Table 10.6 COST OF O&M FACILITIES

(Unit: ₱103)

Item	Unit Price	Required No.	Amount
1. O&M Quater & Motor Pool (1,500 m2)		L.S.	1,400
2. O&M Equipment			
2.1 Heavy Equipment			
1. Back-hoe Shovel (0.35 m3)	490	2	980
2. Bulldozer (11 ton)	510	1	510
" (6 ton)	280	2	560
3. Motor Grader (Blade 3 m)	480	2	960
4. Soil Compactor (90 kg)	10	3	30
5. Vibration Roller (5 ton)	160	1	160
6. Tire Roller (10 - 20 ton)	350	1	350
7. Portable Concrete Mixer (0.2 m3)	20	2	40
8. Concrete Vibrator (ø32)	5	4	20
9. Submergible Pump (ø150)	20	2	40
2.2 Light Equipment			
1. Dump Truck (8 ton)	240	4	960
" (2 ton)	70	6	420
2. Truck, Pick-up Type (2 ton)	60	2	120
3. Trailer Truck (15 ton)	450	1	450
4. Jeep (four wheel drive)	120	8	960
5. Motor Cycle	5	40	200
2.3 Others			
1. Current Meter	15	6	90
2. Personal Computer	70	1	70
3. Radioset	50	1	50
4. Walkie-Talkie	2	15	30
5. Automatic Rain Gage	15	2	30
6. Automatic Water Level Gage	20	2	40
7. Repair Shop Tools	1,000	L.S.	1,000
2.4 Spare Parts (± 10% of the above)			830
2.5 Local Currency Portion (Inland transportation and etc.)		L.S.	700
Sub-total			9,600
Total (1 + 2)			11,000

Table 10.7 ADMINISTRATION AND ENGINEERING COSTS

(Unit: ₱10³)

Item	Foreign Currency	Local Currency	Total
I. Detailed Design Stage			
1. Administration			
1.1 Staff salary (600 M/M)	-	2,100	2,100
1.2 Other direct cost	-	900	900
2. Engineering Consultant			
2.1 Remuneration (200 M/M)	24,000	-	24,000
2.2 Direct cost	11,000	2,500	13,500
2.3 Cost for survey works	-	1,500	1,500
Sub-total	35,000	7,000	42,000
II. Construction Stage			
1. Administration			
1.1 Staff salary (10,800 M/M)	-	37,800	37,800
1.2 Other direct cost	-	16,200	16,200
2. Engineering Consultant			
2.1 Remuneration (230 M/M)	33,600	-	33,600
2.2 Direct cost	6,200	7,000	13,200
2.3 Special equipment	1,200	-	1,200
Sub-total	41,000	61,000	102,000
Total	76,000	68,000	144,000

Table 10.8 REQUIRED MAN-MONTHS OF CONSULTANT ENGINEERS

Specialist	Man-Month		
	Foreign Consultant	Local Consultant	Total
I. Detailed Design Stage			
1. Project Director	1	-	1
2. Team Leader/Irrigation Engr.	12	12	24
3. Irrigation Design Engrs.	20	17	37
4. Dam Engrs.	24	12	36
5. Hydrologist	3	5	8
6. Hydraulic Structure Engr.	8	8	16
7. Engineering Geologist	3	3	6
8. Soil Mechanical Engr.	3	3	6
9. Survey Supervisor	7	14	21
10. Cost & Specification Engr.	3	5	8
11. Metal Work Engr.	3	3	6
12. Equipment Engr.	3	3	6
13. Specialist as required	12	10	22
14. Home Support Engr.	3	-	3
Total	105	95	200
II. Construction Supervision Stage			
1. Project Director	2	-	2
2. Team Leader/Irrigation Engr.	40	-	40
3. Dam Engr.	10	6	16
4. Design Engr.	10	6	16
5. Construction Engr.	40	40	80
6. On-Farm Development Engr.	10	10	20
7. Water Management Expert	4	4	8
8. Agri-Institutional Expert	4	4	8
9. Equipment Engr.	8	-	8
10. Mechanical Engr.	6	-	6
11. Specialist as required	20	-	20
12. Home Support Engr.	6	-	6
Total	160	70	230

Table 10.9 UNIT COST OF LABOUR

(As of March 1984)

No.	Item	Unit	Cost (₱)	Component F (%)	Component L (%)	Unit Cost Foreign (₱)	Unit Cost Local (₱)
1.	Laborer	md	37.99	0	100	0	37.99
2.	Foreman General	md	66.67	0	100	0	66.67
3.	Carpenter	md	50.74	0	100	0	50.74
4.	Head of Carpenter	md	57.91	0	100	0	57.91
5.	Mason Worker	md	50.74	0	100	0	50.74
6.	Head of Mason	md	57.91	0	100	0	57.91
7.	Steel Worker	md	50.74	0	100	0	50.74
8.	Head of Steel Worker	md	57.91	0	100	0	57.91
9.	Asphalt-Mix Worker	md	37.99	0	100	0	37.99
10.	Driver (Light Equipment)	md	69.60	0	100	0	69.60
11.	Operator (Heavy Equipment)	md	80.00	0	100	0	80.00
12.	Mechanical	md	50.74	0	100	0	50.74
13.	Electrical Worker	md	50.74	0	100	0	50.74
14.	Head of Mechanical	md	57.91	0	100	0	57.91
15.	Driller	md	44.86	0	100	0	44.86
16.	Blaster	md	140.00	0	100	0	140.00
17.	Explosive Worker	md	70.00	0	100	0	70.00
18.	Watchman	md	37.99	0	100	0	37.99
19.	Janitor	md	37.99	0	100	0	37.99
20.	Driver (General)	md	51.15	0	100	0	51.15

Remarks: Include cost of living allowances, earn leaves and bonus.

Table 10.10(1) UNIT COST OF MATERIAL

(As of March 1984)

No.	Item	Unit	Cost (₱)	Component F (%)	Component L (%)	Unit Cost Foreign (₱)	Unit Cost Local (₱)
1.	Aggregate (Selling Cost at Manila)						
	a) Sand	m^3	85.00	37	63	31.45	53.55
	b) Gravel	m^3	140.00	37	63	51.80	88.20
	c) Boulder	m^3	140.00	37	63	51.80	88.20
2.	Sod	m^2	1.20	0	100	0	1.20
3.	Lumber						
	a) Form Lumber Ro	bf	4.40	-	-	-	-
	- do -	m^3	1,864.7	0	100	-	1,864.7
	b) Lumber KD	bf	7.60	-	-	-	-
	- do -	m^3	3,220.0	0	100	0	3,220.9
	c) Plywood 1/4 and 4x8	pc.	65.0	-	-	-	-
	- do -	m^3	3,836.8	0	100	-	3,836.8
	d) Plywood 1/2 and 4x8	pc.	145.0	-	-	-	-
	- do -	m^3	4,279.4	0	100	0	4,279.4
	e) Plywood 3/4 and 4x8	pc.	195.0	-	-	-	-
	- do -	m^3	3,836.8	0	100	-	3,836.8
4.	Reinforced Iron Bar	kg	6.70	80	20	5.36	1.34
5.	Nail, Bolt, Nut	kg	12.50	80	20	10.00	2.50
6.	Hardwares	kg	18.00	80	20	14.40	3.60
7.	Cement (1 bag = 40 kg)	bag	44.00	75	25	33.00	11.00
8.	Bituminus Coat or Tack Coat	kg	4.00	50	50	2.00	2.00
9.	Asphalt	kg	0.68	50	50	0.34	0.34
10.	Fuel						
	a) Gasoline	ℓ	6.56	50	50	3.28	3.28
	b) Diesoline	ℓ	4.48	50	50	2.24	2.24

Remarks: 1 bf = 1" x 1' x 1'
= 2.54 x 12 x 2.54 x 12 x 2.54
= 2,360 cm^3

1 m^3 = 1,000,000 cm^3 = 423.8 bf

Table 10.10(2) UNIT COST OF MATERIAL

No.	Item	Unit	Cost (₱)	Component F (%)	Component L (%)	Unit Cost Foreign (₱)	Unit Cost Local (₱)
11.	Blasting						
	a) Dynamite	kg	32.00	50	50	16.00	16.00
	b) ANFO	kg	30.00	50	50	15.00	15.00
	c) Detonator	pc.	21.00	50	50	10.50	10.50
12.	Drilling						
	a) Rod (for Jack Hummer)	pc.	368.0	100	0	368.0	0
	b) Rod (for Drifter)	pc.	1,103.0	100	0	1,103.0	0
	c) Bit (for Jack Hummer)	pc.	515.0	100	0	515.0	0
	d) Bit (for Drifter)	pc.	1,545.0	100	0	1,545.0	0
13.	RC Pipe (l = 1.00 m)						
	a) ø150 (6")	pc.	35.00	57	43	19.95	15.05
	b) ø200 (8")	pc.	40.00	57	43	22.80	17.20
	c) ø250 (10")	pc.	60.00	57	43	34.20	25.80
	d) ø300 (12")	pc.	80.00	57	43	45.60	34.40
	e) ø350 (14")	pc.	117.00	57	43	66.69	50.31
	f) ø450 (18")	pc.	163.00	57	43	92.91	70.09
	g) ø600 (24")	pc.	195.00	57	43	111.15	83.85
	h) ø700 (28")	pc.	322.00	57	43	183.54	138.46
	i) ø800 (32")	pc.	390.00	57	43	222.30	167.70
	j) ø900 (36")	pc.	461.00	57	43	262.77	198.23
	k) ø1,050 (42")	pc.	644.00	57	43	367.08	276.92
	l) ø1,200 (28")	pc.	840.00	57	43	478.80	361.20
	m) ø1,350 (54")	pc.	988.00	57	43	563.16	424.84
	n) ø1,500 (60")	pc.	1,200.0	57	43	684.00	516.00
14.	Cement Products						
	a) Concrete Hollow Block 6"	pc.	2.40	57	43	1.37	1.03
	b) - do - 4"	pc.	2.10	57	43	1.20	0.90
	c) Cement Tiles (20 x 20)	pc.	2.60	57	43	1.48	1.12
	d) Cement Pipe 4"	pc.	30.00	57	43	17.10	12.90
	e) Cement Pipe 6"	pc.	35.00	57	43	19.95	15.05
	f) White Cement (40kg/bag)	bag	160.00	75	25	120.00	40.00
15.	Steel Plate	kg	12.00	80	20	9.60	2.40

Table 10.10(3) UNIT COST OF MATERIAL

No.	Item		Unit	Cost (₱)	Component F (%)	Component L (%)	Unit Cost Foreign (₱)	Unit Cost Local (₱)
16.	H-Beam	(kg/m)	kg	18.00	80	20	14.40	3.60
	a) H-100x100x8.5	(17.6)	m	316.80	80	20	253.44	63.36
	b) H-125x125x9.5	(24.3)	m	437.40	80	20	349.92	87.48
	c) H-150x150x10.5	(32.0)	m	576.00	80	20	460.80	115.20
	d) H-175x175x13.5	(46.7)	m	840.60	80	20	672.48	168.12
	e) H-300x200x12	(64.2)	m	1,155.60	80	20	924.48	231.12
	f) H-300x300x12	(84.1)	m	1,513.80	80	20	1,211.04	302.76
	g) H-400x400x12.5	(146.0)	m	2,628.00	80	20	2,102.40	525.60
	h) H-500x400x12.5	(157.0)	m	2,806.00	80	20	2,244.80	561.20
	i) H-507x400x6	(185.0)	m	3,330.00	80	20	2,664.00	666.00
17.	L-Beam	(kg/m)	kg	13.0	80	20	10.40	2.60
	a) L-20x20x3	(0.885)	m	11.50	80	20	9.20	2.30
	b) L-25x25x5	(1.76)	m	22.88	80	20	18.30	4.58
	c) L-30x30x5	(2.16)	m	28.08	80	20	22.46	5.62
	d) L-40x40x5	(2.95)	m	38.35	80	20	30.68	7.67
	e) L-50x50x6	(4.43)	m	57.59	80	20	46.07	11.52
	f) L-60x60x7	(6.21)	m	80.73	80	20	64.58	16.15
	g) L-70x70x8	(8.29)	m	107.77	80	20	86.22	21.55
18.	Sheet Pile	(kg/m)						
	a) 256x36x5	(14.6)	m	96.0	95	5	91.2	4.8
	b) 303x36x5	(17.0)	m	111.0	95	5	105.5	5.6
	c) 333x75x6	(25.9)	m	170.0	95	5	161.5	8.5
	d) 400x150x7	(41.2)	m	270.0	95	5	256.5	13.5
19.	Steel Pipe (GSP, l = 6.00m)							
	1/2		pc.	101.00	80	20	80.80	20.20
	3/4		pc.	135.90	80	20	108.72	27.18
	1		pc	201.60	80	20	161.28	40.32
	1 1/4		pc.	260.40	80	20	208.32	52.08
	1 1/2		pc.	320.00	80	20	256.00	64.00
	2		pc.	446.00	80	20	356.80	89.20
	2 1/2		pc.	555.00	80	20	444.00	111.00
	3		pc.	740.00	80	20	592.00	148.00
20.	Cast Iron Pipe		kg	30.00	80	20	24.00	6.00
	100 (l = 4m, 52.1kg)		pc.	1,563.0	80	20	1,250.40	312.60
	200 (l = 5m, 156kg)		pc.	4,680.0	80	20	3,744.00	936.00
	300 (l = 6m, 301kg)		pc.	9,030.0	80	20	7,224.00	1,806.00
	400 (l = 6m, 429kg)		pc.	12,870.0	80	20	10,296.00	2,574.00
	500 (l = 6m, 606kg)		pc.	18,180.0	80	20	14,544.00	3,636.00
	800 (l = 6m, 1,310kg)		pc.	39,300.0	80	20	31,440.00	7,800.00
	1,000 (l = 6m, 1,940kg)		pc.	58,200.0	80	20	46,560.00	11,640.00

Table 10.10(4) UNIT COST OF MATERIAL

No.	Item	Unit	Cost (₱)	Component F (%)	Component L (%)	Unit Cost Foreign (₱)	Unit Cost Local (₱)
21.	Small Gate (Complete)						
	a) 610 x 355 mm	asy	1,486	80	20	1,189	297
	b) 610 x 400 mm	asy	1,798	80	20	1,438	360
	c) 800 x 500 mm	asy	3,114	80	20	2,491	623
	d) 800 x 800 mm	asy	3,617	80	20	2,894	723
	e) 1,000 x 800 mm	asy	3,747	80	20	2,998	749
	f) 1,000 x 1,000 mm	asy	8,851	80	20	7,081	1,770
	g) 1,200 x 1,200 mm	asy	9,930	80	20	7,944	1,986
	h) 1,400 x 1,200 mm	asy	10,419	80	20	8,335	2,084
	i) 1,600 x 1,400 mm	asy	13,044	80	20	10,435	2,609
	j) 1,600 x 1,600 mm	asy	13,608	80	20	10,886	2,722
22.	Electricity	kWH	1.00	60	40	0.60	0.40
23.	Accessory of Boring Machine						
	a) Bil (Diamond) ϕ46 mm	pc.	3,828	100	0	3,828	0
	b) - do - ϕ76 mm	pc.	4,167	100	0	4,167	0
	c) Core Lifter	pc.	440	100	0	440	0
	d) Core Barrel	pc.	15,000	100	0	15,000	0
	e) Boring Rod (l = 3.00m)	pc.	1,600	100	0	1,600	0
24.	Wire Mesh for Mortal Spraying	m^2	28.0	80	20	22.4	5.6
25.	Fence (H = 2.00m)	m	80.0	80	20	64.0	16.0
26.	Land Acquisition						
	a) Mountain Area	ha	5,000	0	100	0	5,000
	b) Waste Area	ha	7,000	0	100	0	7,000
	c) Cultivated Area	ha	50,000	0	100	0	50,000

Table 10.11(1) LIST OF UNIT COST BY MAN POWER

(Unit: ₱)

Item	Unit	Unit Cost	Foreign Currency	Local Currency
1. Excavation by Manpower				
Sand	m3	11.9	-	11.9
Normal Soil	m3	19.9	-	19.9
Clayey Soil	m3	24.4	-	24.4
Gravel	m3	27.3	-	27.3
2. Excavation by Manpower H/H Pick Hummer				
Weathered Rock	m3	166.9	110.3	56.6
3. Excavation by Blasting				
3-1 Bench Cut (Small)	m3	112.6	71.0	41.6
3-2 Bench Cut (Large)	m3	30.6	26.1	4.5
4. Hauling by Manpower				
L = 20 m	m3	10.9	-	10.9
L = 40 m	m3	14.4	-	14.4
L = 60 m	m3	16.9	-	16.9
L = 80 m	m3	19.9	-	19.9
L = 100 m	m3	20.9	-	20.9
L = 200 m	m3	21.4	-	21.4
5. Compacting				
5-1 Compacting by Manpower	m3	13.9	-	13.9
5-2 Compacting by Compactor	m3	10.0	1.5	8.5
6. Smoothing of Face Excavated or Filled Up	m3	0.9	-	0.9
7. Concrete				
Mixed by Portable Mixer				
7-1 Plain Concrete	m3	674.0	471.2	202.8
7-2 Reinforced Concrete	m3	828.7	589.9	238.8
7-3 Lean Concrete	m3	664.9	470.1	194.8
7-4 Lining Concrete	m3	818.3	582.7	235.6
Mixed by Batcher Plant				
7-5 Plain Concrete	m3	773.1	568.2	204.9
7-6 Reinforced Concrete	m3	916.6	675.7	240.9
7-7 Lean Concrete	m3	756.3	555.9	200.4
7-8 Lining Concrete	m3	761.8	560.3	201.5

Table 10.11(2) LIST OF UNIT COST BY MAN POWER

(Unit: ₱)

Item	Unit	Unit Cost	Foreign Currency	Local Currency
8. Mortal	m^3	1,244.7	895.4	349.3
9. Wooden Form for Concrete	m^3	226.9	4.8	222.1
10. Processing and Assembling of Reinforced Iron Bar	t	10,452.9	7,378.4	3,074.5
11. Stone Masonry	m^3	863.5	453.0	410.5
12. Sod Facing	m^3	17.5	-	17.5
13. Wooden Scaffolding	m^3	204.7	-	204.7
14. Drainage by Pump	d	381.7	223.5	158.2
15. Drilling for Curtain Grouting				
15-1 Grout Hole Drilling	m	707.1	652.1	55.0
15-2 Test Hole Drilling	m	754.0	618.0	136.0
16. Grouting of Cement Milk	m	172.2	111.5	60.7
17. Anchor Bar	pc.	5,092.8	4,599.0	493.8
18. Mortal Spraying	m^2	184.3	134.2	50.1

Table 10.12(1) LIST OF UNIT COST BY USING CONSTRUCTION EQUIPMENT

(Unit: ₱)

No.	Item	Unit	Unit Cost	Foreign Currency	Local Currency
Eq 1	Excavation by Bull-Dozer (11 ton)				
1-1	Sand	m^3	7.1	5.7	1.4
1-2	Normal Soil	m^3	8.3	6.6	1.7
1-3	Clayey Soil	m^3	9.9	7.9	2.0
1-4	Gravel	m^3	9.9	7.9	2.0
Eq 2	Excavation by Bull-Dozer (21 ton)				
2-1	Sand	m^3	6.6	6.3	1.3
2-2	Normal Soil	m^3	7.7	6.2	1.5
2-3	Clayey Soil	m^3	9.3	7.5	1.8
2-4	Gravel	m^3	9.3	7.5	1.8
2-5	Excavated Rock	m^3	13.2	10.7	2.5
Eq 3	Excavation by 21 ton Ripper				
3-1	Weathered Rock	m^3	8.1	6.6	1.5
Eq 4	Excavation by Bull-Dozer (32 ton)				
4-1	Sand	m^3	5.7	4.4	1.3
4-2	Normal Soil	m^3	6.5	5.2	1.3
4-3	Clayey Soil	m^3	7.7	6.2	1.5
4-4	Gravel	m^3	7.7	6.2	1.5
4-5	Excavated Rock	m^3	13.3	8.9	2.2
Eq 5	Excavation by 32 ton Ripper				
5-1	Weathered Rock	m^3	6.9	5.6	1.3
Eq 6	Excavation by Back-Hoe Shovel (0.35 m3)				
6-1	Sand	m^3	12.5	10.1	2.4
6-2	Normal Soil	m^3	13.4	10.9	2.5
6-3	Clayey Soil	m^3	15.9	12.8	3.1
6-4	Gravel & Weathered Rock	m^3	17.4	14.1	3.3
6-5	Excavated Rock	m^3	34.8	28.2	6.6
Eq 7	Excavation by Back-Hoe Shovel (0.7 m^3)				
7-1	Sand	m^3	10.4	8.6	1.8
7-2	Normal Soil	m^3	11.2	9.2	2.0
7-3	Clayey Soil	m^3	13.2	10.9	2.3
7-4	Gravel & Weathered Rock	m^3	14.5	12.0	2.5
7-5	Excavated Rock	m^3	29.0	23.9	5.1

Table 10.12(2) LIST OF UNIT COST BY USING CONSTRUCTION EQUIPMENT

(Unit: ₱)

No.	Item	Unit	Unit Cost	Foreign Currency	Local Currency
Eq 8	Excavation by Back-Hoe Shovel (1.2 m3)				
8-1	Sand	m^3	11.1	9.4	1.7
8-2	Normal Soil	m^3	12.0	10.1	1.9
8-3	Clayey Soil	m^3	14.1	11.9	2.2
8-4	Gravel & Weathered Rock	m^3	15.5	13.1	2.4
8-5	Excavated Rock	m^3	31.1	26.2	4.9
Eq 9	Excavation by Power Shovel (0.7 m^3)				
9-1	Impervious Materials	m^3	8.7	7.2	1.5
9-2	Normal Soil	m^3	13.2	10.9	2.3
9-3	Clayey Soil	m^3	15.1	12.5	2.6
9-4	Gravel & Weathered Rock	m^3	15.1	12.5	2.6
9-5	Excavated Rock	m^3	35.4	29.2	6.2
Eq 10	Excavation by Power Shovel (1.2 m^3)				
10-1	Impervious Materials	m^3	8.1	6.8	1.3
10-2	Normal Soil	m^3	12.1	10.2	1.9
10-3	Clayey Soil	m^3	13.9	11.7	2.2
10-4	Gravel & Weathered Rock	m^3	13.9	11.7	2.2
10-5	Excavated Rock	m^3	32.4	27.3	5.1
Eq 11	Loading by Tractor Shovel (1.2 m^3)				
11-1	Sand	m^3	11.9	9.6	2.3
11-2	Normal Soil	m^3	11.9	9.6	2.3
11-3	Clayey Soil	m^3	11.9	9.6	2.3
11-4	Gravel & Weathered Rock	m^3	13.5	10.9	2.6
11-5	Excavated Rock	m^3	13.5	10.9	2.6
Eq 12	Loading by Tractor Shovel (1.8 m^3)				
12-1	Sand	m^3	12.3	9.9	2.4
12-2	Normal Soil	m^3	12.3	9.9	2.4
12-3	Clayey Soil	m^3	12.3	9.9	2.4
12-4	Gravel & Weathered Rock	m^3	14.0	11.3	2.7
12-5	Excavated Rock	m^3	14.0	11.3	2.7
Eq 13	Loading by Tractor Shovel (2.2 m^3)				
13-1	Sand	m^3	12.5	10.3	2.2
13-2	Normal Soil	m^3	12.5	10.3	2.2
13-3	Clayey Soil	m^3	12.5	10.3	2.2
13-4	Gravel & Weathered Rock	m^3	14.2	11.7	2.5
13-5	Excavated Rock	m^3	14.2	11.7	2.5

Table 10.12(3) LIST OF UNIT COST BY USING CONSTRUCTION EQUIPMENT

(Unit: ₱)

No.	Item	Unit	Unit Cost	Foreign Currency	Local Currency
Eq 14	Loading by Tractor Shovel (3.2 m3)				
14-1	Sand	m3	12.4	10.0	2.4
14-2	Normal Soil	m3	12.4	10.0	2.4
14-3	Clayey Soil	m3	12.4	10.0	2.4
14-4	Gravel & Weathered Rock	m3	14.1	11.4	2.7
14-5	Excavated Rock	m3	14.1	11.4	2.7
Eq 15	Hauling by Dump Truck (8 ton)				
15-1	Sand	m3	0.0043L +9.0	0.0032L +6.7	0.0011L +2.3
15-2	Normal Soil	m3	0.0040L +8.4	0.0030L +6.3	0.0010L +2.1
15-3	Clayey Soil	m3	0.0045L +9.5	0.0034L +7.1	0.0011L +2.4
15-4	Gravel & Weathered Rock	m3	0.0048L +10.0	0.0036L +7.5	0.0012L +2.5
15-5	Excavated Rock	m3	0.0063L +10.2	0.0047L +9.9	0.0016L +3.3
Eq 16	Hauling by Dump Truck (11 ton)				
16-1	Sand	m3	0.0037L +7.7	0.0028L +5.8	0.0009L +1.9
16-2	Normal Soil	m3	0.0039L +8.2	0.0029L +6.2	0.0010L +2.0
16-3	Clayey Soil	m3	0.0041L +8.7	0.0031L +6.6	0.0010L +2.1
16-4	Gravel & Weathered Rock	m3	0.0044L +9.2	0.0033L +6.9	0.0011L +2.3
16-5	Excavated Rock	m3	0.0057L +12.1	0.0043L +9.1	0.0014L +3.0
Eq 17	Hauling by Dump Truck (20 ton)				
17-1	Sand	m3	0.0073L +15.2	0.0053L +11.1	0.0020L +4.1
17-2	Normal Soil	m3	0.0068L +14.3	0.0050L +10.4	0.0018L +3.9
17-3	Clayey Soil	m3	0.0077L +16.1	0.0056L +11.7	0.0021L +4.4
17-4	Gravel & Weathered Rock	m3	0.0081L +17.0	0.0059L +12.4	0.0022L +4.6
17-5	Excavated Rock	m3	0.0107L +22.3	0.0078L +16.3	0.0029L +6.0

Table 10.12(4) LIST OF UNIT COST BY USING CONSTRUCTION EQUIPMENT

(Unit: ₱)

No.	Item	Unit	Unit Cost	Foreign Currency	Local Currency
Eq 18	Hauling by Dump Truck (32 ton)				
18-1	Sand	m^3	0.0063L +13.3	0.0050L +10.5	0.0013L +2.8
18-2	Normal Soil	m^3	0.0060L +12.5	0.0047L +9.9	0.0013L +2.6
18-3	Clayey Soil	m^3	0.0067L +14.1	0.0053L +11.1	0.0014L +3.0
18-4	Gravel & Weathered Rock	m3	0.0071L +14.8	0.0056L +11.7	0.0015L +3.1
18-5	Excavated Rock	m^3	0.0093L +19.5	0.0073L +15.4	0.0020L +4.1
Eq 19	Spreading by Bull Dozer				
	(11 ton Bull Dozer)				
19-1-1	Sand	m^3	5.3	4.2	1.1
19-1-2	Normal Soil	m^3	5.9	4.7	1.2
19-1-3	Clayey Soil	m^3	5.9	4.7	1.2
19-1-4	Gravel & Weathered Rock	m^3	4.8	3.8	1.0
19-1-5	Excavated Rock	m^3	4.5	3.6	0.9
	(21 ton Bull Dozer)				
19-2-1	Sand	m^3	6.6	5.3	1.3
19-2-2	Normal Soil	m^3	7.3	5.9	1.4
19-2-3	Clayey Soil	m^3	7.4	6.0	1.4
19-2-4	Gravel & Weathered Rock	m^3	5.9	4.8	1.1
19-2-5	Excavated Rock	m^3	5.6	4.5	1.1
Eq 20	Compaction by Tire Roller (10 - 28 ton)				
20-1	Random Materials	m^3	1.5	1.1	0.4
Eq 21	Compaction by Tamping Roller (17 ton)				
21-1	Impervious Materials	m^3	7.2	5.9	1.3
Eq 22	Compaction by Tamping Roller (30 ton)				
22-1	Impervious Materials	m^3	10.5	8.7	1.8
Eq 23	Compaction by Vibration Roller (15 ton)				
23-1	Random Materials	m^3	14.0	11.8	2.2
23-2	Rock Materials	m^3	11.5	9.7	1.8

Table 10.12(5) LIST OF UNIT COST BY USING CONSTRUCTION EQUIPMENT

(Unit: ₱)

No.	Item	Unit	Unit Cost	Foreign Currency	Local Currency
Eq 24	Compaction by Vibration Roller (3 ton)				
24-1	Filter Materials	m^3	7.7	5.9	1.8
Eq 25	Water Content Control by Water Tank Rolley	d	1,887.5	1,272.7	614.8
Eq 26	Transportation by Truck (10 ton, Manila to Site)				
26-1	1 way	way	960.2	695.7	263.5
	1 ton/way	ton	96.1	69.7	26.4
Eq 27	Transportation by Tailor (32 ton, Manila to Site)				
27-1	1 way	way	2,604.0	1,877.6	726.4
	1 ton/way	ton	260.4	187.8	72.6
Eq 28	Lifting by Truck W/H 2 ton Crane	d	1,256.2	873.2	383.0
Eq 29	Lifting by Truck Crane (25 ton)	d	7,138.3	5,744.1	1,394.2
Eq 30	Maintenance of Road	d	3,119.0	2,446.7	672.3
Eq 31	Materials Supplied from River Site				
31-1	Sand	m^3	83.9	65.1	18.8
31-2	Aggregate	m^3	99.9	77.5	22.4
31-3	Boulder for Riprap	m^3	177.3	138.8	38.5

Remarks: L is proposed hauling distance by meter.

Table 10.13 ANNUAL OPERATION AND MAINTENANCE COST

Item	Amount (₱10³)
1. Salaries and Wages	(2,930)
1.1 Staff salaries (See Table 10.13)	2,750
1.2 Labour wages ₱600 x 300 M/M	180
2. Office Expenses ₱40,000 x 12 M	480
3. Operation Cost	(400)
3.1 Fuel for vehicles and equipment ₱25,000 x 12 M	300
3.2 Others	100
4. Maintenance Cost	(740)
4.1 Earth works	150
4.2 Concrete works	100
4.3 Masonry works	150
4.4 Metal works	180
4.5 Others	160
5. Miscellaneous Expenses	150
Total	4,700

Table 10.14 STAFF SALARY AT O&M STAGE

(Unit: P)

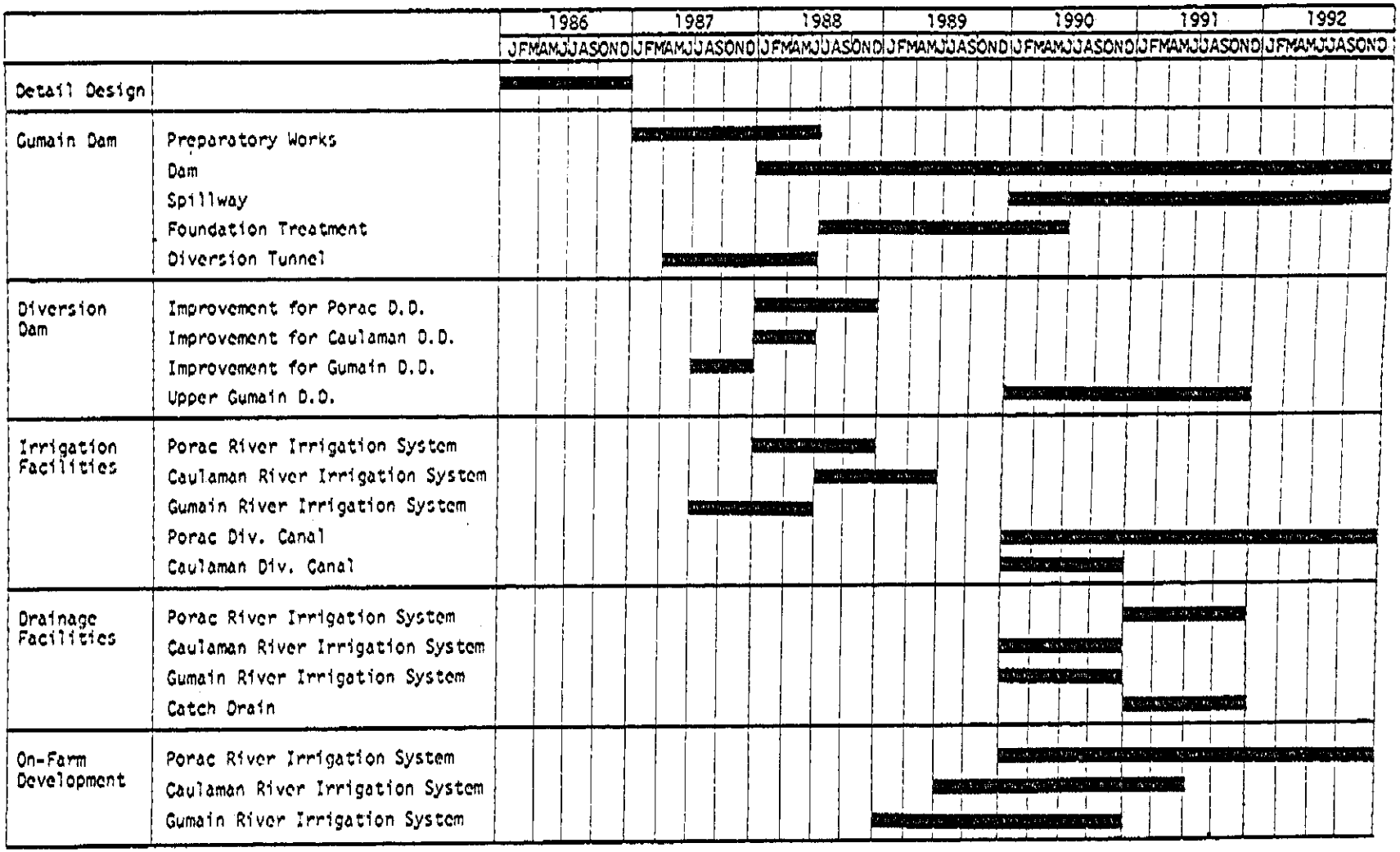
Staffs	Number	Unit Annual Salary	Total
1) Project Manager	1	48,000	48,000
Secretary	1	9,600	9,600
2) Operation Engineer/1	1	42,000	42,000
3) Administrative Section			
Administrative assistant	1	36,000	36,000
Personnal aide	1	9,600	9,600
Accounting clerk	1	9,600	9,600
Cashier	1	9,600	9,600
Property custodian	1	9,600	9,600
Clerk	4	8,400	33,600
Storekeeper	1	8,400	8,400
Typist	1	8,400	8,400
Utilityman	1	8,400	8,400
Security guard	3	8,400	25,200
Janitor	2	7,200	14,400
4) Repair and Maintenance Section			
Supervising engineer	1	36,000	36,000
Engineer	1	30,000	30,000
Mechanic	2	24,000	48,000
Geodetic engineer	1	24,000	24,000
Electrician	1	24,000	24,000
Carpenter	1	24,000	24,000
Mason	1	18,000	18,000
Heavy equipment operator and driver	30	18,000	540,000
Foreman	1	8,400	8,400
Laborer	5	7,200	36,000
5) Operating Section			
Irrigation engineer	3	36,000	108,000
Hydrologist	1	30,000	30,000
Computer engineer	1	30,000	30,000
AWMT/WM	21	12,000	252,000
Ditchtender	84	7,200	604,800
Gatekeeper	12	7,200	86,400
Ratio operator	1	9,600	9,600
Clerk	1	8,400	8,400
Typist	1	8,400	8,400
Measurement aide	5	7,200	36,000
6) Billing and Collection Section			
Collection representative	1	24,000	24,000
Bill collector	2	9,600	19,200
Irrigation fee collector	3	8,400	25,200
Typist	1	8,400	8,400
7) Farmer's Assistance Section			
Agronomist	1	24,000	24,000
Irrigation association organizer	20	12,000	240,000
8) Dam and Reservoir Section			
Assistant operator	1	30,000	30,000
Operator aide	12	12,000	144,000
Total	235		2,749,200 (2,750,000)

Remarks: /1: Operation engineer is in change of both the Operation Section and the Dam and Reservoir Section.

Table 10.15 REPLACEMENT COST AND USEFUL LIFE

Item	Useful Life (Year)	Replacement Cost (₱10⁶)
1. Gate		
1) Gate for Gumain Dam	25	16.2
2) Gate for Diversion Dams	25	4.2
3) Gate for Related Structures of Canal	25	3.3
2. O&M Equipment	10	9.6

Fig. 10.1 IMPLEMENTATION SCHEDULE OF THE PROJECT



APPENDIX XI

PROJECT EVALUATION

APPENDIX XI PROJECT EVALUATION

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APPENDIX XI PROJECT EVALUATION

CHAPTER 1 GENERAL

The object of project evaluation is to ascertain the economic and financial feasibility of the project.

In the economic evaluation, three measures of project worth, namely, internal rate of return (IRR), benefit-cost ratio (B/C) and benefit minus cost (B-C) were computed. Furthermore, a sensitivity analysis in terms of internal rate of return was made to evaluate the economic viability of the project against possible changes in project benefits, project costs and build-up period.

The financial evaluation was carried out by analyzing the capacity to pay of benefited farmers and by preparing cash flow statement of the project as a whole. The analysis of capacity to pay was made to assess the viability of the development from the farmers' economic standpoint. As for the analysis of cash flow statement, it was made to evaluate the repayment capability of the project for the estimated fund requirement.

The project costs and monetary benefits to be used for these economic and financial evaluations were estimated on the account of price levels and exchange rate (US$1.0=₱14.0) of the time when the price survey was conducted on March 1984, and a sensitivity analysis was also made on the price levels forecasted in December 1984, because the price levels of wages, construction materials, etc. rose remarkably after the decree flating the peso on June 6, 1984.

The indirect benefits and socio-economic impacts, which would give the effects on the regional development, were also studied briefly.

CHAPTER 2 ECONOMIC EVALUATION

2.1 Basic Assumption

The economic evaluation was based on the following basic assumptions:

1) The project life is set at 50 years from the initial year of project implementation (1986);

2) Only direct benefits are counted in the evaluation, and any indirect and intangible benefits are not taken into account;

3) The exchange rate of Philippine's Peso (₱) to U.S. Dollar (US$) is taken to be ₱14.0 equivalent to US$1.0; and

4) The constant prices at 1984 level are used in the evaluation.

2.2 Project Benefit

The direct benefit to be expected from the project implementation will accrue from increase in crop production due to stable irrigation water supply and the improvement of drainage. This direct benefit is estimated from the difference of the total net return under the future without project and the future with project conditions. The direct benefit amounts to ₱276 million per annum at the full development, as shown in Table 11.1. According to the proposed implementation schedule, the benefit will initially accrue in 1990, and would gradually increase up to the full benefit in 1997.

With regard to agricultural production within the reservoir area which would be affected by implementation of the project, it was estimated that this would be negligibly small because the reservoir area is mostly occupied by non-farm land such as forest land, bush/grass land, etc., and farm land is found on a limited area. Therefore, the negative benefit for such agricultural production within the reservoir area was disregarded in this study.

2.3 Economic Cost

The project economic costs would consist of construction cost, replacement cost and operation and maintenance cost (O&M cost), and is obtained by deducting transfer payments such as direct/indirect taxes, levies, etc. from the financial costs. The transfer payment was estimated at 17.3% of the financial cost on the basis of the study/1 on shadow price in the Philippines by the World Bank.

/1: Philippines, Social Cost-Benefit Analysis, Estimates of Shadow Prices and Country Parameters, IBRD, 1978.

The total economic cost and its annual disbursement schedule are shown in Table 11.2. The economic construction cost would amount to ₱1,252 million. The steel gates installed in the proposed irrigation and drainage system would be replaced once during the entire period of the project life. Their useful life was assumed to be 25 years. The O & M equipment such as bulldozer, back-hoe shovel, truck, jeep, etc. would be replaced every 10 years. The O&M cost of the project will be initially disbursed in 1990 when partial operation would commence, and would reach the full amount of ₱3.9 million in 1992 when the full operation would start for the whole project area of 16,750 ha. Land acquisition costs and price contingencies in the financial cost of the project are excluded from the economic evaluation.

2.4 Evaluation

In order to compute the internal rate of return, the annual economic cost and benefit streams were prepared as shown in Table 11.3, and the internal rate of return was computed as shown in Fig. 11.1.
In addition, the B/C and B-C were also analyzed as below:

1) IRR: 12.8%
2) B/C: 1.40(10% discount rate)
3) B-C: ₱341/1 million (10% discount rate)

The internal rate of return was estimated to be 12.8% which indicates the highly sensitive feasibility of the project.

2.5 Sensitivity Analysis

The sensitivity analysis in terms of the internal rate of return was made, taking into account the changes in project costs, project benefits and build up period from present crop yield to its target yield. The results of sensitivity analyses on the above cases are shown in Fig. 11.1, and are summarized below:

(IRR: %)

Cost Increased	Benefit Decreased 0%	Benefit Decreased -10%	Build-up Period Delay in One Year
0%	12.8	11.9	11.8
+10%	12.0	11.1	11.1
+20%	11.2	10.4	10.5

In case that project costs increased by 20% and project benefits decreased by 10%, its result indicates the severely sensitive feasility of the project.

/1: Total present worth

In addition to the above analyses, the sensitivity analysis on the following conditions was also made taking into consideration the recent economic dislocation in the Philippines.

- Price level forecasted at December 1984
- Exchange rate: US$1.0 = ₱18.0

In order to estimate the project costs and monetary benefits, the prices for construction materials, wages, farm inputs and outputs, etc. were investigated on March 1984. However, on June 6, 1984, the floating peso rate was decreed from permitting exchange rate (officially set to ₱14.0 equivalent to US$1.0) to float upwards to a new equilibrium level. And the exchange rate after floating peso rate became to be ₱18.0 to US$1.0. With this change, the prices of goods and services rose rapidly. Under such economic circumstances, the sensitivity analysis on the above conditions was made to ascertain realistically the feasibility of this project.

For the price levels on December 1984, it was forecasted that the foreign currency portion of project costs and benefits will increase reliably by the percentage (28.6%) of the decline in the peso rate, and these local currency portion will also increase by 30% at the least along with the increase in foreign currency portion. Based on this forecast price level, the project costs and benefits was estimated as shown in Table 11.4 to 11.12.

The result of analysis is shown in Fig. 11.2. The internal rate of return was estimated to be 12.8% which indicates the same value as the price levels of March 1984. As a result, the feasibility of the project at the price levels of December 1984, is still remain highly sensitive.

CHAPTER 3 FINANCIAL EVALUATION

3.1 Repayment Capability

The repayment capability of the project was studied by preparing a cash flow statement based on the annual disbursement schedule of the project financial cost, fund requirement and anticipated project revenue.

The annual disbursement schedule was prepared as shown in Table 11.13, and its total investment was summarized in the following table. For the price contingency shown in this table, it was forecasted on the basis of the world manufacturing unit value index of the World Bank and the wholesale price index of machinery and transport equipment at Metro Manila as shown in Table 11.14.

(Unit: P10^6)

Item	F.C.	L.C.	Total
Dam	749.6	217.2	966.8
Irrigation and Drainage	97.0	97.8	194.8
O&M Facilities	8.9	2.1	11.0
Land, Compensation	-	14.5	14.5
Engineering and Administration Costs	76.0	68.0	144.0
Physical Contingency	139.8	60.0	199.8
Price Contingency	563.3	673.8	1,237.1
Total	1,634.6	1,133.4	2,768.0
(%)	(59.1)	(40.9)	(100.0)

For the estimation of fund requirement, it was assumed that the capital required for project implementation would be arranged in terms of the following financial conditions:

Foreign Currency Portion

The capital would be financed by bilateral or international organizations with an interest of 3.5% per annum and a repayment period of 30 years including 10 years of grace period.

Local Currency Portion

The capital would be financed by budget allocation of the Government with no interest and no repayment.

According to the above assumptions, the total fund requirement for bilateral or international organizations was estimated at about ₱1,635 million (US$117/1 million) and the capital to be financed by the Government amounted about ₱1,133 million. As for the anticipated project revenue, this would only consist of the irrigation service fee which was estimated at about ₱6.6/2 million per annum under full payment conditions.

Based on the above disbursement schedule, the estimated fund requirement and anticipated project revenue, the cash flow statement was prepared and the repayment capability was analyzed, as shown in Table 11.15. As a result, the project revenue from the irrigation service fee could not cover the annual repayment of the fund, except for O&M cost. Therefore, the repayment of capital will have to be made by subsidies from the Government, which were estimated to be ₱88 million per annum on an average during the repayment period from 1987 to 2015.

3.2 Capacity to Pay of Farmer

Capacity to pay is the ability of farmers to bear the expenses required for development of irrigation facilities. Such capacity is measured by the increase in net reserve which the benefited farmers can earn annually from the project.

In order to assess the capacity to pay of the farmers, a farm budget analysis was made for the typical farmer under the future with project and the future without project conditions. The results are shown in Table 4.47 and 4.48 in Appendix IV, and summarized below:

/1: Exchange rate: US$1.0 = ₱14.0
/2: The total irrigation fee is estimated as below:

- Paddy	:	11,000 ha x 2.5 cavan x ₱87 x 85%*	= ₱2,034,000
	:	6,000 ha x 3.5 cavan x ₱87 x 85%	= ₱1,553,000
- Fruit vegetables	:	1,800 ha x 3.5 cavan x ₱87 x 85%	= ₱ 466,000
- Sugarcane	:	5,750 ha x 6.0 cavan x ₱87 x 85%	= ₱2,551,000
Total			₱6,604,000

* 10%: Back payment to farmers under full payment condition
5%: Incentive to FIAs under full payment condition

Description	Farm Size (ha)	Gross Income (₱10³)	Gross Outgo (₱10³)	Net Reserve (₱10³)
Present Condition				
1) Rice Cultivation Farmer				
- Irrigated	1.3	32.5	32.5	-
- Rainfed	1.3	25.9	25.9	-
2) Sugarcane Planter	4.0	41.6	41.5	0.1
With Project				
1) Rice Cultivation Farmer	1.3	46.2	37.1/1	9.1
2) Sugarcane Planter	4.0	86.3	74.9/1	11.4

As shown in the above table, the annual net reserve or capacity to pay under the future with project condition would increase remarkably as compared with the future without project condition. The increase in net reserve would enable the farmers to pay the fixed irrigation fee and would also offer to them incentive for further development.

/1: Including irrigation fee

CHAPTER 4 INDIRECT BENEFIT AND SOCIO-ECONOMIC IMPACT

The indirect benefits and socio-economic impacts produced by the implementation of the Gumain River Irrigation Project are considered to affect i) food supply to Metro Manila, ii) employment opportunity, iii) farmers' income, iv) marketing of farm inputs and outputs, v) productivity of sugar, vi) operational improvement of sugar mill and vii) contribution to national economy.

4.1 Food Supply to Metro Manila

Since demand for rice and vegetables in Metro Manila will continue to increase with population growth, Region III including the project area will have to be a supply base to Metro Manila for these products. The project would produce a substantial marketable surplus estimated at 20,100/1 tons of rice and 13,700/2 tons of vegetables.

4.2 Employment Opportunity

The project would create a demand for farm labor due to increased farming activity, more intensive use of land, and higher productivity. The incremental farm labor requirement was estimated at 1.39 million man-days per annum. In addition, construction of the project would increase the employment opportunities of the area. During the construction stage, the majority of workers would be unskilled laborers, and the total requirement of unskilled laborers would be about 2.0 million man-days. Most of these laborers would come from landless workers and farmers in and around the project area.

4.3 Farmers' Income

After the implementation of the project, income of farmers estimated at 5,040 households is expected to increase considerably as a direct result of the increase in crop production, as mentioned in Section 3.2. Such increase in income would contribute to improving living standards. Moreover, it is expected that farmers' purchasing power would increase along with improvement of their living standards, and this increased purchasing power would benefit development of regional economy.

4.4 Marketing of Farm Inputs and Outputs

The future marketing in the project area would likely expand as compared with the present condition. With anticipated higher agricultural production, more farm products could be marketed by the farmers. The proportion of sales would also increase relatively to consumption. Businessmen will have bigger volume of business which could increase their income.

/1: See Table 4.37 in Appendix IV
/2: See Table 4.38 in Appendix IV

Marketing functions would not be influenced only by agricultural outputs. It is assumed that when agricultural production develops as a result of the irrigation project, the project area would become a good market for farm supplies. The farmers need them to operate their farm business at the recommended levels. Increased marketing of tools, fertilizers, agro-chemicals, sacks and related agricultural supplies would follow the marketing trend of farm products. From both ends of the marketing channels, the agricultural impact on marketing facilities would be substantial.

4.5 Productivity of Sugar

As mentioned in Appendix IV, the increase in productivity of sugar was taken up as a basic concept for agricultural development. The productivity of land for sugarcane is evaluated as shown in Table 11.16 and summarized below:

	Productivity of Land (₱/ha)
Without Project	1,311
With Project	2,493

As shown in the above table, the productivity of sugarcane would increase remarkably as compared with the future without project condition, and this increased productivity would have a beneficial impact in price competition for sugar export.

4.6 Operational Improvement of Sugar Mill

There is one sugar mill in the project area, the National Sugar Development Corporation (NASUDECO), managed by the Government through the Philippine National Bank (PNB). Due to the shortage of raw materials (sugarcane), this sugar mill operates at only 41% of its milling capacity. With this low level of operation, NASUDECO is in financial difficulties. After implementation of the project, capacity utilization of NASUDECO would reach a level of 80% with the increase in sugarcane production. At this level of capacity utilization, it may be expected that management of NASUDECO would be improved.

4.7 Contribution to National Economy

With completion of the project, sugar production would increase from 19,800 tons at present to 45,100 tons under full development, and increase in sugar export would be estimated to be about 14,200 tons/1.

For the annual net contribution to national economy, it would be expected that export eranings from sugar would be about ₱49.7 million/2.

/1: (45,100 tons - 19,800 tons) x 56%* = 14,200 tons
* Allocation rate for export by NASUTRA.

/2: 14,200 tons x US$250/ton** x ₱14 = ₱49,700,000
** World market price in 1984 forecasted by the World Bank.

Table 11.1 PROJECT BENEFIT

Crops	With Project			Without Project			Benefit
	Area (ha)	Net Return (₱/ha)	Total Value (₱10³)	Area (ha)	Net Return (₱/ha)	Total Value (₱10³)	(₱10³)
Paddy Field			242,333			84,152	158,181
Wet Season Paddy							
- Gravity Irrigation Area	11,000	10,050	110,550	5,970	5,876	35,080	
- Pump Irrigation Area	-	-	-	1,100	5,131	5,644	
- Rainfed Area	-	-	-	4,060	3,213	13,045	
Dry Season Paddy							
- Gravity Irrigation Area	6,000	11,430	68,580	4,540	5,248	23,826	
- Pump Irrigation Area	-	-	-	820	4,219	3,460	
Diversified Crops (Fruit Vegetables)	1,800	35,113/1	63,203	170	18,216	3,097	
Sugarcane Field			209,145			91,379	117,766
Sugarcane	5,750	34,831/2	200,278	5,900	15,488/2	91,379	
Intercrops	(5,750)	1,542	8,867	-	-	-	
Total			451,478			175,531	275,947

Remarks: /1: Average net return of ampalaya and tomato.
/2: Average net return of plant cane and ratoon cane.

Note : Project benefit is estimated on the basis of the price level and exchange rate (US$1.0 = ₱14.0) as of March, 1984.

Table 11.2 ECONOMIC CONSTRUCTION COST

(Unit: ₱10⁶)

Item	Total	1986	1987	1988	1989	1990	1991	1992
1. Direct Construction Cost	960.7	-	163.7	158.3	123.1	199.2	168.0	148.4
1.1 Gumain Dam	799.4	-	154.3	141.8	99.6	143.9	130.1	130.1
1.2 Diversion Dam	21.0	-	0.8	3.0	-	8.6	8.6	-
1.3 Irrigation Facilities	102.4	-	8.6	13.9	19.0	30.7	15.1	15.1
1.4 Drainage Facilities	25.4	-	-	-	4.5	8.8	8.9	3.2
1.5 On - Farm Development	12.5	-	-	-	-	7.2	5.3	-
2. Cost for O & M Facilities	9.1	-	-	-	-	6.6	-	2.5
3. Administrative Cost and Engineering Cost	119.1	34.7	14.1	16.5	16.5	14.1	12.4	10.8
Sub - total	1,088.9	34.7	177.8	174.8	139.6	219.9	180.4	161.7
4. Physical Contingency	163.4	5.2	26.7	26.2	20.9	33.0	27.1	24.3
Total	1,252.3	39.9	204.5	201.0	160.5	252.9	207.5	186.0

This economic cost is estimated on the basis of the price level and exchange rate (US$1.0 = ₱14.0) as of March, 1984.

Table 11.3 ANNUAL ECONOMIC COST AND BENEFIT FLOW

(Unit: ₱10^6)

Year	Year in Order	Economic Cost			Total	Economic Benefit
		Construction Cost	Replacement Cost	O&M Cost		
1986	1	39.9	0	0	39.9	0
1987	2	204.5	0	0	204.5	0
1988	3	201.0	0	0	201.0	0
1989	4	160.5	0	0	160.5	0
1990	5	252.9	0	0.8	253.7	3.9
1991	6	207.5	0	1.6	209.1	11.7
1992	7	186.0	0	1.6	187.6	19.6
1993	8	0	0	3.9	3.9	74.7
1994	9	0	0	3.9	3.9	129.9
1995	10	0	0	3.9	3.9	181.2
1996	11	0	0	3.9	3.9	228.6
1997	12	0	0	3.9	3.9	275.9
1998	13	0	0	3.9	3.9	275.9
1999	14	0	0	3.9	3.9	275.9
2000	15	0	5.5	3.9	9.4	275.9
2001	16	0	0	3.9	3.9	275.9
2002	17	0	2.5	3.9	6.4	275.9
2003	18	0	0	3.9	3.9	275.9
⋮	⋮	⋮	⋮	⋮	⋮	⋮
2009	24	0	0	3.9	3.9	275.9
2010	25	0	5.5	3.9	9.4	275.9
2011	26	0	0	3.9	3.9	275.9
2012	27	0	2.5	3.9	6.4	275.9
2013	28	0	18.0	3.9	21.9	275.9
2014	29	0	0.6	3.9	4.5	275.9
2015	30	0	0.2	3.9	4.1	275.9
2016	31	0	1.1	3.9	5.0	275.9
2017	32	0	0.3	3.9	4.2	275.9
2018	33	0	0	3.9	3.9	275.9
2019	34	0	0	3.9	3.9	275.9
2020	35	0	5.5	3.9	9.4	275.9
2021	36	0	0	3.9	3.9	275.9
2022	37	0	2.5	3.9	6.4	275.9
2023	38	0	0	3.9	3.9	275.9
⋮	⋮	⋮	⋮	⋮	⋮	⋮
2029	44	0	0	3.9	3.9	275.9
2030	45	0	5.5	3.9	9.4	275.9
2031	46	0	0	3.9	3.9	275.9
2032	47	0	2.5	3.9	6.4	275.9
2033	48	0	0	3.9	3.9	275.9
2034	49	0	0	3.9	3.9	275.9
2035	50	0	0	3.9	3.9	275.9

Table 11.4 ECONOMIC PRICE FOR PADDY, 1995 (1984 CONSTANT PRICE)

(Price Level on December, 1984)

Item	Export Parity Price
	(US$/ton)
1) World market price/1 (5% broken)	409
2) Less quality discount/2	57
3) Import costs to Manila	-
4) Export/Import value (FOB Manila, 25 - 35% broken)	352
	(₱/ton)
	6,336/3
5) Port charge	49
6) NFA administration charge	78
7) Transportation/4 (Manila - Rice mill)	170
8) Wholesale price	6,039
9) Milling cost/5	170
10) Value of milling by-product	300
11) Economic price of paddy at mill/6	4,133
12) Costs of procurement, transportation and handling/7	40
13) Farmgate price of paddy	4,093

Remarks: /1: World Bank long run projection for Thai, 5% broken FOB Bangkok.

/2: Estimated at 14% of world market price, as below.

Year	FOB Bangkok (US$/ton) 5%	25%	35%	Quality Discount 25% - 35%
1981	482	415	403	0.15
1982	293	249	248	0.15
1983	277	247	243	0.12
Average	351	304	298	0.14

Source: NFA Central Office

/3: US$ = ₱18.0

/4: Transportation costs are adjusted by 0.78 to reflect shadow price.
120 km x ₱1.82/km/ton x 0.78 = ₱170

/5: Milling costs are ₱8.5/bag (50 kg) for output, while by-products are valued at ₱300/ton of rice.

/6: Milling rate : 67%

/7: ₱2.0/cavan (50 kg) of paddy

Table 11.5 ECONOMIC PRICE FOR SUGARCANE, 1995
(1984 CONSTANT PRICE)

(Price Level on December, 1984)

Item	Export Parity Price
	(US$/ton)
1) FOB Manila/1	447
	(₱/ton)
	8,046
2) Port charge/2	26
3) Transportation cost/3 (Floridablanca - Manila)	169
4) Ex-mill gate price of sugar	7,851
5) Milling cost/4	1,118
6) By-product/5	650
7) Economic price of sugarcane at mill/6	724
8) Transportation cost (Farm - Mill)	46
9) Farmgate price of sugarcane	678

Remarks: /1: Estimated on the basis of the Commodity Price Forecast by World Bank, 1983.

/2: Philippine Port Authority

/3: Transportation costs are adjusted by 0.78 to reflect shadow price.

/4: Include costs of milling, storage and handling.

/5: Molases (data from NASUDECO)

/6: Recovery rate from sugarcane to sugar: 9.8%

Table 11.6 ECONOMIC PRICE FOR FERTILIZER, 1995
(1984 CONSTANT PRICE)

(Price Level on December, 1984)

Item	Import Parity Price		
	Urea	TSP	KCl
	(US$/ton)	(US$/ton)	(US$/ton)
1) World market price/1	270	191	107
2) Ocean freight and insurance	30	70	25
3) CIF Manila	300	261	132
	(₱/ton)	(₱/ton)	(₱/ton)
	5,400	4,698	2,376
4) Landing charge/2	130	130	130
5) Bagging	-	-	130
Land cost	5,530	4,828	2,636
6) Transportation cost/3	142	142	142
7) Operating expenses	156	156	156
8) Industry margin (2%)	117	103	59
Ex-warehouse cost	5,945	5,229	2,993
9) Transport to dealer/3	28	28	28
10) Handling	26	26	26
11) Dealer's mark-up	104	104	104
12) Transport to farmgate	26	26	26
Economic price at farmgate	6,129	5,413	3,177
Economic price per nutrient (₱/kg)	13.6	11.8	5.3

Remarks: /1: Workd Bank long run projection

Urea : FOB Europe
T.S.P.: FOB US Gulf

/2: Include port charge

/3: Transportation costs are adjusted by 0.78 to reflect shadow price

100 km x ₱1.82/km/ton x 0.78 = ₱142
20 km x ₱1.82/km/ton x 0.78 = ₱28

Table 11.7 FINANCIAL AND ECONOMIC PRICES FOR AGRICULTURAL OUTPUTS AND INPUTS (PRICE LEVEL ON DECEMBER, 1984)

Outputs and Inputs			Financial Price (1984)	Economic Price/1 (1995)
Outputs				
	- Paddy (export parity)	(₱/t)	2,640*	4,093
	- Sugarcane	(")	239	678
	- Ampalaya	(")	3,400	3,400
	- Tomato	(")	2,600	2,600
	- Mongo beans	(")	6,500	6,500
	- Peanut	(")	5,200	5,200
Inputs				
(1) Seed	- Paddy	(₱/kg)	2.2	4.1
	- Sugarcane	(₱/1,000 pieces)	6.5	18.4
	- Ampalaya	(₱/kg)	108.0	108.0
	- Tomato	(")	130.0	130.0
	- Mongo beans	(")	6.5	6.5
	- Peanut	(")	5.2	5.2
(2) Fertilizer	- N	(₱/kg)	11.8*	13.6
	- P_2O_5	(")	9.1*	11.8
	- K_2O	(")	9.1*	5.3
(3) Agro-chemicals/2	- Liquid	(₱/ℓ)	126*	143
	- Granular	(₱/kg)	18*	22
(4) Labor		(₱/day)	32	14/4
(5) Hired animal		(")	46	46
(6) Operation cost of farm machinery				
	- 4-wheel tractor	(₱/day)	600*	600
	- Hand tractor	(")	263*	263
(7) Irrigation cost				
	- Gravity: W.S.P. & D.S.P.	(₱/ha)	180/5	180/5
	- Pump : W.S.P.	(")	1,110	1,110
	: D.S.P.	(")	1,460	1,460
	: Vegetables	(")	850	850

Remarks: /1: 1984 Constant Price

/2: Economic price of agro-chemicals are estimated as below:

$EP = FP \times SP \times IR$

EP: Economic price of agro-chemicals
FP: Financial price of agro-chemicals
SP: Conversion factor for shadow price (0.83)
IR: Average increased rate of prices for fertilizers from 1984 to 1995 (1.44)

	1984 Constant Price 1984 (US$/t)	1984 Constant Price 1995 (US$/t)	Average Increased Rate
Urea	148	270	1.82
T.S.P.	155	191	1.23
KCl	84	107	1.27
Average			1.44

(Source: IBSD Price Projection)

/3: Estimated on the basis of compound fertilizer (14:14:14)

/4: Shadow wage rate: 0.44

/5: O&M cost of existing irrigation system

*: Actual farm gate and market prices as of June, 1984. Other financial prices are assumed at 1.3 times of the prices as of March, 1984.

Table 11.8(1) NET RETURN PER HECTARE - WITHOUT PROJECT
(PRICE LEVEL ON DECEMBER, 1984)

Item	Unit	Unit Price (₱)	Irrigated Paddy: Gravity Irrigation Area (Wet Season)		Irrigated Paddy: Gravity Irrigation Area (Dry Season)		Irrigated Paddy: Pump Irrigation Area (Wet Season)	
I) Gross Income								
- Unit Yield	(ton/ha)			2.97		2.80		2.97
- Unit Price	(₱/ton)			4,093		4,093		4,093
- Gross Income	(₱)			12,156		11,460		12,156
II) Production Cost			Q'ty	Amount (₱)	Q'ty	Amount (₱)	Q'ty	Amount (₱)
1) Seed	(kg)	4.1	80	328	80	328	80	328
2) Fertilizer								
- N	(kg)	13.6	73	993	79	1,074	73	993
- P_2O_5	(kg)	11.8	6	71	6	71	6	71
- K_2O	(kg)	5.3	6	32	6	32	6	32
3) Agro-chemicals								
- Liquid	(ℓ)	143	2.2	315	2.3	329	2.2	315
- Granular	(kg)	22	5.5	121	5.0	110	5.5	121
4) Labor Input	(man-day)	14	84	1,176	85	1,190	84	1,176
5) Animal Power	(day)	46	13.9	639	14.1	649	13.9	639
6) Mechanical Power	(day)	263	2.4	631	2.4	631	2.4	631
7) Irrigation Cost								
- Gravity Irrigation				180		180		-
- Pump Irrigation				-		-		1,110
8) Miscellaneous				224		230		271
Total				4,710		4,824		5,687
III) Net Return				7,446		6,636		6,469

Table 11.8(2) NET RETURN PER HECTARE - WITHOUT PROJECT
(PRICE LEVEL ON DECEMBER, 1984)

Item	Unit	Unit Price (₱)	Irrigated Paddy Pump Irrigation Area (Dry Season)		Rainfed Paddy (Wet Season)		Sugarcane	
I) Gross Income								
- Unit Yield	(ton/ha)			2.80		1.96		36.00
- Unit Price	(₱/ton)			4,093		4,093		678
- Gross Income	(₱)			11,460		8,022		24,408
			Q'ty	Amount (₱)	Q'ty	Amount (₱)	Q'ty	Amount (₱)
II) Production Cost								
1) Seed	(kg)		80	328	85	349	15,050	277
2) Fertilizer								
- N	(kg)	13.6	79	1,074	46	626	106	1,442
- P_2O_5	(kg)	11.8	6	71	3	35	2	24
- K_2O	(kg)	5.3	6	32	3	16	2	11
3) Agro-chemicals								
- Liquid	(ℓ)	143	2.3	329	2.4	343	-	-
- Granular	(kg)	22	5.0	110	-	-	-	-
4) Labor Input	(man-day)	14	85	1,190	76	1,064	75	1,050
5) Animal Power	(day)	46	14.1	649	15.8	727	3.6	166
6) Mechanical Power	(day)		2.4	631	2.5	658	2.6	1,560
7) Irrigation Cost								
- Gravity Irrigation				-		-		-
- Pump Irrigation				1,460		-		-
8) Miscellaneous				294		192		227
Total				6,168		4,037		4,757
III) Net Return				5,292		3,985		19,651

Table 11.8(3) NET RETURN PER HECTARE - WITHOUT PROJECT
(PRICE LEVEL ON DECEMBER, 1984)

Item	Unit	Unit Price (₱)	Fruit Vegetables			
			Ampalaya		Tomato	
I) Gross Income						
- Unit Yield	(ton/ha)			10.90		9.85
- Unit Price	(₱/ton)			3,400		2,600
- Gross Income	(₱)			37,060		25,610
II) Production Cost			Q'ty	Amount (₱)	Q'ty	Amount (₱)
1) Seed	(kg)		2.7	292	1.0	130
2) Fertilizer						
- N	(kg)	13.6	370	5,032	80	1,088
- P_2O_5	(kg)	11.8	110	1,298	-	-
- K_2O	(kg)	5.3	80	424	-	-
3) Agro-chemicals						
- Liquid	(ℓ)	143	6.8	972	8.4	1,201
- Granular	(kg)	22	0.8	18	-	-
4) Labor Input	(man-day)	14	182	2,548	193	2,702
5) Animal Power	(day)	46	19.2	883	20.8	957
6) Mechanical Power	(day)		0.5	132	-	-
7) Irrigation Cost						
- Gravity Irrigation				-		-
- Pump Irrigation				850		850
8) Miscellaneous				622		346
Total				13,071		7,274
III) Net Return				23,989		18,336

Table 11.9(1) NET RETURN PER HECTARE - WITH PROJECT
(PRICE LEVEL ON DECEMBER, 1984)

Item	Unit	Unit Price (P)	Irrigated Paddy				Sugarcane	
			Wet Season		Dry Season			
I) Gross Income								
- Unit Yield	(ton/ha)			4.5		5.0		80
- Unit Price	(P/ton)			4,093		4,093		678
- Gross Income	(P)			18,419		20,465		54,240
II) Production Cost			Q'ty	Amount (P)	Q'ty	Amount (P)	Q'ty	Amount (P)
1) Seed	(kg)		60	246	60	246	11,670/1	215
2) Fertilizer								
- N	(kg)	13.6	80	1,088	90	1,224	200	2,720
- P_2O_5	(kg)	11.8	30	354	30	354	100	1,180
- K_2O	(kg)	5.3	30	159	30	159	220	1,166
3) Agro-chemicals								
- Liquid	(ℓ)	143	3	429	3	429	2	286
- Granular	(kg)	22	10	220	10	220	-	-
4) Labor Input	(man-day)	14	105	1,470	110	1,540	140	1,960
5) Animal Power	(day)	46	13.9	639	14.1	649	3.5	161
6) Mechanical Power	(day)	-	2.9	763	3.1	815	2.7	1,620
7) Irrigation Cost								
- Gravity Irrigation				-		-		-
- Pump Irrigation				-		-		-
8) Miscellaneous				268		282		465
Total				5,636		5,918		9,773
III) Net Return				12,783		14,547		44,467

Remarks: /1: Pieces

Table 11.9(2) NET RETURN PER HECTARE - WITH PROJECT
(PRICE LEVEL ON DECEMBER, 1984)

Item	Unit	Unit Price (₱)	Ampalaya		Tomato	
I) Gross Income						
- Unit Yield	(ton/ha)			14		25
- Unit Price	(₱/ton)			3,400		2,600
- Gross Income	(₱)			47,600		65,000
II) Production Cost			Q'ty	Amount (₱)	Q'ty	Amount (₱)
1) Seed	(kg)		3	324	1	130
2) Fertilizer						
- N	(kg)	13.6	120	1,632	100	1,360
- P_2O_5	(kg)	11.8	120	1,416	190	2,242
- K_2O	(kg)	5.3	120	636	100	530
3) Agro-chemicals						
- Liquid	(ℓ)	143	10	1,430	12	1,716
- Granular	(kg)	22	-	-	-	-
4) Labor Input	(man-day)	14	190	2,660	275	3,850
5) Animal Power	(day)	46	19.2	883	20.8	957
6) Mechanical Power	(day)		0.5	132	-	-
7) Irrigation Cost						
- Gravity Irrigation			-	-	-	-
- Pump Irrigation			-	-	-	-
8) Miscellaneous				456		539
Total				9,569		11,324
III) Net Return				38,031		53,676

Table 11.9(3) NET RETURN PER HECTARE - WITH PROJECT
(PRICE LEVEL ON DECEMBER, 1984)

Item	Unit	Unit Price (P)	Mongo		Peanut	
I) Gross Income						
- Unit Yield	(ton/ha)			0.50		0.75
- Unit Price	(P/ton)			6,500		5,200
- Gross Income	(P)			3,250		3,900
II) Production Cost			Q'ty	Amount (P)	Q'ty	Amount (P)
1) Seed	(kg)		18	117	80	416
2) Fertilizer						
- N	(kg)	13.6	14	190	14	190
- P_2O_5	(kg)	11.8	14	165	14	165
- K_2O	(kg)	5.3	14	74	14	74
3) Agro-chemicals						
- Liquid	(ℓ)	143	1.4	200	1.4	200
- Granular	(kg)	22	-	-	-	-
4) Labor Input	(man-day)	14	30	420	35	490
5) Animal Power	(day)	46	2.8	129	2.8	129
6) Mechanical Power	(day)		-	-	-	-
7) Irrigation Cost						
- Gravity Irrigation			-	-	-	-
- Pump Irrigation			-	-	-	-
8) Miscellaneous				65		83
Total				1,360		1,747
III) Net Return				1,890		2,153

Table 11.10 PROJECT BENEFIT (PRICE LEVEL ON DECEMBER, 1984)

Crops	With Project			Without Project			Benefit
	Area/3 (ha)	Net Return (P/ha)	Total Value (P10³)	Area/3 (ha)	Net Return (P/ha)	Total Value (P10³)	(P10³)
Paddy Field			310,432			106,292	204,140
Wet Season Paddy							
- Gravity Irrigation Area	11,000	12,783	140,613	5,970	7,446	44,453	
- Pump Irrigation Area	-	-	-	1,100	6,469	7,116	
- Rainfed Area	-	-	-	4,060	3,985	16,179	
Dry Season Paddy							
- Gravity Irrigation Area	6,000	14,547	87,282	4,540	6,636	30,127	
- Pump Irrigation Area	-	-	-	820	5,292	4,339	
Diversified Crops (Fruit Vegetables)	1,800	45,854/1	82,537	170	23,989	4,078	
Sugarcane Field			267,312			115,941	151,371
Sugarcane	5,750	44,467/2	255,685	5,900	19,651/2	115,941	
Intercrops	(5,750)	2,022	11,627	-	-	-	
Total			577,744			222,233	355,511

Remarks: /1: Average net return of ampalaya and tomato.

/2: Average net return of plant cane and ratoon cane.

/3: See Table 4.36.

Table 11.11 ECONOMIC CONSTRUCTION COST
(PRICE LEVEL ON DECEMBER, 1984)

(Unit: P10^6)

Item	Total	1986	1987	1988	1989	1990	1991	1992
1. Direct Construction Cost	1,238.7		211.0	204.1	158.7	257.0	216.6	191.3
1.1 Gumain Dam	1,030.6	-	198.9	182.2	128.3	185.6	167.8	167.8
1.2 Diversion Dam	27.1	-	1.0	3.9	-	11.1	11.1	-
1.3 Irrigation Facilities	132.2	-	11.1	18.0	24.6	39.7	19.4	19.4
1.4 Drainage Facilities	32.6	-	-	-	5.8	11.3	11.4	4.1
1.5 On - Farm Development	16.2	-	-	-	-	9.3	6.9	-
2. Cost for O & M Facilities	11.7	-	-	-	-	8.5	-	3.2
3. Administrative Cost and Engineering Cost	153.9	44.7	18.2	21.4	21.4	18.2	16.1	13.9
Sub - total	1,404.3	44.7	229.2	225.5	180.1	283.7	232.7	208.4
4. Physical Contingency	211.0	6.7	34.4	33.8	27.0	42.6	34.9	31.6
Total	1,615.3	51.4	263.6	259.3	207.1	326.3	267.6	240.0

Table 11.12 ANNUAL ECONOMIC COST AND BENEFIT FLOW
(PRICE LEVEL ON DECEMBER, 1984)

(Unit: ₱10⁶)

Year	Year in Order	Economic Cost			Total	Economic Benefit
		Construction Cost	Replacement Cost	O&M Cost		
1986	1	51.4	0	0	51.4	0
1987	2	263.6	0	0	263.6	0
1988	3	259.3	0	0	259.3	0
1989	4	207.1	0	0	207.1	0
1990	5	326.3	0	1.0	327.3	4.9
1991	6	267.6	0	2.0	269.6	15.0
1992	7	240.0	0	2.0	242.0	25.0
1993	8	0	0	5.0	5.0	96.2
1994	9	0	0	5.0	5.0	167.2
1995	10	0	0	5.0	5.0	233.4
1996	11	0	0	5.0	5.0	294.4
1997	12	0	0	5.0	5.0	355.5
1998	13	0	0	5.0	5.0	355.5
1999	14	0	0	5.0	5.0	355.5
2000	15	0	7.0	5.0	12.0	355.5
2001	16	0	0	5.0	5.0	355.5
2002	17	0	3.2	5.0	8.2	355.5
2003	18	0	0	5.0	5.0	355.5
⋮	⋮	⋮	⋮	⋮	⋮	⋮
2009	24	0	0	5.0	5.0	355.5
2010	25	0	7.0	5.0	12.0	355.5
2011	26	0	0	5.0	5.0	355.5
2012	27	0	3.2	5.0	8.2	355.5
2013	28	0	23.2	5.0	28.2	355.5
2014	29	0	0.8	5.0	5.8	355.5
2015	30	0	0.2	5.0	5.2	355.5
2016	31	0	1.4	5.0	6.4	355.5
2017	32	0	0.4	5.0	5.4	355.5
2018	33	0	0	5.0	5.0	355.5
2019	34	0	0	5.0	5.0	355.5
2020	35	0	7.0	5.0	12.0	355.5
2021	36	0	0	5.0	5.0	355.5
2022	37	0	3.2	5.0	8.2	355.5
2023	38	0	0	5.0	5.0	355.5
⋮	⋮	⋮	⋮	⋮	⋮	⋮
2029	44	0	0	5.0	5.0	355.5
2030	45	0	7.0	5.0	12.0	355.5
2031	46	0	0	5.0	5.0	355.5
2032	47	0	3.2	5.0	8.2	355.5
2033	48	0	0	5.0	5.0	355.5
2034	49	0	0	5.0	5.0	355.5
2035	50	0	0	5.0	5.0	355.5

Table 11.13 DISBURSEMENT SCHEDULE OF FINANCIAL CONSTRUCTION COST

(Unit: P10^6)

Item	Total			1986			1987			1988		
	F.C.	L.C.	Total	F.C.	L.C.	Total	F.C.	L.C.	Total	F.C.	L.C.	Total
1. Direct Construction Cost	846.6	315.0	1,161.0	-	-	-	151.4	46.5	197.9	145.8	45.7	191.5
1.1 Gumain Dam	749.6	217.2	966.8	-	-	-	148.5	38.1	186.6	137.2	33.8	171.0
1.2 Diversion Dam	16.4	9.0	25.4	-	-	-	0.4	0.5	0.9	2.8	0.9	3.7
1.3 Irrigation Facilities	61.9	61.7	123.6	-	-	-	2.5	7.9	10.4	5.8	11.0	16.8
1.4 Drainage Facilities	17.8	12.8	30.6	-	-	-	-	-	-	-	-	-
1.5 On-Farm Development	0.9	14.3	15.2	-	-	-	-	-	-	-	-	-
2. Compensation Cost for Land Acquisition	-	14.5	14.5	-	-	-	-	5.0	5.0	-	5.0	5.0
3. Cost for O & M Facilities	8.9	2.1	11.0	-	-	-	-	-	-	-	-	-
4. Administration and Engineering Costs	76.0	68.0	144.0	35.0	7.0	42.0	7.0	10.0	17.0	8.0	12.0	20.0
Sub-total	931.5	399.6	1,331.1	35.0	7.0	42.0	158.4	61.5	219.9	153.8	62.7	216.5
5. Physical Contingency	139.8	60.0	199.8	5.3	1.1	6.4	23.8	9.2	33.0	23.1	9.4	32.5
Total	1,071.3	459.6	1,530.9	40.3	8.1	48.4	182.2	70.7	252.9	176.9	72.1	249.0
6. Price Continbency	563.3	673.8	1,237.1	7.1	5.1	12.2	51.6	58.4	110.0	70.6	75.4	146.0
Grand Total	1,634.6	1,133.4	2,768.0	47.4	13.2	60.6	233.8	129.1	362.9	247.5	147.5	395.0

Item	1989			1990			1991			1992		
	F.C.	L.C.	Total	F.C.	L.C.	Total	F.C.	L.C.	Total	F.C.	L.C.	Total
1. Direct Construction Cost	113.3	35.5	148.8	163.8	76.9	249.7	141.6	61.6	203.2	130.7	48.8	179.5
1.1 Gumain Dam	98.2	22.2	120.4	131.5	42.5	174.0	117.1	40.3	157.4	117.1	40.3	157.4
1.2 Diversion Dam	-	-	-	6.6	3.8	10.4	6.6	3.8	10.4	-	-	-
1.3 Irrigation Facilities	12.0	11.0	23.0	19.0	18.0	37.0	11.3	6.9	18.2	11.3	6.9	18.2
1.4 Drainage Facilities	3.1	2.3	5.4	6.2	4.4	10.6	6.2	4.5	10.7	2.3	1.6	3.9
1.5 On-Farm Development	-	-	-	0.5	8.2	8.7	0.4	6.1	6.5	-	-	-
2. Compensation Cost for Land Acquisition	-	4.5	4.5	-	-	-	-	-	-	-	-	-
3. Cost for O & M Facilities	-	-	-	6.1	1.9	8.0	-	-	-	2.8	0.2	3.0
4. Administration and Engineering Costs	8.0	12.0	20.0	7.0	10.0	17.0	6.0	9.0	15.0	5.0	8.0	13.0
Sub-total	121.3	52.0	173.3	176.9	88.8	265.7	147.6	70.6	218.2	138.5	57.0	195.5
5. Physical Contingency	18.2	7.8	26.0	26.5	13.3	39.8	22.1	10.6	32.7	20.8	8.6	29.4
Total	139.5	59.8	199.3	203.4	102.1	305.5	169.7	81.2	250.9	159.3	65.6	224.9
6. Price Contingency	70.3	77.2	147.5	120.8	159.9	280.7	116.9	152.2	269.1	126.0	145.6	271.6
Grand Total	209.8	137.0	346.8	324.2	262.0	586.2	286.6	233.4	520.0	285.3	211.2	496.5

Remarks: F.C.: Foreign Currendy, L.C.: Local Currency

This disbursement schedule is estimated on the basis of the price level and exchange rate (US$1.00 = P14.0) as of March, 1984.

Table 11.14 ESTIMATION OF PRICE CONTINGENCY

Year	Forecast of World Manufacturing Unit Value Index/1		Actual Wholesale Price Index for Metro Manila/2		Estimation of Price Contingency			
					F.C./3		L.C./4	
	1983=100	%	1978=100	%	1984=100	%	1984=100	%
1978	91.6	17.9	100.0	-				
1979	102.2	11.6	100.7	0.7				
1980	110.6	8.3	123.9	23.0				
1981	105.4	-4.8	136.9	10.5				
1982	103.3	-2.0	155.2	13.4				
1983	100.0	-3.2						
1984	103.3	3.3			100.0		100.0/7	
1985	111.5	8.0			108.0	8.0/5	145.6	45.6/8
1986	121.5	9.0			117.7	9.0	163.1	12.0/6
1987	132.5	9.0			128.3	9.0	182.6	12.0
1988	144.4	9.0			139.9	9.0	204.6	12.0
1989	155.2	7.5			150.4	7.5	229.1	12.0
1990	164.5	6.0			159.4	6.0	256.6	12.0
1991	174.4	6.0			168.9	6.0	287.4	12.0
1982	184.8	6.0			179.1	6.0	321.9	12.0

Remarks: /1: Unit value index of manufactured exports from developed to developing countries.
This index was forecasted by IBRD.

Source: Half-Yearly Revisions of Commodity Price Forecasts, IBRD, December 1983.

/2: Wholesale price index of machinery and transport equipment.
Source: 1983 Philippine Statistical Yearbook, NEDA.

/3: Foreign Currency

/4: Local Currency

/5: Apply the manufacturing unit value index to the price contingency of foreign currency.

/6: Average wholesale price index for Metro Manila from 1978 to 1982. = 11.6% ≒ 12.0% (Rounded)

/7: Price level as of March 1984

/8: (Price escalation from March to December 1984) x (Price escalation from 1984 to 1985) = 1.30 x 1.12 = 1.456.
As for the price escalation from March to December 1984, it is assumed that the prices of goods and services will increase by 30% at the least along with the change in exchange rate from US$1.0 = ₱14.0 to US$1.0 = ₱18.0.

Table 11.15 CASH FLOW STATEMENT

(Unit: ₱10⁶)

Year	Year in Order	Cash Outflow: Capital Cost F.C./1	Capital Cost L.C./2	Loan Repayment/3: Interest	Loan Repayment/3: Principal	O&M Cost	Replacement	Reimbursement/4 and Incentive for Irrigation Fee	Total	Cash Inflow: Construction Fund F.C.	Construction Fund L.C.	Revenue/5	Government Subsidy	Total	Balance
1989	1	44.7	13.2	-	-	-	-	-	57.9	44.7	13.2	-	-	57.9	0
1987	2	233.8	129.1	1.6	-	-	-	-	364.5	233.8	129.1	-	1.6	364.5	0
1988	3	247.5	147.5	9.7	-	-	-	-	404.7	247.5	147.5	-	9.7	404.7	0
1989	4	209.8	137.0	18.4	-	-	-	-	365.2	209.8	137.0	-	18.4	365.2	0
1990	5	324.2	262.0	25.8	-	0.9	-	0.2	613.1	324.2	262.0	1.0	25.9	613.1	0
1991	6	286.6	233.4	37.1	-	1.9	-	0.3	559.3	286.6	233.4	2.0	37.3	559.3	0
1992	7	285.3	211.2	47.1	-	1.9	-	0.3	545.8	285.3	211.2	2.0	47.3	545.8	0
1993	8	-	-	57.1	-	4.7	-	1.2	63.0	-	-	7.8	55.2	63.0	0
1994	9	-	-	57.1	-	4.7	-	1.2	63.0	-	-	7.8	55.2	63.0	0
1995	10	-	-	57.1	-	4.7	-	1.2	63.0	-	-	7.8	55.2	63.0	0
1996	11	-	-	57.1	81.6	4.7	-	1.2	144.6	-	-	7.8	136.8	144.6	0
1997	12	-	-	54.3	81.6	4.7	-	1.2	141.8	-	-	7.8	134.0	141.8	0
1998	13	-	-	51.4	81.6	4.7	-	1.2	138.9	-	-	7.8	131.1	138.9	0
1999	14	-	-	48.5	81.6	4.7	-	1.2	136.0	-	-	7.8	128.2	136.0	0
2000	15	-	-	45.7	81.6	4.7	6.6	1.2	139.8	-	-	7.8	132.0	139.8	0
2001	16	-	-	42.8	81.6	4.7	-	1.2	130.3	-	-	7.8	122.5	130.3	0
2002	17	-	-	40.0	81.6	4.7	3.0	1.2	130.5	-	-	7.8	122.7	130.5	0
2003	18	-	-	37.1	81.6	4.7	-	1.2	124.6	-	-	7.8	116.8	124.6	0
2004	19	-	-	34.3	81.6	4.7	-	1.2	121.8	-	-	7.8	114.0	121.8	0
2005	20	-	-	31.4	81.6	4.7	-	1.2	118.9	-	-	7.8	111.1	118.9	0
2006	21	-	-	28.6	81.6	4.7	-	1.2	116.1	-	-	7.8	108.3	116.1	0
2007	22	-	-	25.7	81.6	4.7	-	1.2	113.2	-	-	7.8	105.4	113.2	0
2008	23	-	-	22.8	81.6	4.7	-	1.2	110.3	-	-	7.8	102.5	110.3	0
2009	24	-	-	20.0	81.6	4.7	-	1.2	107.5	-	-	7.8	99.7	107.5	0
2010	25	-	-	17.1	81.6	4.7	6.6	1.2	111.2	-	-	7.8	103.4	111.2	0
2011	26	-	-	14.3	81.6	4.7	-	1.2	101.8	-	-	7.8	94.0	101.8	0
2012	27	-	-	11.4	81.6	4.7	3.0	1.2	101.9	-	-	7.8	94.1	101.9	0
2013	28	-	-	8.6	81.6	4.7	21.0	1.2	117.1	-	-	7.8	109.3	117.1	0
2014	29	-	-	5.7	81.6	4.7	0.8	1.2	94.0	-	-	7.8	86.2	94.0	0
2015	30	-	-	2.9	81.6	4.7	0.2	1.2	90.6	-	-	7.8	82.8	90.6	0
2016	31	-	-	0	0	4.7	1.3	1.2	7.2	-	-	7.8	-	7.8	0.6

Remarks: /1: Foreign Currency Portion, /2: Local Currency Portion

/3: Interest: 3.5%
Grace period: 10 years
Repayment period including grace period: 30 years

/4: 10%; Back payment to farmers under full payment condition.
5%; Incentive to FIAs under full payment condition.

/5: Revenue from irrigation fee to be collected from farmer.

This analysis is made on the basis of the price level and exchange rate (US$1.0 = ₱14.0) as of March, 1984.

Table 11.16 LAND PRODUCTIVITY FOR SUGARCANE

Item		Without Project/1		With Project/1	
I) Gross Income					
- Unit Yield	(t/ha)		36		80
- Unit Price	(₱/t)		184		184
- Gross Income	(₱)		6,624		14,720
II) Production Cost					
		Q'ty	Amount (₱)	Q'ty	Amount (₱)
1) Seed Cane	(piece)	15,120	76/2	11,655	58/2
2) Fertilizer					
- N	(kg)	106	774	200	1,460
- P_2O_5	(kg)	2	14	100	700
- K_2O	(kg)	2	14	220	1,540
3) Agro-chemicals	(ℓ)	-		2	182
4) Labor	(man-day)	76	1,900	140	3,500
5) Animal Power	(day)	3.6	126	3.5	123
6) Mechanical Power	(day)	2.6	1,040	2.7	1,080
7) Irrigation Cost	(day)	-	-		522
8) Quedan/3			396		880
9) Transportation Cost/4			720		1,600
10) Miscellaneous			253		582
Total			5,313		12,227
III) Net Income			1,311		2,493

Remarks: /1: Cropping ratio per ha

Without project	- Plant cane :	0.432
	- Ratoon cane:	0.568
With project	- Plant cane :	0.333
	- Ratoon cane:	0.667

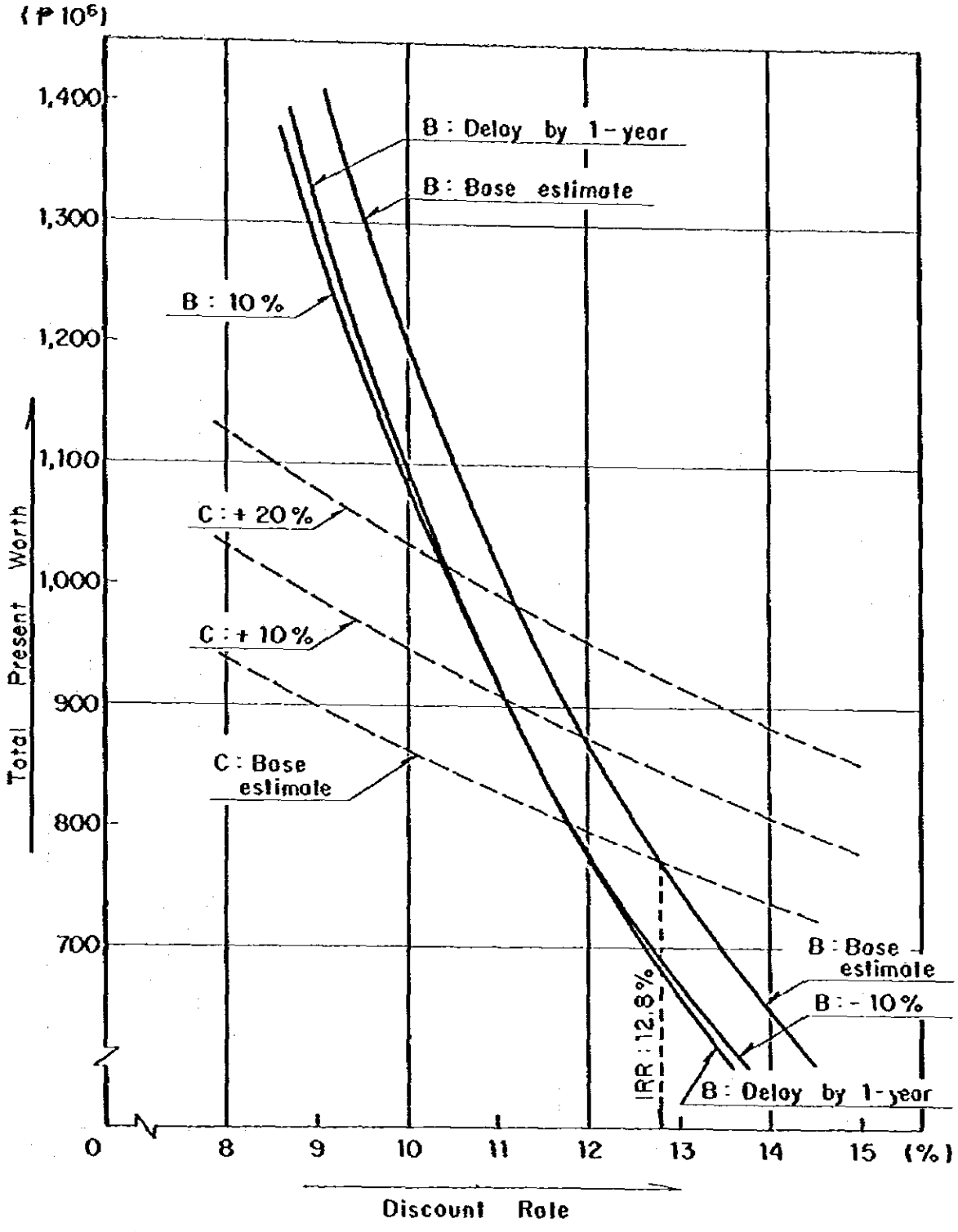
/2: ₱ 5/1,000 pieces

/3: ₱11/one ton of sugarcane

/4: ₱20/one ton of sugarcane

This analysis was made on the basis of the price level and exchange rate (US$1.0 = ₱14.0) as of March, 1984.

Fig. 11.1 INTERNAL RATE OF RETURN
(PRICE LEVEL ON MARCH, 1984)



Remarks : B Benefit
C Cost

Fig. 11.2 INTERNAL RATE OF RETURN
(PRICE LEVEL ON DECEMBER, 1984)