220	237	237	310	276	320	340	12	267	340	204	1.7	Onion		370	375	375	300	300	300	300	300	375	350	387	400	12	344	400	300	1.3
-	-	-	-	-	-	-	77	60	36	33	-	4	52	77	33	2.3	Orange		83	100	182	112	84	78	81	116	94	76	68	69	12	95	182	68	2.7
-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	*Mango*	KENT	-	-	-	192	189	132	-	-	-	-	-	-	3	171	192	132	1.5
-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	*Mango*		-	-	244	204	184	112	-	-	-	-	-	-	4	186	244	112	2.2
-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	*Lime*	green	192	-	195	127	154	263	145	140	113	106	153	138	11	157	263	106	2.5

Source: OCPV, San Pedro

Name: No wholesale markets

Name: Wholesale markets are established only in a few months

Table E.2.2 Market Prices of Agricultural Products in San-Pédro (1998)

Unit: CFA/kg

WHOLESALE																	Year of 1998		RETAIL															
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	No.	Average	Max. (A)	Min. (B)	A/B			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	No.	Average	Max. (A)	Min. (B)	A/B
275	275	300	300	306	325	-	-	-	-	-	-	6	297	325	275	1.2	Rice	local	300	300	325	325	331	350	-	-	-	-	-	-	6	322	350	300	1.2
240	240	240	246	257	260	-	-	-	-	-	-	6	247	260	240	1.1	Rice	imported	275	275	275	275	294	300	-	-	-	-	-	-	6	282	300	275	1.1
110	125	125	125	144	156	-	-	-	-	-	-	6	131	156	110	1.4	Yam	Bete-Bete	135	150	150	150	162	200	-	-	-	-	-	-	6	158	200	135	1.5
110	125	125	125	144	156	-	-	-	-	-	-	6	131	156	110	1.4	Yam	Florido	135	150	150	150	162	200	-	-	-	-	-	-	6	158	200	135	1.5
225	225	225	235	312	-	-	-	-	-	-	-	5	244	312	225	1.4	Yam	Kingle	250	250	250	260	337	-	-	-	-	-	-	-	5	269	337	250	1.3
225	-	-	-	-	-	-	-	-	-	-	-	1	225	225	225	1.0	Yam	Kponan	250	-	-	-	-	-	-	-	-	-	-	-	1	250	250	250	1.0
200	-	-	-	-	-	-	-	-	-	-	-	1	200	200	200	1.0	Yam	Assawa	225	-	-	-	-	-	-	-	-	-	-	-	1	225	225	225	1.0
-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	*Cassava*	sweet	86	85	94	102	91	85	-	-	-	-	-	-	6	91	102	85	1.2
340	340	290	280	320	330	-	-	-	-	-	-	6	-	-	-	-	Potato		400	400	350	350	387	400	-	-	-	-	-	-	6	381	400	350	1.1
-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	*Banana*	plantain	119	119	112	144	238	336	-	-	-	-	-	-	6	178	336	112	3.0
101	105	110	118	125	132	-	-	-	-	-	-	6	115	132	101	1.3	Maiz		127	137	150	155	162	175	-	-	-	-	-	-	6	151	175	127	1.4
216	225	210	210	232	240	-	-	-	-	-	-	6	222	240	210	1.1	Millet		250	250	250	250	287	300	-	-	-	-	-	-	6	265	300	250	1.2
200	200	200	200	200	200	-	-	-	-	-	-	6	200	200	200	1.0	Sorgham		225	225	225	225	225	225	-	-	-	-	-	-	6	225	225	225	1.0
135	99	90	96	107	142	-	-	-	-	-	-	6	112	142	90	1.6	Palm	grain	294	289	260	247	245	256	-	-	-	-	-	-	6	265	294	245	1.2
438	455	500	510	550	560	-	-	-	-	-	-	6	502	560	438	1.3	Groundnut	husked	500	500	600	600	600	600	-	-	-	-	-	-	6	567	600	500	1.2
-	-	-	-	74	42	-	-	-	-	-	-	2	58	74	42	1.8	Avocado		160	158	112	94	117	157	-	-	-	-	-	-	6	133	160	94	1.7
235	250	250	230	287	300	-	-	-	-	-	-	6	259	300	230	1.3	Ginger		285	300	300	280	337	350	-	-	-	-	-	-	6	309	350	280	1.3
101	128	273	333	-	467	-	-	-	-	-	-	5	260	467	101	4.6	Tomato	standard	295	303	426	468	-	679	-	-	-	-	-	-	5	434	679	295	2.3
470	400	500	710	933	####	-	-	-	-	-	-	6	671	1,012	400	2.5	Tomato	SODEFOR	609	540	644	853	1,130	1,156	-	-	-	-	-	-	6	822	1,156	540	2.1
164	214	286	288	268	232	-	-	-	-	-	-	6	242	288	164	1.8	Egg plant		322	360	442	461	442	397	-	-	-	-	-	-	6	404	461	322	1.4
114	185	232	155	111	170	-	-	-	-	-	-	6	161	232	111	2.1	Okra	fresh	249	341	461	273	233	320	-	-	-	-	-	-	6	313	461	233	2.0
340	266	366	363	212	125	-	-	-	-	-	-	6	279	366	125	2.9	Capsicum	fresh	471	386	509	535	342	249	-	-	-	-	-	-	6	415	535	249	2.1
-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	*Cabbage*	green	478	366	342	347	570	846	-	-	-	-	-	-	6	492	846	342	2.5
-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	*Cucumber*		248	209	173	159	192	184	-	-	-	-	-	-	6	194	248	159	1.6
775	-	750	-	-	-	-	-	-	-	-	-	2	763	775	750	1.0	Carrot		913	-	900	-	-	-	-	-	-	-	-	-	2	907	913	900	1.0
433	500	-	-	700	700	-	-	-	-	-	-	4	583	700	433	1.6	Haricot	green	642	643	-	-	860	1,037	-	-	-	-	-	-	4	796	1,037	642	1.6
-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	*Lettuce*		471	416	485	760	-	374	-	-	-	-	-	-	5	501	760	374	2.0
300	300	300	300	300	300	-	-	-	-	-	-	6	300	300	300	1.0	Shallot		350	350	350	350	350	350	-	-	-	-	-	-	6	350	350	350	1.0
356	360	290	248	232	235	-	-	-	-	-	-	6	287	360	232	1.6	Onion		420	425	350	350	337	300	-	-	-	-	-	-	6	364	425	300	1.4
-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	*Orange*		86	94	-	135	98	79	-	-	-	-	-	-	5	98	135	79	1.7
-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	*Mango*	KENT	-	-	-	-	161	155	-	-	-	-	-	-	2	158	161	155	1.0
-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	*Mango*		-	-	-	107	92	84	-	-	-	-	-	-	3	94	107	84	1.3
-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	*Lime*	green	178	113	135	143	-	179	-	-	-	-	-	-	5	150	179	113	1.6

Source: OCPV, San Pedro

Name: No wholesale markets

Name: Wholesale markets are established only in a few months

Table E.2.2 Market Prices of Agricultural Products in San-Pédro (1998)

Unit: CFA/kg

WHOLESALE																	Year of 1998		RETAIL															
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	No.	Average	Max (A)	Min (B)	A/B			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	No.	Average	Max (A)	Min (B)	A/B
275	275	300	300	306	325	-	-	-	-	-	-	6	297	325	275	1.2	Rice	local	300	300	325	325	331	350	-	-	-	-	-	-	6	322	350	300	1.2
240	240	240	246	257	260	-	-	-	-	-	-	6	247	260	240	1.1	Rice	imported	275	275	275	275	294	300	-	-	-	-	-	-	6	282	300	275	1.1
110	125	125	125	144	156	-	-	-	-	-	-	6	131	156	110	1.4	Yam	Bete-Bete	135	150	150	150	162	200	-	-	-	-	-	-	6	158	200	135	1.5
110	125	125	125	144	156	-	-	-	-	-	-	6	131	156	110	1.4	Yam	Florido	135	150	150	150	162	200	-	-	-	-	-	-	6	158	200	135	1.5
225	225	225	235	312	-	-	-	-	-	-	-	5	244	312	225	1.4	Yam	Kingle	250	250	250	260	337	-	-	-	-	-	-	-	5	269	337	250	1.3
225	-	-	-	-	-	-	-	-	-	-	-	1	225	225	225	1.0	Yam	Kponan	250	-	-	-	-	-	-	-	-	-	-	-	1	250	250	250	1.0
200	-	-	-	-	-	-	-	-	-	-	-	1	200	200	200	1.0	Yam	Assawa	225	-	-	-	-	-	-	-	-	-	-	-	1	225	225	225	1.0
-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	*Cassava*	sweet	86	85	94	102	91	85	-	-	-	-	-	-	6	91	102	85	1.2
340	340	290	280	320	330	-	-	-	-	-	-	6	-	-	-	-	Potato		400	400	350	350	387	400	-	-	-	-	-	-	6	381	400	350	1.1
-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	*Banana*	plantain	119	119	112	144	238	336	-	-	-	-	-	-	6	178	336	112	3.0
101	105	110	118	125	132	-	-	-	-	-	-	6	115	132	101	1.3	Maiz		127	137	150	155	162	175	-	-	-	-	-	-	6	151	175	127	1.4
216	225	210	210	232	240	-	-	-	-	-	-	6	222	240	210	1.1	Millet		250	250	250	250	287	300	-	-	-	-	-	-	6	265	300	250	1.2
200	200	200	200	200	200	-	-	-	-	-	-	6	200	200	200	1.0	Sorghum		225	225	225	225	225	225	-	-	-	-	-	-	6	225	225	225	1.0
135	99	90	96	107	142	-	-	-	-	-	-	6	112	142	90	1.6	Palm	grain	294	289	260	247	245	256	-	-	-	-	-	-	6	265	294	245	1.2
438	455	500	510	550	560	-	-	-	-	-	-	6	502	560	438	1.3	Groundnut	husked	500	500	600	600	600	600	-	-	-	-	-	-	6	567	600	500	1.2
-	-	-	-	74	42	-	-	-	-	-	-	2	58	74	42	1.8	Avocado		160	158	112	94	117	157	-	-	-	-	-	-	6	133	160	94	1.7
235	250	250	230	287	300	-	-	-	-	-	-	6	259	300	230	1.3	Ginger		285	300	300	280	337	350	-	-	-	-	-	-	6	309	350	280	1.3
101	128	273	333	-	467	-	-	-	-	-	-	5	260	467	101	4.6	Tomato	standard	295	303	426	468	-	679	-	-	-	-	-	-	5	434	679	295	2.3
470	400	500	710	933	####	-	-	-	-	-	-	6	671	1,012	400	2.5	Tomato	SODEFOR	609	540	644	853	1,130	1,156	-	-	-	-	-	-	6	822	1,156	540	2.1
164	214	286	288	268	232	-	-	-	-	-	-	6	242	288	164	1.8	Egg plant		322	360	442	461	442	397	-	-	-	-	-	-	6	404	461	322	1.4
114	185	232	155	111	170	-	-	-	-	-	-	6	161	232	111	2.1	Okra	fresh	249	341	461	273	233	320	-	-	-	-	-	-	6	313	461	233	2.0
340	266	366	363	212	125	-	-	-	-	-	-	6	279	366	125	2.9	Capsicum	fresh	421	386	509	535	342	249	-	-	-	-	-	-	6	415	535	249	2.1
-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	*Cabbage*	green	478	366	342	347	570	846	-	-	-	-	-	-	6	492	846	342	2.5
-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	*Cucumber*		248	209	173	159	192	184	-	-	-	-	-	-	6	193	248	159	1.6
775	-	750	-	-	-	-	-	-	-	-	-	2	763	775	750	1.0	Carrot		913	-	900	-	-	-	-	-	-	-	-	-	2	907	913	900	1.0
433	500	-	-	700	700	-	-	-	-	-	-	4	583	700	433	1.6	Haricot	green	642	643	-	-	860	1,037	-	-	-	-	-	-	4	796	1,037	642	1.6
-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	*Lettuce*		471	416	485	760	-	374	-	-	-	-	-	-	5	501	760	374	2.0
300	300	300	300	300	300	-	-	-	-	-	-	6	300	300	300	1.0	Shallot		350	350	350	350	350	350	-	-	-	-	-	-	6	350	350	350	1.0
356	360	290	248	232	235	-	-	-	-	-	-	6	287	360	232	1.6	Onion		429	425	350	350	337	300	-	-	-	-	-	-	6	364	425	300	1.4
-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	*Orange*		86	94	-	135	98	79	-	-	-	-	-	-	5	98	135	79	1.7
-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	*Mango*	KENT	-	-	-	-	161	155	-	-	-	-	-	-	2	158	161	155	1.0
-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	*Mango*		-	-	-	107	92	84	-	-	-	-	-	-	3	94	107	84	1.3
-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	*Lime*	green	178	113	135	143	-	179	-	-	-	-	-	-	5	150	179	113	1.6

Source: OCPV, San Pedro

Name: No wholesale markets

Name: Wholesale markets are established only in a few months

F : IRRIGATION AND DRAINAGE

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F : IRRIGATION AND DRAINAGE

F.1 Irrigation in Côte d'Ivoire

Main agricultural production in Côte d'Ivoire is tree crop such as cacao and coffee. They are usually grown in the rain forest area where due to enough water rainfall. Therefore, they are not irrigated. Modern paddy and vegetable cultivation depend on the irrigation. The irrigated area was estimated at 20,000 ha by the FAO in 1970, but it increased up to 73,000 ha in 1994. Among the 73,000 ha, the paddy irrigation area occupies about 40 %.

F.2 Present Irrigation and Drainage Conditions in the Study Area

F.2.1 Irrigation

(1) Rainfed Cultivation

More than 70% of the agricultural land are covered by tree crops. They are seldom irrigated except for planting period. Food crops such as upland and lowland paddies, maize, cassava are produced in and near the lowland (bas-fonds) without any artificial irrigation. They are cultivated depend on the flooding conditions during the wet season with minimum input considering weather risks. Small-scale vegetable cultivation is practiced under the irrigation by water drawn from shallow wells dug using the water pots.

(2) Small-scale Irrigation

In 1970's, several irrigation development activities especially paddy irrigation were started by ARSO, under the Government's subsidy. Locations of small-scale irrigation are shown in Fig. F.2.1. They were irrigated by the water pumped up from the San-Pédro river. And they were implemented under the Taiwanese technical assistance. After fading out of ARSO and Taiwanese from the area in 1986/1987, most of them stopped the pump operation. The San-Pédro Paddy Project Area continued its pump operation up to 1988, and it was reinforced by the renovation of pumps by the Canadian assistance in 1992. But they stopped the paddy cultivation in 1992, and the last irrigated paddy cultivation field was taken over by a private farmer. At present, two irrigation pumps are operated in the southern end of the San-Pédro Paddy Project Area by a private farmer, covering about 20 and 8ha of paddy cultivation lands, respectively.

1) Grand Gabo Paddy Irrigation Project Area

About 10 ha of paddy area, irrigated by pump (one unit 300mm dia.) was developed in the same period as the development of the San-Pédro Paddy Project by ARSO/SODERIZ in 1973. 200m long flood protection dyke against the San-Pédro river was constructed. It is located in the north of the San-Pédro Paddy Project Area. It was operated up to 1980 by SODERIZ. OCTIDE, private company, continued the cultivation, and they employed more than 20 workers at the peak. Because of inefficiency of pump and difficulty of extension of cultivation land, they stopped its operation.

2) Right Bank Paddy Irrigation Areas

There were two pump irrigated paddy areas on the right bank of the San-Pédro river adjacent to SODECI Pumping Station. Both of them were constructed by ARSO/SODERIZ. The same scale pumping stations (150 mm dia. pump) were designed and their construction was made at the same period as the San-Pédro Paddy Project. They were operated by the agricultural labors lived in San-Pédro city under the technical guidance of Taiwanese engineers. Their pumps were moved out and no detailed data are available at present. The upstream scheme area of about 10ha is cultivated for paddy by the farmers in the area and the downstream scheme area of about 5ha is remained as a cultivable waste at present.

3) Cpt. Bernard ARSO Pond Area

A small-scale pond for irrigation was constructed by ARSO/SODERIZ near the Ganou river after crossing the National Highway at Cpt. Bernard. The pond is surrounded by about 2 m high banks, and have a stop log controlled intake/spillway. The control structure is not functioning at present. No technical details are available. Presently in the lower area of the pond, vegetables are cultivated by women's groups.

4) Northern Lycée Professional Valley

About 15 farmers, led by a farmer ousted from the San-Pédro Paddy Project Area, are cultivating paddy by taking water from one of the internal drains of the San-Pédro Paddy Project Area during the wet season in the northern valley of Lycée Professionnel.

(3) San-Pédro Paddy Irrigation Project Area

1) Purpose of the Project

Based on the ARSO's master plan of San-Pédro development, the San-Pédro Paddy Project was implemented. The purpose of the project is to supply rice to San-Pédro city by the labor force of youth volunteer from various areas of Côte d'Ivoire.

2) Progress of the Development

The construction of the project was started by ARSO/SODERIZ in 1973. The first 50 farmers with their families and Taiwanese engineers were settled in the area having 80 ha paddy field. In 1977, the planned 650ha of paddy field were developed and they were cultivated by 200 farmers. The executing agency of the project was changed from SDERIZ to SODEPALM in 1979. In 1989, the farmers in the project area reduced to 114 from 200 families and the cultivation area also reduced to 330ha from 650ha. Even the reinforcement of the agricultural infrastructures like renewal of the irrigation pumps were made, cultivation area has never been recovered up to now. The details are shown in Table F.2.1.

3) Pumping Station

Pumping station of the project is located on the left bank of the San-Pédro river about 21 km from the river mouth. Pumping station and 3 units of pump with 2 units of diesel generator were installed in 1975. Pumps and generators were renewed with the Canadian assistance in 1991. Present dimensions of the pumping station are summarized as follows:

i) Pumping Station (Fig. F.2.2)

House area	7.4 X 6.8m
House floor elevation	9.80m
River bed elevation	1.75m
River design water level	3.0m
River design flood level	8.0m
Pump chamber floor elevation	0.50m
Minimum pumping water level	1.87m
Attachment	cranes

ii) Pumps (replaced in 1991-92)

Name of manufacturer	IIT Fluid Technology Corporation
Model of pump	PL 7050.760 – submergible motor pump
Specification	380 V /3HP /50Hz /75kw
Pump head	7.6m
Pump suction diameter	530mm
Design discharge	700 lit/sec

iii) Generator (installed in 1991-92)

Name of manufacturer	Onan Corporation
Model of generator	DFBD
Model of diesel engine	NT855-G4

4) Irrigation Canal and Related Structures

The project area is divided into 4 blocks irrigated by 4 main canals. Most of the irrigation canal is non-lined earth canal. In the irrigation canal many structures are installed, such as diversions and turnouts. Also canal related structures are installed such as bridge and drainage culvert. They are summarized as follows:

Name of Block	Name of canal	Area (ha)	Highest EL	Irrigation facilities			
				Main canal length (m)	Secondary canal length (m)	Irrigation Structures (no.)	Related structures (no.)
West	A	173	7.2	3,300	1,240	7	5
Central	B	108	7.10	5,400	2,150	18	4
South-east	C	122	6.90	7,790	3,580	35	3
North	D	33	5.35	4,050	2,620	12	5
Total		306		20,540	9,590	90	17

There is ex-ARSO block of 40ha in the southern end of the project area and it is irrigated by separate pumps.

5) Drainage System

The project area is protected by flood dykes from the San-Pédro and Gonou rivers. Northern extension is protected by dykes at Grand Gabo paddy project in west, by Grand Gabo flood dyke in north and the road connecting Grand Gabo and Cite Agricole villages in east. West block is protected by the high flood dyke along the San-Pédro river. The area is protected by flood dykes and elevated hills. Internal drainage treatment is most important. There are many drains in the area with gentle slope without any dykes. Installed drainage culverts have small capacity together with water head. Therefore, the large area becomes the retarding basin, and drainage canal areas occupy large portion of the cultivable area.

6) Operation and Maintenance of Project

The operation and maintenance of the irrigation system was carried out by GVCs formulated by beneficiary farmers. At the initial stage of project under SODERIZ, Taiwanese irrigation engineers assisted the irrigation water management between 1973 and 1980. According to monthly report of pump operation prepared by SDEPARM in 1981, which were available continuous record of original pump operation, are shown in Table F.2.2. At the peak of pump operation, all of three pumps were operated more than 10 hours/day in September 1981.

According to the farmers, even during this period, there were many water troubles/conflicts among the farmers. Throughout the period of the project operation, the pump O&M was conducted by governmental organization, SODERIZ, SODEPALM and CIDV. Even these technical financial supports were made, O&M of the irrigation system could not be performed by the farmers. New pumps were installed under the CIDA assistance, they were operated only for one crop season by a private firm in 1992. But it was not continued because of farmers objection for private farms management. Therefore, the present condition has continued since 1994. The causes for the failure of project are discussed in section 3.7.

F.2.2 Drainage Conditions

(1) Flooding of San-Pédro Rivers

Every year flooding of the San-Pédro river occurs in the low plain of the Study Area. The flow capacity of the San-Pédro river channel is estimated at around 150m^3/sec and its annual flood is also estimated to be more than 200m^3/sec in the Study Area.

(2) Tributaries

Tributaries in the northern part of the Study Area, such as the Niré and Kpohou, formulate the marshy area in the San-Pédro river flood plain, retarding their floodwater during the flood of San-Pédro river. Tributaries in the southern part of the Study Area run through the flat area. They have no outlet to the San-Pédro river. Many seasonal ponds are found along the San-Pédro river in the southern part of the Study Area during the wet season, such area as near the San-Pédro bridge and SODECI Pumping Station.

(3) Road Crossings

Drainage culverts crossing the road are installed. Drainage culverts under the highway are constructed by steel corrugated pipes. Some of them are deteriorated and partially cropped and upstream areas becomes swampy areas. On the other hand, traffic is stopped for several days at the crossing of tributaries during the wet season because of low capacity of the drainage culverts and embankment of road at low level.

F.2.3 Study on Causes of Failure in the ARSO Rice Cultivation Project

In connection with the engineering aspects of the project, the following matters have come up as the causes of its failure; 1) insufficiency of irrigation water, 2) unequal water ponding, 3) poor drainage. These are interpreted to 1) poor water management, 2) incomplete land leveling and 3) poor drainage.

(1) Insufficiency of Water

Three units of pumps (one unit was standby), and two sets of generator were installed. After initial installation of them in 1973, because of their deterioration, they were replaced in 1991. The pump operation record of second crop season (September to February) in 1981 shows as follows;

a.	Total pump operation:	2,511 hours
b.	Estimated pumped water amount (700 lit/sec/pump):	6,327,000 m^3
c.	Total fuel consumption:	42,800 lit
d.	Irrigated area:	219.53 ha
e.	Unit irrigation water:	28,820m^3/ha = 2,882mm
f.	Estimated irrigation water requirement:	1,122mm
g.	Fuel cost per ha at present fuel cost(=c x 235 / d):	F.CFA 45,816/ha-crop

From the above, irrigation efficiency is estimated as 39%. As the standard efficiency is said to be 65%, this low irrigation efficiency might be caused by 1) conveyance losses through the unlined sandy irrigation canals, and 2) improper water management in the field (cultivated plot).

(2) Poor Land Leveling

Based on the existing data, land levels of some typical plot area are examined as shown below:

(Unit: m)

Plot No.	Area (ha)	Maximum El.	Minimum El.	Mean El.	Difference
50-1	4.0	11.10	10.22	10.88	±0.44
14	4.0	10.16	9.76	9.94	0.20
82	2.2	8.91	8.51	8.73	0.20
82-1		8.91	8.75	8.80	0.08
82-2		8.80	8.59	8.67	0.11

Note: Elevations shown above are about 4 m higher than project datum.

Plot 50-1 shows the difference of the land level at ±44cm and Plot 14 and 82 shows ±20cm of undulation. Under these conditions, the water management in each plot could not be implemented and it might require excess irrigation water. If Plot 82 were divided into 2 sub-plots, the undulation could be reduced half of the undivided plot.

Undulation limit of within ± 5cm is usually considered and targeted for paddy field plots in Asian countries. This might allow easy weed control during the paddy-growing period. Land leveling in large cultivation plot requires high technical accuracy, but land leveling in small area within ± 5cm undulation is easy to maintain. Considering the mechanized farming, the favorable scale of cultivation plot is 0.25 ha.

(3) Poor Drainage

In the project, the paddy field was developed in the flat area protected by the artificial flood protection dyke. During the direction of the Ganou river flow was changed to southwards from westwards. Therefore, internal drainage of the project area was very important. But not so much attention on the drainage was paid in the project. Wide and uncontrolled drains or artificial swamps are observed at present. It might have reduced the irrigable area of the project.

(4) Project Operation

In the early stage of the project, the rice double cropping was carried out comparatively smoothly with the government subsidies and Taiwanese experts under their strong leadership. In 1990, government subsidies for agricultural input materials were stopped in order to urge the farmers to establish self-supporting agriculture. In 1992, the government stopped all the subsidies and gave necessary input materials for the next coming season only, that is, 25,000 litters of fuel for operation of water pumps. However, the farmers wasted these input materials and could not make effective use of farming funds in the next season. After 1993, CIDV and ANADER have supplied the farmers with input materials by credits.

Though the mono-culture of rice which was rather imposed by the government, showed the vulnerability to disasters such as flood or drought, the farmers had to depend on it for both their income and self consumption. Some farmers tried to minimize risks by diversifying crops, but faced difficulties in cultivating other crops since they were involved in land troubles with neighboring indigenous people on the uplands in and around their site. In addition, the government supported and subsidized irrigated paddy cultivation throughout the project period so that farmers' reliance upon "others" increased. Consequently, they have never learned to plan an investment in agriculture or to manage farming by themselves.