J-2 Investment Schedule

The investment schedule of the development cost at current price is determined on the basis of priority of the development plans. Investment amount is estimated at 1,502.7 million pesos for the short-term development stage (1991 - 1995), 879.4 million pesos for the medium-term development stage (1996 - 2000), and 1,417.9 million pesos for the long-term development stage (2001 - 2010). (refer to Table J-1-1)

J-3 Operation and Maintenance Cost

The annual operation and maintenance cost is estimated at current price by project and by development stage. (refer to Tables J-3-1, J-3-2 and J-3-3)

Table J-1-1 Summary of Development Cost (As of June 1989)

(Unit: 1,000 ₱)

Description	Total	Short-Term (1991-1995)	Medium-Term (1996-2000)	Long-Term (2001-2010)
1. Agricultural Development	166,000	74,800	66,700	24,500
2. Agricultural Infrastructure Development				
1) Irrigation Development	814,000	78,400	181,800	553,800
2) Drainage Development	483,000	162,000	160,500	160,500
3) Rural Road Development	1,204,000	401,300	290,700	512,000
4) Village Water Supply Development	40,000	40,000	-	-
Sub-total of 2	2,541,000	681,700	633,000	1,226,300
3. Rural Infrastructure Development				
1) Rural Water Supply Development	244,000	97,000	78,500	68,500
2) Hydro-Power & Rural Electrification Development	254,000	190,500	26,000	37,500
3) Traffic System Development	65,500	16,800	20,000	28,700
4) Social Services Development	133,500	65,900	35,200	32,400
Sub-total of 3	697,000	370,200	159,700	167,100
4. Aquaculture Development	20,000	-	20,000	-
5. MADPP	376,000	376,000	-	-
Total (1~5)	3,800,000 (100%)	1,502,700 (40%)	879,400 (23%)	1,417,900 (37%)

Table J-1-2 Breakdown of Project Cost for Irrigation Development

(Unit: 1,000₱)

No.	Name of Project	Irrigable Area (ha)	Intake Type	Intake Facility	Irrigation Canal	On-Farm Facility	Drainage Canal	Others	Total Amount	Remark
1) Rehabilitation Project										
1.	Mansabang	150	D	-	1,904	450	1,200		3,554	ST
2.	Amoigon	10	D	736	459	30	80		1,305	ST
3.	Maybo-Malbog	13	D	-	-	39	104		143	ST
4.	Katubugan	16	D	304	785	48	128		1,265	ST
5.	Pawa-Tagwak	32	D	192	731	96	256		1,275	ST
6.	Balanacan	15	D	304	1,650	45	120		2,119	ST
7.	Landy-Baliis	60	D	-	216	180	480		876	ST
8.	Lipa	10	D	228	297	30	80		635	ST
9.	Matuyatuya	23	C.D.	300	1,980	69	184		2,533	ST
10.	Sibuyao	11	D	133	-	33	88		254	ST
11.	Bonliw	20	I	3,850	1,650	60	160		5,720	ST
12.	Poctoy	15	I	805	1,980	45	120		2,950	ST
13.	Busay	5	D	144	-	15	40		199	ST
14.	Malindig	27	D	570	-	81	216		867	ST
15.	Ilaya	19	D	342	1,650	57	152		2,201	ST
16.	Marlangga	22	I	2,625	-	66	176		2,867	ST
17.	Mabuhay	15	I	2,800	-	45	120		2,965	ST
19.	Bagtingon	9	D	920	2,860	27	72		3,879	ST
20.	Malbog	70	D	2,070	5,457	210	560		8,297	ST
21.	Banuyo	30	D	-	2,134	90	240		2,464	ST
22.	Tumagabok	20	D	144	384	60	160		748	ST
	Sub-total			16,467	24,137	1,776	4,736		47,116	
2) New Project										
26.	Bahi	90	I	10,200	4,400	270	720		15,590	MT
27.	Cabugao	30	I	7,800	1,980	90	240		10,110	MT
28.	Bachao	80	I	8,600	4,620	240	640		14,100	MT
29.	Antipolo	45	I	13,600	1,870	135	360		15,965	MT
30.	Amoigon	25	D	920	2,200	75	200		3,395	MT
31.	Balagasan	50	I	9,700	3,740	150	400		13,990	MT
32.	Bagtingon	200	I	20,200	10,010	600	1,600		32,410	MT
33.	Bangbang	120	I	10,700	4,510	360	960		16,530	MT
34.	Masaguisi	40	I	9,000	1,760	120	320		11,200	MT
35.	Cawit	40	I	10,200	2,200	120	320		12,840	LT
36.	Tugos (North)	50	I	12,500	2,420	150	400		15,470	LT
37.	Tugos (East)	25	D	4,600	2,200	75	200		7,075	LT
38.	Maybo Ext.	25	D	920	2,750	75	200		3,945	LT
39.	Binunga	710	I	180,000	74,000	2,130	5,680		261,810	LT
40.	Manlunay	70	I	18,200	2,750	210	560		21,720	LT
41.	Tiguion	50	I	10,200	3,300	150	400		14,050	LT
42.	Dawis	110	I	8,200	6,050	330	880		15,460	LT
43.	Bintakay	45	G	800	2,750	135	360		4,045	LT
44.	Buangan	35	I	12,500	2,750	105	280		15,635	LT
45.	Tagum-Augas	630	I	MADPP	MADPP	MADPP	MADPP		2,800	MT/LT
46.	Laylay-Ihatub	90	I	12,500	3,300	270	720		16,790	LT
47.	Masiga Ext.	40	P	5,600	2,200	120	320		8,240	LT
48.	Tapuyan	50	D	7,360	3,850	150	400		11,760	LT
	Sub-total	2,500		374,300	145,610	6,060	16,160	2,800	544,930	
3) Rehabilitation Project										
50.	Masiga	53	P	-	2,420	159	424		3,003	ST
51.	Laon	59	P	-	-	177	472		649	ST
52.	Bintakay	12	P	-	880	36	96		1,012	ST
53.	Mabuhay	27	D	760	822	81	216		1,879	ST
54.	Pawa	12	I	-	2,055	36	96		2,187	ST
55.	Bantad	17	C.D.	700	1,370	51	136		2,257	ST
	Sub-total			1,460	7,547	540	1,440		10,987	
	Total			392,227	177,294	8,376	22,336	2,800	603,033	
	Engineering & Administration Cost			78,400	35,400	1,700	4,500	600	120,600	
	Physical Contingency			58,873	26,606	1,224	3,264	400	90,367	
	Grand Total			529,500	239,300	11,300	30,100	3,800	814,000	

Figure J-1-3 Breakdown of Project Cost (1/5)

(Unit: 1,000₱)

Description	Q'ty	Unit	Amount	Remark
Agricultural Development				ST MT LT
1) Strengthening of Reserch Staff	1	Lot	1,800	1- 0- 0
2) Strengthening of Agricultural Extension Workers	6	"	8,400	6- 0- 0
3) Pest/Disease Observatory	6	"	7,800	6- 0- 0
4) Seed Bank	1	"	6,000	1- 0- 0
5) DA Municipal Nurseries	5	"	8,000	1- 2- 2
6) Irrigated Paddy Demonstration Farm	6	"	8,160	2- 4- 0
7) Rainfed Paddy/Diversified Crops Demonstration Farm	1	"	1,310	1- 0- 0
8) Vegetable Demonstration Farm	6	"	5,400	2- 2- 2
9) Coconut Intercropping Demonstration Farm	6	"	1,320	2- 2- 2
10) Hillside Farming Demonstration Farm	6	"	360	2- 2- 2
11) Agro-forest Demonstration Farm	2	"	160	0- 2- 0
12) Post-harvest of Rice	6	"	5,700	1- 2- 3
13) Post-harvest of Corn	5	"	1,350	1- 2- 2
14) Post-harvest of Coconut	6	"	5,880	2- 2- 2
15) Coconut Timber Utilization	6	place	7,920	2- 2- 2
16) Goat Stock Farm	1	"	2,300	1- 0- 0
17) Backyard Poultly Demonstration Farm	6	"	540	0- 6- 0
18) Grazing Field Demonstration Farm	6	"	6,000	2- 2- 2
19) Slaughter House Remodelling	5	"	13,000	2- 2- 1
20) Integrated Agriculture Traiding Center	1	"	16,400	0- 1- 0
21) Strengthening of Livestock Registration System	6	"	960	6- 0- 0
22) Public Animal Auction Market	6	"	14,400	3- 3- 0
Sub-total			123,160	
Engineering & Administration Cost	L.S.		24,600	
Physical Contingency	L.S.		18,240	
Total			166,000	
Drainage Development				
1) Bagtingon Area Main Drain				ST
Drain (T-A)	700	m	175	
" (T-B)	800	"	288	
Pipe Culvert	4	place	188	
Sub-total			651	
2) Boac Area Main Drain				ST
Drain (T-C)	500	m	135	
" (T-D)	1,500	"	600	
Pipe Culvert	3	place	141	
Sub-total			876	
				ST MT LT
3) Mogpog River Control				1/3-1/3-1/3
Flood Protection Dike (T-I)	1,000	m	25,000	
" (T-II)	3,600	"	39,600	
" (T-III)	8,900	"	67,640	
Tidal Gate	3	place	1,590	
Sub-total			133,830	

Figure J-1-3 Breakdown of Project Cost (2/5)

(Unit: 1,000₱)

Description	Q'ty	Unit	Amount	Remark
				ST MT LT
4) Boac River Control				1/3-1/3-1/3
Flood Protection Dike (T-I)	700	m	17,500	
" (T-II)	2,600	"	28,600	
" (T-III)	23,200	"	176,320	
Tidal Gate	1	place	530	
Sub-total			222,950	
Total			358,307	
Engineering & Administration Cost	L.S.		71,600	
Physical Contingency	L.S.		353,093	
Grand Total			483,000	
Rural Road Development				
1) Improvement of Farm-to-market Road				ST MT LT
Type A	160	km	144,000	40 - 40- 80
Type B	64.5	"	32,250	34.5- 30- 0
Type C	65.5	"	19,650	45.5- 20- 0
Sub-total	290	km	195,900	
2) Construction of Farm-to-market Road				
Type A	20	km	52,000	20- 0- 0
Type B	120	"	186,000	20- 30- 70
Type C	190	"	180,500	40- 50-100
Sub-total	330	km	418,500	
3) Construction of Farm Road				
Type D	285	km	114,000	65- 70-150
4) Multi-purpose Pavement	380	place	76,000	180-100-100
5) Bridges				
Replacement	370	l.m.	29,600	200-100- 70
New Construction	500	"	35,000	120-120-260
Sub-total	870	l.m.	64,600	
6) Reinforcement of PEO Motor-Pool	1	Lot	23,000	ST
Total			892,000	
Engineering & Administration Cost	L.S.		178,400	
Physical Contingency	L.S.		133,600	
Grand Total			1,204,000	
Village Water Supply Development				
1) Buenavista Village Water Supply				ST
Intake Facility	2,850	m^3/day	228	
Break-pressure Chamber	6	place	1,200	
Ground Reservoir	950	m^3	2,850	
Transmission Pipeline	7.5	km	14,250	
Distribution Pipeline	16	"	11,200	
Communal Faucet	84	place	336	
Sub-total			30,064	
Engineering & Administration Cost	L.S.		6,000	
Physical Contingency	L.S.		3,936	
Total			40,000	

Figure J-1-3 Breakdown of Project Cost (3/5)

(Unit: 1,000₱)

Description	Q'ty	Unit	Amount	Remark
Rural Water Supply Development				
1) Sta Cruz Rural Water Supply (New)				ST
Intake Facility	4,400	m^3/day	352	
Ground Reservoir	1,500	m^3	4,500	
Transmission Pipeline	20	km	38,000	
Distribution Pipeline	40	"	28,000	
Break-pressure Chamber	3	place	600	
Communal Faucet	154	"	616	
Sub-total			72,068	
2) Rehabilitation of Boac Rural Water Supply				MT
Transmission Pipeline	12.5	km	23,750	
Distribution Pipeline	4.5	"	3,150	
Sub-total			26,900	
3) Rehabilitation of Mogpog Rural Water Supply				MT
Distribution Pipeline	8.5	km	5,950	
4) Rehabilitation of Torrijos Rural Water Supply				MT
Transmission Pipeline	10	km	19,000	
5) Rehabilitation of Sta Cruz Rural Water Supply				MT
Distribution Pipeline	6.5	km	4,550	
6) Rehabilitation of Deepwell (Mogpog)				MT
Deepwell Pump Station	1,600	m^3/d	1,920	
Pump House	20	m^2	40	
Sub-total			1,960	
7) Gasan Rural Water Supply (New)				LT
Intake Facility	2,200	m^3/d	176	
Ground Reservoir	880	m^3	2,640	
Transmission Pipeline	8	km	15,200	
Distribution Pipeline	28.5	"	19,950	
Communal Faucet	133	place	532	
Sub-total			38,498	
8) Boac Rural Water Supply (New)				LT
Ground Reservoir	670	m^3	2,010	
Transmission Pipeline	1	km	1,900	
Distribution Pipeline	12	"	8,400	
Sub-total			12,310	
Total			181,236	
Engineering & Administration Cost	L.S.		36,000	
Physical Contingency	L.S.		26,764	
Grand Total			244,000	

Figure J-1-3 Breakdown of Project Cost (4/5)

(Unit: 1,000₱)

Description	Q'ty	Unit	Amount	Remark
Hydro-power and Rural Electrification Development				
1) Tagum-Angas Hydro Power	300	kw	9,900	MT
2) Binunga Hydro Power	600	"	14,400	LT
3) Rural Electrification				
Generator (2.25 MW/unit)	4	unit	92,000	ST
				ST MT LT
Transmission Line (69 KV)	49	km	15,190	49- 0- 0
Distribution Line (3 φ)	25	"	4,250	25- 0- 0
" (1 φ)	340	"	27,200	270- 30- 40
Secondary Line	425	"	25,500	135-120-170
Sub-total			164,140	
Total			188,440	
Engineering & Administration Cost	L.S.		37,500	
Physical Contingency	L.S.		28,060	
Grand Total			254,000	
Traffic System Development				ST MT LT
1) Road Waiting Shed	845	place	29,575	230-215-400
2) Improvement of Kawit Port				ST
Passenger Shed	1	unit	900	
Cargo Shed	1	"	2,000	
Fork Lift	1	"	1,500	
Sub-total			4,400	
3) Improvement of Balanacan Port				MT
Passenger Port	2	unit	1,800	
Cargo Port	2	"	4,000	
Fork Lift	1	"	1,500	
Sub-total			7,300	
4) Improvement of Buyabod Port				LT
Passenger Port	2	unit	1,800	
Cargo Port	2	"	4,000	
Fork Lift	1	"	1,500	
Sub-total			7,300	
Total			48,575	
Engineering & Administration Cost	L.S.		9,700	
Physical Contingency	L.S.		7,225	
Grand Total			65,500	
Social Services Development				ST MT LT
1) Health & Medical Service Facility				
Construction of BHS	15	unit	3,750	8- 7- 0
Construction of Health Center	1	"	350	1- 0- 0
Construction of RHU	3	"	2,100	0- 3- 0
Rehabilitation of BHS	2	"	100	2- 0- 0
Rehabilitation of RHU	2	"	100	2- 0- 0
Rehabilitation of Hospital	2	"	5,200	2- 0- 0
Clinic Car	2	"	3,000	2- 0- 0
Sub-total			14,600	

Figure J-1-3 Breakdown of Project Cost (5/5)

(Unit: 1,000₱)

Description	Q'ty	Unit	Amount	Remark
2) Education & Welfare Facility				ST MT LT
Improvement of MIST	6	rooms	210	0- 6- 0
Rehabilitation of E.S.	236	school	18,880	236- 0- 0
Construction of E.S.	60	"	12,000	60- 0- 0
Const. of School Toilet	173	unit	13,840	7- 56-110
Sub-total			44,930	
3) Communication Facility				
Telephone Cable Line	140	km	21,000	40- 0-100
Telephone	130	unit	1,300	60- 50- 20
Telephone Station	1	sta.	17,000	0- 1- 0
Sub-total			39,300	
Total			98,830	
Engineering & Administration Cost	L.S.		19,800	
Physical Contingency	L.S.		14,870	
Grand Total			133,500	
Aquaculture Development				
1) Small Scale Fish-Meal & Feed Processing Plant				MT
Fish Meal Processing Line, Automatic, 300 kg/hr	1	unit	6,700	
Feed Processing Line 250 kg/hr	1	"	7,000	
Office Building	150	m^2	1,200	
Sub-total			14,900	
Engineering & Administration Cost	L.S.		2,900	
Physical Contingency	L.S.		2,200	
Total			20,000	

Table J-3-1 Summary of Annual Operation and Maintenance Cost

(Unit: 1,000 ₱)

Description	Short-Term (1991-1995)	Medium-Term (1996-2000)	Long-Term (2001-2010)
1. Agricultural Development	8,860	12,790	13,430
2. Agricultural Infrastructure Development			
1) Irrigation Development	440	1,180	3,470
2) Drainage Development	130	230	330
3) Rural Road Development	8,165	12,955	20,595
4) Village Water Supply Development	435	435	435
Sub-total of 2	9,170	14,800	24,830
3. Rural Infrastructure Development			
1) Rural Water Supply Development	660	1,330	1,960
2) Hydro-Power & Rural Electrification Development	23,400	29,500	48,500
3) Traffic System Development	270	620	1,080
4) Social Services Development	1,840	2,660	3,700
Sub-total of 3	26,170	34,110	55,240
4. Aquaculture Development	-	700	700
5. MADPP	9,000	9,000	9,000
Total (1~5)	53,200	71,400	103,200

Table J-3-2 Breakdown of Annual Operation and Maintenance Cost for Irrigation Development

(Unit: 1,000P)

No.	Name of Project	Irrigable Area (ha)	Intake Type	Intake Facility	Irrigation and Drainage Canal	Others	Total Amount	Remark
1) Rehabilitation Project								
1.	Mansabang	150	D	-	60		60	ST
2.	Amoigon	10	D	8	4		12	"
3.	Maybo-Malbog	13	D	-	5		5	"
4.	Katubugan	16	D	3	6		9	"
5.	Pawa-Tagwak	32	D	2	13		15	"
6.	Balanacan	15	D	3	6		9	"
7.	Landy-Baliis	60	D	-	24		24	"
8.	Lipa	10	D	2	4		6	"
9.	Matuyatuya	23	C.D.	3	9		12	"
10.	Sibuyao	11	D	1	4		5	"
11.	Bonliw	20	I	20	8		28	"
12.	Poctoy	15	I	4	6		10	"
13.	Busay	5	D	1	2		3	"
14.	Malindig	27	D	6	11		17	"
15.	Ilaya	19	D	3	8		11	"
16.	Marlangga	22	I	13	9		22	"
17.	Mabuhay	15	I	14	6		20	"
19.	Bagtingon	9	D	9	4		13	"
20.	Malbog	70	D	21	28		49	"
21.	Banuyo	30	D	-	12		12	"
22.	Tumagabok	20	D	2	8		10	"
	Sub-total			115	237		352	
2) New Project								
26.	Bahi	90	I	51	36		87	MT
27.	Cabugao	30	I	39	12		51	"
28.	Bachao	80	I	43	32		75	"
29.	Antipolo	45	I	67	18		85	"
30.	Amoigon	25	D	9	10		19	"
31.	Balagasan	50	I	48	20		68	"
32.	Bagtingon	200	I	100	80		180	"
33.	Bangbang	120	I	52	48		100	"
34.	Masaguisi	40	I	45	16		61	"
35.	Cawit	40	I	51	16		67	LT
36.	Tugos (North)	50	I	63	20		83	"
37.	Tugos (East)	25	D	46	10		56	"
38.	Maybo Ext.	25	D	9	10		19	"
39.	Binunga	710	I	900	284		1,184	"
40.	Manlunay	70	I	91	28		119	"
41.	Tiguion	50	I	51	20		71	"
42.	Dawis	110	I	41	44		85	"
43.	Bintakay	45	G	8	18		26	"
44.	Buangan	35	I	63	14	(Farm Pond)	77	"
45.	Tagum-Angas	630	I	(MADPP)	(MADPP)	28	28	MT/LT
46.	Laylay-Ihatub	90	I	63	36		99	LT
47.	Masiga Ext.	40	P	280	16		296	"
48.	Tapuyan	50	D	74	20		94	"
	Sub-total						3,030	
3) Rehabilitation Project								
50.	Masiga	53	P	-	21		21	ST
51.	Laon	59	P	-	24		24	"
52.	Bintakay	12	P	-	5		5	"
53.	Mabuhay	27	D	8	11		19	"
54.	Pawa	12	I	-	5		5	"
55.	Bantad	17	C.D.	7	7		14	"
	Sub-total						88	
	Total	S.T 772		130	310	0	440	
		M.T 1,692		584	582	14	1,180	
		L.T 3,272		2,324	1,118	28	3,470	

Figure J-3-3 Breakdown of Annual Operation and Maintenance Cost (1/2)

(Unit: 1,000 ₱)

Description	Q'ty	Unit	Rate	Amount	Remark
Agricultural Development					ST MT LT
1) Strengthening of Research Staff	1	lot		600	1- 0- 0
2) Strengthening of Agricultural Extension Workers	6	place	600	3,600	6- 0- 0
3) Pest/Disease Observatory	6	"	200	1,200	6- 0- 0
4) Seed Bank	1	"		300	1- 0- 0
5) DA Municipal Nurseries	5	"	140	700	1- 2- 2
6) Irrigated Paddy Demonstration Farm	6	"	150	900	2- 4- 0
7) Rainfed Paddy/Diversified Crops Demonstration Farm	1	"		110	1- 0- 0
8) Vegetable Demonstration Farm	6	"	50	300	2- 2- 2
9) Coconut Intercropping Demonstration Farm	6	"	100	600	2- 2- 2
10) Hillside Farming Demonstration Farm	6	"	50	300	2- 2- 2
11) Agro-forest Demonstration Farm	2	"	50	100	0- 2- 0
12) Post-harvest of Rice	6	"	60	360	1- 2- 3
13) Post-harvest of Corn	5	"	10	50	1- 2- 2
14) Post-harvest of Coconut	6	"	30	180	2- 2- 2
15) Coconut Timber Utilization	6	"	150	900	2- 2- 2
16) Goat Stock Farm	1	"		100	1- 0- 0
17) Backyard Poultly Demonstration Farm	6	"	10	60	0- 6- 0
18) Grazing Field Demonstration Farm	6	"	100	600	2- 2- 2
19) Slaughter House Remodelling	5	"	200	1,000	2- 2- 1
20) Integrated Agriculture Trading Center	1	"		1,000	0- 1- 0
21) Strengthening of Livestock Resistration System	6	"	30	180	6- 0- 0
22) Public Animal Auction Market	6	"	300	1,800	3- 3- 0
Drainage Development					
1) Bagtingon Area Main Drain	1.5	km	8.5	13	ST
2) Boac Area Main Drain	2.0	"	8.5	17	ST
3) Mogpog River Control					
Flood Protectia Dike	13.5	"	5	68	
Tidal Gate	3	place	25	75	
Sub-total				143	
4) Boac River Control					1/3-1/3-1/3
Flood Protection Dike	26.5	km	5	132	
Tidal Gate	1	place	25	25	
Sub-total				157	1/3-1/3-1/3
Rural Road Development					
1) Farm-to-market Road					
Type A	180	km	42	7,560	60- 40- 80
Type B	185	"	24	4,440	55- 60- 70
Type C	255	"	15	3,825	85- 70-100
2) Farm Road					
Type D	285	"	6	1,710	65- 70-150
3) Multi-purpose Pavement	380	place	2	760	180-100-100
4) PEO Motor Pool	1	loc		2,300	ST
Village Water Supply Development					
1) Buenavista Village Water Supply	2,900	m^3	0.15	435	ST

Figure J-3-3 Breakdown of Annual Operation and Maintenance Cost (2/2)

(Unit: 1,000 ₱)

Description	Q'ty	Unit	Rate	Amount	Remark
Rural Water Supply Development					
1) Sta. Cruz Rural Water Supply (New)	4,400	m^3	0.15	660	ST
2) Boac Rural Water Supply (Rehabilitation)	1	lot		270	MT
3) Mogpog Rural Water Supply (Rehabilitation)	1	"		60	MT
4) Torrijos Rural Water Supply (Rehabilitation)	1	"		190	MT
5) Sta. Cruz Rural Water Supply (Rehabilitation)	1	"		50	MT
6) Mogpog Deep Well (Rehabilitation)	1	"		100	MT
7) Gasan Rural Water Supply (New)	2,200	m^3	0.15	330	LT
8) Boac Rural Water Supply (New)	2,000	"	0.15	300	LT
Hydro-power & Rural Electrification Development					
1) Tagum-Augas Hydro Power	300	kw	1.1	330	MT
2) Binunga Hydro Power	600	"	1.1	660	LT
3) Generating Power Plant					50%-60%-100%
Operation Cost	25,100	MWH	1.5	37,650	
Depreciation Cost	1	lot		6,440	
Sub-total				44,090	
4) Transmission/Distribution Line	28,500	MWH	0.12	3,420	40%-60%-100%
Traffic System Development					ST MT LT
1) Road Waiting Shed	845	place	0.6	507	230-215-400
2) Improvement of Kawit Port	1	lot		132	ST
3) Improvement of Balanacan Port	1	"		221	MT
4) Improvement of Buyabod Port	1	"		220	LT
Social Services Development					
1) Health & Medical Service Facility					
B.H.S.	17	place	5	85	10- 7- 0
Health Center	1	"		11	1- 0- 0
R.H.U.	5	"	15	75	2- 3- 0
Hospital	2	"	60	120	2- 0- 0
Clinic Car	2	unit	75	150	2- 0- 0
2) Education Facility					
Improvement MIST	1	lot		5	0- 1- 0
Elementary School	296	school	4	1,184	296- 0- 0
School Toilet	173	unit	5	865	7- 56-110
3) Social Welfare					
Seminar/Training	60	"	5	300	20- 22- 18
4) Communication Facility					
Telephone Cable	140	km	4	560	40- 0-100
Telephone Station	1	sta.		345	0- 1- 0
Aquaculture Development					
1) Small Scale Fish Meal & Feed Processing Plant					
Salary & Wages Technical Staff	4	person	26	104	MT
Labour	6	"	10	60	
Administration & General Expenditure	1	lot		16	
Repair/maintenance Cost	1	"		450	
Contingency	L.S.			70	
Total				700	

APPENDIX K AGRO-ECONOMY AND PROJECT EVALUATION

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APPENDIX K AGRO-ECONOMY AND PROJECT EVALUATION

K-1 Present Agro-economic Situations in Marinduque

K-1-1 Marketing of Agricultural Products

1) Inflow of Agricultural Products

Although main economic activity in Marinduque is agriculture, it is not self-sufficient in rice supply and some other agricultural products such as vegetables, flour, eggs, sugar, etc.

As a result of analysis of demand and supply situation of rice in the province, it is estimated that about half of rice demand in the province have been supplied by inflow of rice from neighbor provinces, i.e. Quezon and Oriental Mindoro. Most of rice deficit in the province have been supplied through the channel of commercial traders. National Food Authority (NFA) has been one of the major rice suppliers in Marinduque, supplying about 20 to 30% of rice requirement in Marinduque through its retailers. (refer to Table K-1-1)

In addition to rice, some vegetables are also imported from neighbor provinces of Quezon and Oriental Mindoro. Vegetables like tomato, garlic, red and white onions, carrots, cabbage, etc. are shipped from Lucena City to Marinduque and are sold at public and private markets in the province. Import of fruit and vegetables amounted to about 720 tons in 1987 through the ports of Balanacan and Santa Cruz (Buyabod). (refer to Table K-1-2)

2) Outflow of Agricultural Products

Coconut has been the most important agricultural product in Marinduque, although the production has tendency to decrease. Consumption of coconut in Marinduque is estimated as about 5% of the

total production. The remaining coconut will be converted into copra and sold to copra buyers. There are 66 registered copra buyers in Marinduque. These copra buyers ship the collected copra to the copra processing mills in Lucena City. In 1987, about 5,226 tons and 3,000 tons of copra were shipped to Lucena City from the ports of Balanacan and Santa Cruz (Buyabod), respectively. Although no definite data on the flow of copra from Marinduque to Lucena City in 1988 are available, it is estimated that the quantity of copra transported to Lucena City did not exceed 2,000 tons due to sharp decline in the production of coconut in 1988.

In addition to copra, about 410 tons of bananas were also shipped to Lucena City from the ports of Balanacan and Santa Cruz (Buyabod) in 1987. A small quantity of vegetables are also shipped from these ports. (refer to Table K-1-2)

3) Public Markets

One public market is operated by each municipality, totaling six public markets in Marinduque. Among the products sold are vegetables, meat, fish, fruits, and dry goods. Most of agricultural products from the farm are sold on market day. Floor area, number of stalls, market day and monthly revenue of each public market are presented in Table K-1-3.

4) Barangay Markets

In addition to the public markets, there are some Barangay markets in the province. Markets are usually operated once a week, and most common among the days fall on Sunday, a day for Barangay people to peddle their products at their centers. On market day, several vendors come from neighboring places to market their products.

K-1-2 Prices of Farm Products

1) Coconut

Main marketing farm product in the province is coconut. Consumption of coconut in Marinduque is estimated as about 5% of the total production. The remaining coconuts are converted to copra and sold to copra buyers. Prices of copra fluctuate largely depending on supply and demand situation. Farmgate prices of copra in 1988 fluctuated from 5.70 pesos per kg to 6.13 pesos per kg. Farmgate prices of coconut (green nut) ranged from 1.30 pesos per kg in September to 1.69 pesos per kg in January 1989.

2) Rice

Marinduque is not self-sufficient in rice supply. Therefore, market prices of rice depend on the inflow of rice from other provinces. Rice deficit in the province is estimated as about 10,000 tons in terms of milled rice, of which about 20 to 30% have been supplied through the channel of NFA and the remaining by commercial traders. Retail prices of rice in 1988 ranged from 6.18 to 6.50 pesos per kg for regular milled rice (RMR) and 6.85 to 7.00 pesos per kg for well milled rice (WMR). Retail prices increased in 1989 to 7.78 pesos per kg for RMR and 8.34 pesos per kg for WMR in May. Farmgate price of paddy is estimated as 3.50 to 3.60 pesos per kg in 1988.

3) Vegetables

Although definite data on vegetables production in the province are not available, it is estimated that the province is not self-sufficient in vegetables supply. Vegetables like tomato, garlic, red and white onions, carrots, cabbage, etc. are shipped from Lucena City to Marinduque and are sold at public and private markets. Retail prices of major vegetables are given in Table K-1-4.

K-1-3 Agricultural Credit

Many rural banks, an important conduit for channeling credit to small farmers, experienced serious financial difficulties due partly to difficulty in recovering their debt and partly to little deposit mobilization. Their arrearages mounted with the Central Bank (CB) and several of them incurred operational losses and consequent impairment of capital.

Agricultural credit services in Marinduque are provided through the Philippine National Bank (PNB) at Boac and the Rural Bank of Santa Cruz, Inc. at Santa Cruz. PNB Boac Branch is providing agricultural credit for the areas of fishpond development, livestock raising and staple food production including rice and corn. Their outstanding arrearages amounted to about 0.58 million pesos in agriculture sector. Interest rates of 19.5% for the loan of less than one year and 21.5% for the loan of more than one year are applied.

There exist five rural banks in Marinduque, one each at Boac, Buenavista, Gasan, Mogpog and Santa Cruz. Most of these rural banks have serious financial difficulties for the reasons as mentioned above. The Rural Bank of Santa Cruz, Inc. is the only one rural bank in Marinduque who still conducts banking operations. Other rural banks are concentrating their activities on the collection of arrearages in the past.

Aside from these formal lending institutions, there are also informal lenders such as traders and other types of private financing arrangement. Some of farmers obtain private loans from their relatives or friends.

K-1-4 Agro-economic Surveys

1) Twenty Barangays Sample Survey

In order to update existing data inputs, agro-economic survey was conducted in 20 Barangays during the field survey. Twenty Barangays were selected from six municipalities at random sampling. Four Barangays each were selected from Boac and Santa Cruz, and three Barangays each were selected from four municipalities of Buenavista, Gasan, Mogpog and Torrijos. List of 20 sample Barangays is presented in Table K-1-5.

Interviews were made by staff of provincial agriculturist office to each Barangay captain on specific agro-economic items. Questions on agro-economic aspect were made to each Barangay captain to obtain average figures in each Barangay. Data thus collected were tabulated as given in Table K-1-6.

Major findings obtained in the survey are briefly presented below.

(1) Percentage of farm family in a Barangay is 62%.
(2) Percentage of landownership is:
  - full owner : 42%
  - tenant : 58%
(3) Average land holding of land owner is 1.8 ha.
(4) Average land holding of tenant is 1.7 ha.
(5) Average farm size is 1.0 ha for paddy, 0.4 ha for corn and 1.9 ha for coconut field.
(6) Average palay production is 2.7 ton/ha at dry season and 3.4 ton/ha at wet season.
(7) Average corn production is 0.6 ton/ha.
(8) Average crop sharing rate is 25% for palay and 65% for coconut.
(9) Average farm gate prices: palay at ₱3.60 and copra at ₱3.70.
(10) Average livestock consumption per household: carabao 1.4 heads, hogs 1.7 heads and chicken 5.5 heads.

(11) Average cost of human and animal labors: human labor at 32 and animal labor at 25 pesos.

(12) Average family income is ₱14,842 per year.

(13) The busiest months: 1. June 2. October 3. November

(14) The dullest months: 1. August 2. February 3. January

(15) Percentage of energized Barangays: 37.5%

(16) Development needs ranking: 1. Agriculture 2. Water supply 3. Roads

2) Agro-economic Survey on 50 Sample Farmers

In order to update existing data inputs, agro-economic survey on 50 sample farmers in 5 Barangays was conducted in priority development areas. Five Barangays selected are Tamayo and Landy at Santa Cruz, Sibucao at Mogpog, and Agot and Bantad at Boac.

Interviews were made by staff of provincial agriculturist office to each farmer on specific agro-economic items to obtain the latest data on each farmer's farming activities. Data thus collected were tabulated as given in Table K-1-7.

Table K.1.1 Supply and Demand of Rice

(Unit: Metric Ton)

Year	Demand (Estimate)	Production in Marinduque	Deficit	Supply by NFA	Share of NFA (%)	Supply by Traders
1984	19,904	10,052	9,852	3,282	33	5,468
1985	20,333	10,719	9,614	3,736	39	6,157
1986	20,757	11,486	9,271	270	3	9,226
1987	21,172	12,995	8,177	841	10	7,531
1988	21,581	8,717	12,864	2,894	22	10,941

Source: NFA, Marinduque.

Notes : 1. Rice demand is estimated at per capita consumption of 103 kg.

2. Production of rice in Marinduque is estimated from production data of provincial office of Department of Agriculture Region IV. Conversion rate of 0.65 is used for conversion from palay to milled rice.

Table K.1.2 Flow of Agricultural Commodities
(1987)

Commodity		Quantity in Ton	
		Balanacan	Sta. Cruz
Rice	In	1,324.4	1,442.9
	Out	1.6	0
Corn	In	2.1	0
	Out	4.9	3.5
Banana	In	2.1	0
	Out	239.5	171.2
Vegetables	In	570.3	232.4
	Out	37.0	11.5
Sugar	In	342.5	395.5
	Out	0	0.8
Copra	In	7.0	0
	Out	5,226.0	3,036.4
Animal	In	0	0
	Out	91.2	182.2
Flour	In	207.7	405.3
	Out	0	0

Source: 1. Port Authority Office, Balanacan.
2. NCSO, Manila.

Table K.1.3 Public Markets in Marinduque

Location	Floor Area (sq.m)	No. of Stalls	Monthly Revenue (pesos)
Boac	6,488	148	15,708
Buenavista	297	14	830
Gasan	946	40	11,000
Mogpog	2,066.9	139	9,457
Santa Cruz	1,496.9	208	n.a.
Torrijos	645	20	n.a.

Source: Municipality Offices in Marinduque.

Table K.1.4 Prices of Vegetables

(Unit: pesos per kg)

	1988 (Average)	1989 (June)
Cabbage	18.30	22.70
Tomato	18.25	18.15
Eggplant	7.00	9.40
Okra	7.70	9.00
Onion (Red)	35.15	15.90
Garlic	140.90	161.15
Ginger	14.90	20.25
Ampalaya	9.85	13.10
Cauliflower	25.75	35.00
Pechay, Baguio	17.50	23.00
Pechay, Native	7.80	11.65

Source: Bureau of Agricultural Statistics, Marinduque.

Table K.1.5 List of 20 Sample Barangays for Agro-economic Survey

Municipality	Name of Barangay
Boac	1. Maybo
	2. Balimbing
	3. Catubungan
	4. Baliasin
Buenavista	5. Libas
	6. Caigangan
	7. Timbo
Gasan	8. Masiga
	9. Dawis
	10. Cabugao
Mogpog	11. Bintakay
	12. Lamesa
	13. Anapug-Sibucao
Santa Cruz	14. Taytay
	15. Balis
	16. Aturan
	17. Tamayo
Torrijos	18. Malibago
	19. Bonliw
	20. Marlangga

Table K.1.6 20 Barangays Sample Survey (1/2)

	Boac	Buenavista	Gasan	Mogpog	Sta, Cruz	Torrijos	Overall
1. Family Composition							
1.1 Family Size (Av.)	6	6	6	7	5.75	6	6.1
1.2 Farm Family (%)	39.5	79	47.3	70.7	76.5	66.3	62.2
2. Land Tenure							
2.1 Ratio of Landowner (%)	54.5	38.3	30.4	46.3	37.5	44.3	41.9
2.2 Ratio of Tenant	45.5	61.7	69.6	53.7	62.5	55.7	58.1
3. Land Holding							
3.1 Av. Land Holding of Landowner (ha)	1.7	1.5	2.0	0.9	2.1	2.7	1.8
3.2 Av. Land Holding of Tenant (ha)	1.4	3.0	1.7	1.4	0.8	1.7	1.7
3.3 Av. Farm Size (ha)							
a) Paddy	1.8	1.0	1.3	0.5	0.8	0.4	1.0
b) Corn	0.2	1.5	0.4	0.04	0.3	0.2	0.4
c) Coconut	0.9	2.7	5.1	1.4	0.4	0.7	1.9
4. Crop Production (ton/ha)							
4.1 Palay, Dry	1.3	1.6	3.1	3.5	3.2	3.2	2.7
Palay, Wet	4.0	2.2	3.6	4.0	2.9	3.6	3.4
4.2 Corn	0.6	0.8	0.6	0.5	0.5	0.6	0.6

Table K.1.6 20 Barangays Sample Survey (2/2)

	Boac	Buenavista	Gasan	Mogpog	Sta. Crus	Torrijos	Overall
5. Crop Sharing (Payment to Landowner)							
5.1 Palay (%)	20	31	33.3	20	31	25	26.7
5.2 Coconut (%)	74	66	65	74	67	65	68.5
6. Prices							
6.1 Palay (pesos/kg)	3.70	-	4.17	3.50	3.38	3.33	3.62
6.2 Copra (pesos/kg)	3.00	4.50	4.20	3.50	4.00	4.00	3.87
6.3 Carabao (pesos/head)	4,000	4,700	4,300	5,300	4,500	5,300	4,700
7. Livestock Consumption							
7.1 Carabao (head/year)	1	1	1	1.3	1.5	2.7	1.4
7.2 Hogs (head/year)	1.3	1.3	1.7	2.0	1.8	2.3	1.7
7.3 Chicken (head/year)	5.0	6.3	5.0	5.0	6.3	5.3	5.5
8. Cost of Production							
8.1 Labor Cost (pesos/day)	27.50	33.33	41.67	30.00	28.75	30.00	31.88
8.2 Animal Cost (pesos/day)	27.50	33.33	25.00	20.00	20.00	26.67	25.42
9. Income Level (per year)							
9.1 Average Income (pesos/HH)	15,700	7,500	18,600	16,700	12,250	18,300	14,842

Table K.1.7 Agroeconomic Survey, Marinduque, 1989 (1/3)
(50 Sample Farmers in 5 Barangays)

		Tamayo	Landy	Sibucao	Bantad	Agot	Overall Average
Family Composition							
1. Family size (no.)		6.4	5.5	4.9	5.3	6.4	5.7
2. Family members living outside (no.)	Male	0.3	1.0	0.1	1.3	0.8	0.70
	Female	1.0	0.5	0.4	1.5	0.9	0.86
3. 0-15 years old (%)		33	33	29	34	41	34.0
4. 16-64 years old (%)		58	60	63	62	58	60.2
5. 65 years old and over (%)		9	7	8	4	1	5.8
6. Labor force in a family (no.)		4.1	2.0	1.4	2.8	2.9	2.6
Land Ownership							
1. Full owner (%)		20	10	10	10	10	12
2. Owner-cum-Tenant (%)		40	60	40	20	50	42
3. Tenant (%)		40	30	50	70	40	46
Land holding size							
1. 0.-1.0 ha. (%)		40	10	40	70	20	36
2. 1.1-5.0 ha (%)		60	90	60	30	70	62
3. 5.1 and over (%)		0	0	0	0	10	2
4. Average rice field size (ha)		0.98	1.05	0.63	0.75	1.05	0.89
5. Average coconut land (ha)		-	0.91	1.01	0.44	2.65	1.00
6. Average farm size (ha)		1.3	1.95	1.64	0.94	3.61	1.89
Farm production							
1. Paddy yield, irrigated (ton/ha)		-	1.56	-	2.20	2.04	1.93
2. Paddy yield, rainfed (ton/ha)		0.62	-	1.60	1.64	1.82	1.42
3. Paddy yield, upland (ton/ha)		0.60	-	-	-	-	0.60
4. Copra (ton/ha)		-	0.93	0.75	0.80	0.86	0.84

Table K.1.7 Agroeconomic Survey, Marinduque, 1989 (2/3)
(50 Sample Farmers in 5 Barangays)

		Tamayo	Landy	Sibucao	Bantad	Agot	Overall Average
Selling prices of farm products							
1. Paddy (P/kg)		2.50	3.28	3.00	4.17	4.50	3.49
2. Copra (P/kg)		-	5.74	-	5.90	5.90	5.85
3. Peanuts (P/kg)		6.17	-	-	-	-	6.17
4. Mongo (P/kg)		9.00	-	-	-	-	9.00
5. Camote (P/kg)		-	3.50	-	-	-	3.50
6. Arrow root (P/kg)		-	10.00	-	-	-	10.00
Use of Agricultural Inputs							
1. Seed (kg/ha)		92	104	94	135	102	105
2. Fertilizer (kg/ha)	14-14-14	0	96	53	125	93	73
	46-0-0	0	51	87	94	86	64
3. Agrochemicals (ml/ha)	Azodrin	60(Polidol)	81	60	142	77(Thiodan)	94
	Cymbus		100	80	120	73	93
4. Hired labor (Man-day/ha)		33	57	24	53	30	39
Use of Labor Input							
1. Irrigated rice (man-day/ha)		-	56.4	-	67	60	61.1
2. Rainfed rice (man-day/ha)		61.9	-	64.7	53	57	59.2
Wage rate/high rate							
1. Human labor with meal (P/day)		20	20	20	20	20	20
2. Human labor without meal (P/day)		25	25	25	25	25	25
3. Animal labor with operator (P/day)		50	50	50	50	50	50
4. A tractor with operator (P/day)		-	-	-	-	494	494

Table K.1.7 Agroeconomic Survey, Marinduque, 1989 (3/3)
(50 Sample Farmers in 5 Barangays)

	Tamayo	Landy	Sibucao	Bantad	Agot	Overall Average
Livestock inventory						
1. Cattle (heads/family)	1.9	0	0	0	0.7	0.52
2. Buffalo (heads/family)	0.9	1.6	1.0	1.3	1.7	1.30
3. Hogs (heads/family)	1.3	1.4	2.1	2.1	3.0	1.98
4. Chickens (head/family)	9.3	6.4	5.5	4.5	10.3	7.20
5. Ducks (heads/family)	0	0	0	0.2	0.8	0.20
6. Horses (heads/family)	0	0	0	0	0	0
Non-farm Income Source						
1. Remittance from relative s(P/year)	2,000	3,210	4,700	9,810	9,000	5,744
2. Receipt of gifts from relatives (P/year)	1,500	450	1,400	500	1,340	1,038
3. Others (salary, hired labor, etc.)	800	130	11,160	3,110	34,480	9,936
4. Average amount (P/year)	4,300	3,790	17,260	13,420	44,820	16,718
Household Expenditures						
1. Rice and other cereals (P/year)	6,310	7,715	2,375	2,750	1,891	4,208
2. Fish and meat (P/year)	7,740	10,712	9,200	8,450	9,100	9,040
3. Food ingredients (P/year)	930	960	380	400	970	728
4. Clothing (P/year)	1,170	1,800	250	290	1,150	932
5. Fuel, light and gas (P/year)	208	320	30	290	568	283
6. Medical care	835	740	160	145	590	494
7. Transportation	515	700	370	1,194	630	682
8. Education	1,830	1,370	1,200	2,050	2,100	1,710
9. Others	1,748	2,760	2,970	1,261	4,171	2,583
10. Total	21,286	27,077	16,935	16,830	21,170	20,660

K-2 Markets and Prices for Project Output

K-2-1 Incremental Production under the Master Plan

By implementing the master plan, significant volume of agricultural products will be generated. Annual incremental production at full development stage of the master plan is estimated at 20,615 tons of paddy, 35 tons of coconut, 3,336 tons of corn, 1,665 tons of pulses, 7,600 tons of root crops, 13,800 tons of vegetables, 5,750 tons of banana, 17,100 tons of various fruits, and 1,944 tons of coffee, valued at 374.1 million pesos at 1989 prices. Aquaculture production will also be increased to about 749 tons of Black Tiger shrimps valued at 114.2 million pesos at 1989 prices. (refer to Table K-3-1)

K-2-2 Market Outlets

Paddy production would increase as a result of irrigation and road development, improvement in marketing, extension and input supply. With the project, self-sufficiency in rice would increase from present level of 47% to more than 80% in 2010. It is expected that marketing of rice would be channeled through NFA, commercial traders or cooperatives to be established in each municipality.

Most of the current production of vegetables, peanut, corn, and mungbeans is consumed locally although a small quantity of vegetables and corn are transported to Lucena City when available. There would be no difficulty in marketing incremental production of vegetables, corn, peanuts and mungbeans. Improved quality of the products would be the most essential to maintain better prices.

The Philippines exports coffee and imports cacao. These two crops are considered highly suitable for growing under coconuts. Considering long-term market prospects, no problems are foreseen in marketing the incremental production.

K-2-3 Prices Prospects

Prices of paddy (palay) and rice are subject to Government intervention through the channel of NFA aimed at stabilizing prices at fair levels for both producers and consumers. However, NFA's price activity in Marinduque has not been much effective due to its low share in rice market. Prices of rice in Marinduque depend on the prices imported from other provinces which are usually higher than the support price. However, for estimating farm incomes the support price has been assumed on a conservative basis.

Prices of other products are determined by the supply and demand for particular commodities. Average market prices in 1988 are assumed for estimating farm incomes concerning vegetables, lugumes, and other agricultural products on a conservative basis.

K-2-4 Supply of Agricultural Inputs

Agricultural inputs such as fertilizers and agrochemicals are supplied by private sector in Marinduque. There are several stores at Boac, Mogpog, Gasan and Santa Cruz handling these products. With the implementation of the master plan, use of agricultural input would be considerably increased and some of them would be channeled through farmers' cooperatives to be established in each municipality in the future.

K-3 Project Evaluation

K-3-1 Contribution to National Economy

The master plan would help achieve several of the national economic and social objectives. These include: (a) alleviation of poverty, (b) generation of more productive employment, (c) promotion of equity and social justice, and (d) attainment of sustainable economic growth. Annual incremental production at full development stage of the master plan is estimated at 20,615 tons of paddy, 35 tons of coconut, 3,336 tons of corn, 1,665 tons of pulses, 7,600 tons of root crops, 13,800 tons of vegetables, 5,750 tons of banana, 17,100 tons of various fruits, and 1,944 tons of coffee, valued at 374.1 million pesos (gross value) at 1989 prices. Aquaculture production will also be enhanced through provision of improved fish/shrimp culture technology transferred to rural population by the Brackishwater Demonstration Farm at Tamayo. Incremental production of about 627 tons of Black Tiger shrimp and about 993 tons of Bangus fish is expected to arise during the master plan period. (refer to Table K-3-1)

K-3-2 Economic Internal Rate of Return (EIRR)

1) Methodology for Economic Analysis

Economic analysis is made to assess the viability of a project from the viewpoint of national economy. Direct tangible benefits will be quantified and compared with direct project costs. Benefits and costs identified will be converted into present value and expressed in terms of Economic Internal Rate of Return (EIRR). Valuation of costs and benefits for the traded goods will be made on the basis of international prices. Financial prices of non-traded goods (e.g. labor) will be converted into international parity prices using standard conversion factor (SCF) of 0.86 which is widely used for the project evaluation in the Philippines by international institutions. The costs for land acquisition and price contingency will not be taken into account in economic analysis.

2) Basic Assumptions

The economic evaluation has been undertaken on the basis of the following assumptions.

a) Exchange rate: The exchange rate between Philippine pesos and U.S. dollars is set at US$1.00 = ₱21.80, which is an official exchange rate as of June 1989.

b) Price level: The current prices as of June 1989 are used in the cost estimate.

c) Project life: Economic life of the master plan are set at 30 years. The costs and benefits are discounted over a period of 30 years.

d) Benefits: Only direct tangible benefits are quantified for the calculation of EIRR. Indirect benefits are not valued in monetary terms, but assessed in a qualitative manner.

e) Interest during construction: Interest during construction (IDC) is not included in the cost estimate.

f) Price escalation: Escalation of costs and benefits in the future is assumed to be in the order of magnitude of overall inflation rates. Therefore, costs and benefits are not escalated in the economic analysis.

g) Economic prices: For economic analysis, the estimated future farmgate prices of internationally traded agricultural inputs and outputs have been derived from the World Bank Commodity Prices Forecast of September 1987, with adjustments for quality, freight, insurance, handling, local transport and processing. In order to take into account the existing import and export taxes, as well as trade restrictions, a standard conversion factor (SCF) of 0.86 is applied to the non-traded component of various inputs and outputs.

3) Economic Costs

Tariff and trade restrictions disturb the price relationship between traded and non-traded goods and services. In order to make value of non-traded goods and services to more closely reflect their economic value, it needs to be converted into border prices using a standard conversion factor (SCF). SCF of 0.80 is applied in the analysis. Project costs of the master plan are assumed to include 50% of non-traded goods and services which are converted into border prices based on the financial prices multiplied by 0.86. The SCF of 0.86 is widely used for the project evaluation in the Philippines by international lending institutions. Transfer payments such as taxes and subsidies are excluded in the economic costs. Also excluded are the costs for land acquisition and price escalation.

Estimated disbursement schedule of development expenditures in economic prices is presented in K-3-2.

4) Economic Benefits

The master plan can broadly be categorized into (a) agricultural development, (b) agricultural infrastructure development including irrigation, drainage, rural roads, and village water supply, (c) rural infrastructure development including rural water supply, rural electrification and social services development, and (d) aquaculture development.

Direct tangible benefits of each project category have been identified as follows.

a) Agricultural Development

Twenty-nine (29) projects have been proposed in this category, most of which will be implemented as short-term development program. These projects aim at increased agricultural production, particularly

foodcrops, through strengthening of agricultural support services including research, extension, marketing and storage services. Paddy production will be significantly increased from the present level of about 15,000 tons to about 38,000 tons at full development stage, although a part of the incremental production is attributable to irrigation development program. Incremental production of paddy under the proposed irrigation projects are also included. In addition to paddy, production of other crops such as coconut, corn, pulses, root crops, vegetables and fruit are also increased. Net value of production of these crops are derived from the comparison of net value of production between "without project" and "with project" situations as presented in Table K-3-3.

It is assumed that 20% of total benefits will arise in 1992, and will reach full development in 1999.

b) Agricultural Infrastructure Development

i) Irrigation Development

Fifty-four (54) projects are proposed in this sub-category, of which thirty-two (32) projects are expected to be implemented during 1990-1995, nine (9) projects to be implemented during 1995-2000, and the remaining during 2001-2010. The direct benefits will arise from increased agricultural production through rehabilitation and construction of irrigation facilities. Incremental production of paddy is assumed to be direct benefits attributable to irrigation development program. Incremental production of other crops are not included in the benefits of this category, but in agricultural development category.

Main benefits accruing from irrigation development program are increased production of paddy, pulse crops, and vegetables. Net value of production of these crops under the irrigation development program is given in Table K-3-3.

ii) Drainage and Flood Protection

The drainage improvement, some 10% of total project cost, would affect most of the paddy area. Provision of drainage would reduce the damage due to inundation after heavy rainfall during tillering periods. It is estimated that with drainage, paddy yields would increase by about 10% which are reflected in the increased production under irrigation development program.

Benefits accruing from flood protection would be avoidance of damages to be caused by floods in the future. On the basis of information obtained during field survey, provincial statistics and topographical maps, flood damage in the future includes siltation in inundated area, damage to irrigation canals, damage to crops, and damage to roads.

- Siltation disposal in inundated area

  As a result of flood, a total of 183 ha of agricultural land will be inundated at the depth of 0.10 m. The costs for disposal of silt are estimated at 18.3 million pesos.

- Damage to irrigation canals

  As a result of flood, irrigation canals will be damaged at a length of 3.0 km. The costs for rehabilitation are estimated at 0.81 million pesos.

- Damage to crops

  Inundated area is estimated to include about 365 ha of rainfed paddy field. Assuming that flood damage to paddy crop will be 50%, the amount of damage is estimated at 1.8 million pesos.

- Damage to roads

  It is estimated that roads of a total length of 8.7 km will be damaged as a result of flood. The costs for rehabilitation works is estimated at 7.8 million pesos.

- Total flood damage of 1 in 10 year probability

  The whole damages caused by flood amount to 28.7 million pesos in June 1989 price level. Assuming flood probability of 1/10, annual flood damage of 28.7 million pesos is assumed to arise once in every 10 years without the project.

- Annual flood damage

  It is estimated that 20% of total flood damage of 1 in 10 year probability will be caused in normal years based on the field survey and discussion with the converned agencies.

Annual benefits under flood control program are given in Table K-3-4.

iii) Rural Roads

Rural roads component, comprising 23% of total project cost, will play vital role in the master plan in promoting a greater equitable distribution of benefits particularly in rural areas. Main benefits accruing from improvement/upgrading of existing roads are vehicle operating cost savings, whereas main benefits accruing from construction of new roads are value of time savings and running cost savings.

The proposed road improvements/upgrading of existing roads will result in reliable and less costly transport services, enhance the mobility of the people in the province, and help stimulate the economy of the province, particularly in rural areas. The quantifiable benefits accruing from the proposed road development include operating cost savings of passenger and goods vehicles. Vehicle operating costs (VOC) are calculated "without" and "with" the project situations. VOC savings are based on anticipated changes in surface roughness of existing and improved pavement, as well as in road gradient, road capacity, volume and composition of traffic, and roadside development. Vehicle operating cost savings are estimated as 0.70 pesos per km for cars, jeepneys and pickups, 0.30 pesos per km for motor cycles and motor tricycles, and 1.60 pesos per km for buses and trucks which are estimated on the basis of experiences of similar projects in the Philippines.

Benefits accruing from rehabilitation of rural roads and construction of new roads are presented in Table K-3-5.

iv) Village Water Supply

Economic benefits of village and rural water supply will be economic value of water, increase in income due to reduction in mortality, and increase in income due to reduction in morbidity.

- Economic value of water

The economic value of water can be measured by the willingness of the household to pay for potable water supply and is reflected in the water fees. Specifically, the economic value of water can be estimated by: (number of served household) x (water fee per household per month) x 12. The experience gathered under the past project reveal that the water charge are 54 pesos for Level II system. Result of computation is given in Table K-3-6.

- Increase in income due to reduction in mortality

With the improved quality of water provided through the project, mortality levels from water-borne diseases can be reduced. It is estimated that mortality and morbidity levels will decrease by 40%. The direct benefits that can be generated by the reduction in mortality rates can be quantified by savings in man-days that would have been lost due to deaths caused by the incidence of water-related diseases. Savings in man-days are then adjusted by 60% since not all potential deaths from water-borne diseases can be considered as deaths of economically active persons. (refer to table K-3-6)

- Increase in income due to reduction in morbidity

With the project, morbidity levels can be expected to be likewise reduced by 40%. Economic benefits from the reduction in morbidity levels are presented in Table K-3-6.

c) Rural Infrastructure Development

i) Rural water supply

Economic value of water can be measured in the same manner as in the case of village water supply scheme. Result of computation is given in Table K-3-6.

ii) Rural electrification

The economic value of electrification can be measured by the willingness of the household to pay for electricity and is reflected in the electricity fees. Specifically, the economic value of electrification can be estimated by: (total power demand) x (electricity value: 2.5 pesos per kwh). Annual benefits are presented in Table K-3-7.

iii) Social services

Main benefits will be in social aspects such as better health, better quality of life, improved nutrition, etc. which are difficult to quantify. Benefits accruing from this category are not quantified.

d) Aquaculture Development

The direct benefits consist of (1) production of shrimp fry totaling about 120 million per year, with net value of production of 0.29 million pesos, (2) production of fish meal and feed totaling about 1,500 tons per year, with net value of production of 7.9 million pesos, and (3) processed shrimp totaling about 500 tons (with head) per year, with net value of production of 16.49 million pesos. (refer to Table K-3-8)

In addition to the above, farmers and other people who are willing to invest in aquaculture production will be able to receive more improved technology on aquaculture and stable supply of shrimp fry which will help increase fish and shrimp production in the province. Secondary benefits of aquaculture development is estimated in such a manner that improved shrimp culture technology will be transferred to rural population to encourage rehabilitation of existing fish ponds and construction of new fish ponds totaling about 1,500 ha which are expected to produce about 1,500 tons of Black Tiger shrimp and 2,250 tons of Bangus, valued at 270 million pesos in June 1989 price level.

Indirect benefits include increased employment opportunity and increased income which are major objective of national as well as regional development plan.

Overall project costs and benefits are compared and overall EIRR has been calculated as presented in Table K-3-9.

K-3-3 Farm Income and Rural Employment

The majority of families in Marinduque will enjoy higher levels of income and other benefits. The net annual farm income of a typical farm holding of 2.0 ha (1.0 ha of rice and 1.0 ha of coconut land) is estimated to increase from 9,255 pesos to 21,702 pesos as a result of improved agricultural services and irrigation facilities. (refer to Table K-3-10)

Labor input proposed in the Master Plan is expected to increase to a level of 8.7 million man-days which corresponds to about 44,000 farm labors assuming 200 working days a year.

The Master Plan will increase the utilization of surplus rural labor force and it is estimated that about 7.9 million man-days of labor would be required during the implementations of the Master Plan. The Plan would generate about 0.2 million man-days of employment per year at full development for operation and maintenance of the project facilities.

K-3-4 Improvement of Agricultural and Rural Infrastructures

Many Barangays in Marinduque have very poor accessibility, particularly in the interior areas of the province. The construction and improvement of roads will remove this constraint and will bring these Barangays into the mainstream of regional economy. As a result, mobility of goods and services will be improved and economic activities will be expanded.

Agricultural productivity will directly or indirectly be improved through improvements in the input supply system, marketing and storage and processing facilities.

The development of rural infrastructure facilities and social services will contribute substantially towards reducing the incidence of disease, improving health standards and raising the general quality of life in the province.

Table K-3-1 Present and Projected Crops and Fish/Shrimp Production (Financial Prices)

	Future without Project			Future with Project			Incremental Production	Unit Price	Net Value of Production
	Area (ha)	Yield (ton/ha)	Production (ton)	Area (ha)	Yield (ton/ha)	Production (ton)	(ton)	(P/kg)	('000 Pesos)
Crops									
Coconut	32,470	1.0	32,470	29,550	1.1	32,505	35	4.50	159
Paddy, irrigated	1,710	2.7	4,617	* 6,843	4.0	27,372	22,775	3.50	79,643
Paddy, rainfed	6,300	1.7	10,719	3,280	2.5	8,200	-2,510	3.50	-8,785
Paddy, upland	3,500	0.8	2,800	3,500	0.9	3,150	350	3.50	1,225
Corn	1,020	0.7	714	* 2,700	1.5	4,050	3,336	4.60	15,346
Pulse crops	450	0.7	315	* 1,800	1.1	1,980	1,665	13.60	22,644
Root crops	700	2.0	1,400	* 900	10.0	9,000	7,600	2.40	18,240
Vegetables	300	4.0	1,200	* 1,500	10.0	15,000	13,800	12.50	172,500
Banana	550	7.0	3,850	* 800	12.0	9,600	5,750	0.55	3,163
Other fruit	160	2.5	400	* 2,500	7.0	17,500	17,100	1.90	32,490
Coffee	80	0.7	56	* 2,000	1.0	2,000	1,944	19.30	37,519
Crops Total:									374,143
Fish/Shrimp									
Black tiger shrimp	280	0.44	123	500	1.5	750	627	152.60	95,680
Bangus fish	588	0.6	507	1,000	1.5	1,500	993	40	39,720
Fish/Shrimp Total:									135,400

Note: * intercropping area

Table K.3.2 Estimated Schedule of Development Expenditures

(Economic Prices) 1/

Unit: million pesos

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	.....	2010	Total
1. Agricultural Development	-	17.4	17.4	17.4	17.4	12.4	12.4	12.4	12.4	12.4	2.4	.....	2.4	155.6
2. Agricultural Infra. Development														
1) Irrigation	-	18.2	18.2	18.2	18.2	33.8	33.8	33.8	33.8	33.8	55.4	.....	55.4	756.8
2) Drainage	-	37.7	37.7	37.7	37.7	29.8	29.8	29.8	29.8	29.8	16.0	.....	16.0	447.6
3) Rural Roads	-	93.3	93.3	93.3	93.3	54.1	54.1	54.1	54.1	54.1	51.2	.....	51.2	1,119.7
4) Village Water Supply	-	9.3	9.3	9.3	9.3	-	-	-	-	-	-	.....	-	37.2
3. Rural Infrastructure Develop.														
1) Rural Water Supply	-	2.6	22.6	22.6	22.6	14.6	14.6	14.6	14.6	14.6	6.9	.....	6.9	227.4
2) Rural Electrification	-	4.3	44.3	44.3	44.3	4.8	4.8	4.8	4.8	4.8	3.8	.....	3.8	236.2
3) Traffic System	-	3.9	3.9	3.9	3.9	3.7	3.7	3.7	3.7	3.7	2.9	.....	2.9	61.1
4) Social Services	-	15.3	15.3	15.3	15.3	6.5	6.5	6.5	6.5	6.5	3.2	.....	3.2	123.7
4) Aquaculture Development	-	-	-	-	-	3.7	3.7	3.7	3.7	3.7	-	.....	-	18.5
5) MADPP 2/	349.7	-	-	-	-	-	-	-	-	-	-	.....	-	349.7
Total (Rounded)	350	262	262	262	262	163	163	163	163	163	132	.....	132	3,533.0

Notes: 1/ Economic Prices = Financial prices x (0.5 + 0.5 x 0.86)

2/ MADPP = Marinduque Agricultural Development and Promotion Project

Table K-3-3 Net Value of Production of Crops under Agricultural/Irrigation Development
(1/11) (Economic Prices)

unit: Net Value of Production in million pesos

	Coconut (Copra)	Paddy, Irrigated	Paddy, Rainfed	Paddy, Upland	Corn	Pulses	Root Crops	Vegeta-bles	Banana	Other Fruit	Coffee
Without Project (1)											
Yield (ton/ha)	1.0	2.7	1.7	0.8	0.7	0.7	2.0	4.0	7.0	2.5	0.7
Farmgate price (₱/ton)	3,870	3,100	3,100	3,100	3,960	11,700	2,060	10,750	470	1,630	16,600
Gross production value (₱/ha)	3,870	8,559	5,270	2,480	2,170	8,190	4,120	43,000	3,290	4,080	11,620
Production cost (₱/ha)	1,776	2,783	2,741	1,970	2,227	2,209	771	4,096	470	816	4,648
Cropped area (ha)	32,470	1,710	6,300	3,500	1,020	450	700	300	550	160	80
Net value of production (₱10^6)	68.0	9.9	15.9	1.8	0.0	2.7	2.3	11.7	1.6	0.5	0.6
With Project (2)											
Yield (ton/ha)	1.1	4.0	2.5	0.9	1.5	1.1	10.0	10.0	12.0	7.0	1.0
Farmgate price (₱/ton)	3,870	3,100	3,100	3,100	3,960	11,700	2,060	10,750	470	1,630	16,600
Gross production value (₱/ha)	4,257	12,400	7,750	2,790	5,940	12,870	20,600	107,500	5,640	11,410	16,600
Production cost(₱/ha)	1,776	5,857	4,286	2,775	4,338	3,876	2,787	10,467	564	1,142	5,578
Cropped area (ha)	29,550	6,843	3,280	3,500	2,700	1,800	900	1,500	800	2,500	2,000
Net value of production (₱10^6)	73.3	44.8	11.4	0.1	4.3	16.2	16.0	145.5	4.1	25.7	22.0
Net Value of Production (2)-(1):	5.3	34.9	- 4.5	- 1.7	4.3	13.5	13.7	133.8	2.5	25.2	21.4

Net Value of Production Total: 248.4 million pesos

Table K.3.3 Farmgate Prices of Agricultural Inputs and Outputs
(2/11)

Unit: Pesos per kg

Item	Financial Prices	Economic Prices
A. Inputs		
1. Seeds		
Paddy	3.50	3.10
Corn	20.00	17.20
Tomato	3,500.00	3,450.00
Mungo Bean	16.00	15.80
2. Fertilizer		
46-0-0 (Bag, 50 kg)	275	271
14-14-14 (Bag, 50 kg)	325	320
0-0-60 (Bag, 50 kg)	275	271
3. Chemical		
Azodrin (liter)	200.00	197.20
4. Labor		
Hired Labor (pesos/day)	25.00	20.00
Animal with Operator (pesos/day)	50.00	40.00
B. Outputs		
Paddy	3.50	3.10
Copra	4.50	3.87
Tomato	11.56	10.75
Pulse	12.58	11.70

Notes:

(1) Economic price (EP) of imported goods: $EP = FP \times (0.9 + 0.1 \times 0.86)$
(2) A shadow wage rate of 0.80 is applied for economic labor cost.
(3) Economic price of paddy is based on the international price.

Table K.3.3 Economic Price of Rice
(3/11) (Constant 1989 Prices)

Item	Paddy/Rice
Projected 1995 World Market Price (US$/ton)	265
Quality Adjustment (%)	80
Adjusted Price (US$/ton)	212
Ocean Freight and Insurance (US$/ton)	15
Border Price (US$/ton)	227
(Pesos/ton)	4,948.60
Inland Transport and Handling (Pesos/ton)	-180.00
Farmgate Price (Pesos/ton)	4,768.60
Processing Ratio (%)	65
Economic Farmgate Price (Pesos/ton, Rounded)	3,100.00

Table K.3.3 Production Cost for Paddy, Irrigated
(4/11)
(Economic Prices)

Item	Future without Project		Future with Project	
	Quantity	Amount	Quantity	Amount
Seeds (kg)	75	232	50	155
Fertilizers				
14-14-14 (bag)	-		3	960
46- 0- 0 (bag)	1	271	2	542
Chemical				
Insecticide (liter)	-		2.0	200
Human Labors (man day)	84	1,680	165	3,300
Animal with Operator	12	600	14	700
Base Cost for Production		2,783		5,857

Table K.3.3 Production Cost for Paddy, Rainfed
(5/11)
(Economic Prices)

Item	Future without Project		Future with Project	
	Quantity	Amount	Quantity	Amount
Seeds (kg)	100	310	50	155
Fertilizers				
14-14-14 (bag)	1	320	3	960
46- 0- 0 (bag)	1	271	1	271
Chemical				
Insecticide (liter)	-		2.0	200
Human Labors (man day)	62	1,240	100	2,000
Animal with Operator	12	600	14	700
Base Cost for Production		2,741		4,286

Table K.3.3 Production Cost for Paddy, Upland (6/11)

(Economic Prices)

Item	Future without Project		Future with Project	
	Quantity	Amount	Quantity	Amount
Seeds (kg)	100	310	50	155
Fertilizers				
14-14-14 (bag)	1	320	1	320
46- 0- 0 (bag)	-	-	-	-
Chemical				
Inspecticide (liter)	-		0.8	160
Human Labors (man day)	47	940	72	1,440
Animal with Operator	10	400	10	700
Base Cost for Production		1,970		2,775

Table K.3.3 Production Cost for Corn (7/11)

(Economic Prices)

Item	Future without Project		Future with Project	
	Quantity	Amount	Quantity	Amount
Seeds (kg)	22	348	20	316
Fertilizers				
14-14-14 (bag)	-		1	320
46- 0- 0 (bag)	1	271	2	542
Chemical				
Insecticide (liter)	-		2.0	200
Human Labors (man day)	50	1,000	113	2,260
Animal with Operator	12	600	14	700
Base Cost for Production		2,219		4,338

Table K.3.3 Production Cost for Pulse Crops
(8/11)
(Economic Prices)

Item	Future without Project		Future with Project	
	Quantity	Amount	Quantity	Amount
Seeds (kg)	22	348	20	316
Fertilizers				
14-14-14 (bag)	-		1	320
46- 0- 0 (bag)	1	271	2	542
Chemical				
Insecticide (liter)	-		2.0	200
Human Labors (man day)	50	1,000	90	1,800
Animal with Operator	12	600	14	700
Base Cost for Production		2,219		3,878

Table K.3.3 Production Cost for Root Crops
(9/11)
(Economic Prices)

Item	Future without Project		Future with Project	
	Quantity	Amount	Quantity	Amount
Seeds (kg)	-	-	-	-
Fertilizers				
14-14-14 (bag)	1	271	4	1,280
46- 0- 0 (bag)	-	-	-	-
0- 0-60 (bag)			1.5	407
Chemical				
Insecticide (liter)	-		-	-
Human Labors (man day)	25	500	55	1,100
Animal with Operator	-	-		
Base Cost for Production		771		2,787

Table K.3.3 Production Cost for Vegetables
(10/11)
(Economic Prices)

Item	Future without Project		Future with Project	
	Quantity	Amount	Quantity	Amount
Seeds (kg)	0.5	1,725	0.5	1,725
Fertilizers				
14-14-14 (bag)	-		3	960
46- 0- 0 (bag)	1	271	2	542
Chemical				
Inspecticide (liter)	-		2.0	200
Human Labors (man day)	75	1,500	317	6,340
Animal with Operator	12	600	14	700
Base Cost for Production		4,096		10,467

Table K.3.3 Production Cost for Coconut (Copra)
(11/11)
(Economic Prices)

Item	Future without Project		Future with Project	
	Quantity	Amount	Quantity	Amount
Seeds (kg)	-	-	-	-
Fertilizers				
14-14-14 (bag)	-	-	-	-
46- 0- 0 (bag)	-	-	-	-
Chemical				
Insecticide (liter)	-		-	-
Human Labors (man day)	74	1,480	74	1,480
Animal with Operator	-	-		
Miscellaneous Expenses (Transportation, etc.)	-	296	-	296
Base Cost for Production		1,776		1,776

Table K-3-4 Benefits of Flood Control Program
(Economic Prices)

unit: million pesos

	1991	1992 1999	2000	2001 2009	2010	2011 2019	2020
Benefits:	0	5.7 ..... 5.7	28.7	5.7 ..... 5.7	28.7	5.7 ..... 5.7	28.7

1. Costs for disposal of silt: 183 ha x 0.10 m x 100 pesos = 18.3 million pesos
2. Rehabilitation costs of damaged canals: 3,000 m x 270 pesos = 0.81 million pesos
3. Damage to crops: 365 ha x 1.6 ton/ha x 3,100 pesos = 1.8 million pesos
4. Damage to roads: 8.7 km x 0.9 million pesos = 7.8 million pesos

Table K.3.5 Benefits of Rural Roads Development (M/P)

1. Improvement of Roads (290 km)

Unit: Benefits in million pesos

Kind of Vehicle	Traffic Volume (per day)				Operating Cost Saving (year)			
	1992	1995	2000	2010	1992	1995	2000	2010
Car, Truck, Jeepney	469	1,025	1,489	1,961	43.7	95.5	138.7	182.7
Tricycle, Motor Cycle	961	2,101	3,052	4,020	30.5	66.7	96.9	127.7
Sub-total					74.2	162.2	235.6	310.4

Notes: (1) Average traffic volume is estimated from Table G.2.7.
(2) Vehicle operating costs savings are estimated at 0.70 pesos per km for cars, jeepneys, etc. (80%) and 1.60 pesos per km for trucks and buses, with average saving cost of 0.88 pesos per km per day. Vehicle operating costs savings are estimated at 0.30 pesos per km for tricycle and motor cycle.
(3) Benefits = Traffic volume x operating cost saving x 290 km

2. Construction of New Roads (330 km)

Unit: Benefits in million pesos

Kind of Vehicle	Passengers (per day)				Saving Time Benefits (year)			
	1992	1995	2000	2010	1992	1995	2000	2010
Without Project								
Cart, on Foot	2,177	2,304	2,531	3,055				
With Project								
Car, Truck, Jeepney	14,065	30,765	44,680	58,835				
Incremental passengers	11,888	28,461	42,149	55,780	16.72	43.26	62.83	82.74

Notes: (1) No. of passengers without the project is assumed to be 1% of total population.
(2) No. of passengers with the project is assumed to be 5 passengers for each of jeepney, car, truck, etc. on average and 2 passengers for tricycle, motor cycle.
(3) Time saving benefits = traffic volume x time saving x wage rate per hour x 300 working days x 0.5.
(4) Average travel time without the project is estimated at 4 hours on foot and 1 hour by cart, with average time of 3.4 hours.
(5) Average travel time with the project is estimated at 0.4 hours.
(6) Annual wage rate is assumed to be 7,500 pesos with 300 working days.

3. Total Annual Benefits:

1992	1995	2000	2010
90.9	205.5	298.4	393.1 million pesos

Table K.3.6 Benefits of Village Water Supply System (MADP Project)
(1/5)

1. Economic Value of Water

	1992	1995	2000	2005	2010
No. of families	586	620	681	748	822
Economic value of water	...54 pesos per month per Level II...				
Annual benefits in mln pesos	0.38	0.40	0.44	0.48	0.53

Notes: (1) Economic value of water in 1989 is estimated at 54 pesos per Level II on the basis of water fee of 40 pesos in 1984 multiplied by price indexes of 1.357.
(2) Population growth rate is assumed to be 1.9% per annum.

2. Increase in Income due to Reduction in Mortality

	1992	1995	2000	2005	2010
Population	3,908	4,135	4,543	4,991	5,484
Mortality rate (%) 1/	0.85	0.85	0.85	0.85	0.85
No. of reported deaths	33	35	39	42	47
Annual wage rate 2/	7,500	7,500	7,500	7,500	7,500
WP income (mln pesos) 3/	0.25	0.26	0.30	0.32	0.35
Annual benefits	0.10	0.10	0.12	0.13	0.14

Notes: (1) Mortality rate due to the incidence of water-borne diseases of diarrhea (0.46%) and pneumonia (0.37%) is reported in Appendix-I.
(2) Wage rate of 25 pesos at 300 working days is assumed.
(3) WP indicates with the project situation. Increase in income is expected from reduction in mortality by 40% under with the project situation.

3. Increase in Income due to Reduction in Morbidity

	1992	1995	2000	2005	2010
Population	3,908	4,135	4,543	4,991	5,484
Morbidity rate (%) 1/	2.36	2.36	2.36	2.36	2.36
No. of reported morbidity	92	98	107	118	129
Annual wage rate 2/	7,500	7,500	7,500	7,500	7,500
WP income (mln pesos) 3/	0.69	0.74	0.80	0.89	0.97
Benefits (mln pesos)	0.28	0.30	0.32	0.36	0.39

Notes: (1) Morbidity rate due to the incidence of water-borne diseases of diarrhea (1.96%) and pneumonia (0.40%) is reported in Appendix-I.
(2) Wage rate of 25 pesos at 300 working days is assumed.
(3) WP indicates with the project situation. Increase in income is expected from reduction in morbidity by 40% under with the project situation.

Table K.3.6 Benefits of Village Water Supply System (Bagtingon Area)
(2/5)

1. Economic Value of Water

	1993	1995	2000	2005	2010
No. of families	1,601	1,694	1,861	2,045	2,247
Economic value of water	...54 pesos per month per Level II...				
Annual benefits in mln pesos	1.04	1.10	1.21	1.33	1.46

Notes: (1) Economic value of water in 1989 is estimated at 54 pesos per Level II on the water fee of 40 pesos in 1984 multiplied by price indexes of 1.357.
(2) Population growth rate is assumed to be 1.9% per annum.

2. Increase in Income due to Reduction in Mortality

	1993	1995	2000	2005	2010
Population	9,606	10,164	11,166	12,270	13,482
Mortality rate (%) 1/	0.85	0.85	0.85	0.85	0.85
No. of reported deaths	82	86	95	104	115
Annual wage rate 2/	7,500	7,500	7,500	7,500	7,500
WP income (mln pesos) 3/	0.62	0.65	0.71	0.78	0.86
Benefits (mln pesos)	0.25	0.26	0.28	0.31	0.34

Notes: (1) Mortality rate due to the incidence of water-borne diseases of diarrhea (0.46%) and pneumonia (0.37%) is reported in Appendix-I.
(2) Wage rate of 25 pesos at 300 working days is assumed.
(3) WP indicates with the project situation. Increase in income is expected from reduction in mortality by 40% under with the project situation.

3. Increase in Income due to Reduction in Morbidity

	1993	1995	2000	2005	2010
Population	9,605	10,164	11,166	12,270	13,482
Morbidity rate (%) 1/	2.36	2.36	2.36	2.36	2.36
No. of reported morbidity	227	240	264	290	318
Annual wage rate 2/	7,500	7,500	7,500	7,500	7,500
WP income (mln pesos) 3/	1.70	1.80	1.98	2.18	2.39
Benefits (mln pesos) 4/	0.68	0.72	0.79	0.87	0.96

Notes: (1) Morbidity rate due to the incidence of water-borne diarrhea (1.96%) and pneumonia (0.40%) is reported in Appendix-I.
(2) Wage rate of 25 pesos at 300 working days is assumed.
(3) WP indicates with the project situation. Increase in income is expected from reduction in morbidity by 40% under with the project situation.
(4) WOP indicates without the project situation.

Table K.3.6 Benefits of Rural Water Supply System (Short Term)
(3/5)

1. Economic Value of Water

	1995	2000	2005	2010
No. of families	6,062	6,661	7,318	8,040
Economic value of water	...54 pesos per month per Level II...			
Annual benefits in mln pesos	3.93	4.32	4.74	5.21

Notes: (1) Economic value of water in 1989 is estimated at 54 pesos per Level II on the basis of water fee of 40 pesos in 1984 multiplied by price indexes of 1.357.
(2) Population growth rate is assumed to be 1.9% per annum.

2. Increase in Income due to Reduction in Mortality

	1995	2000	2005	2010
No. of families	6,062	6,661	7,318	8,040
Population	36,372	39,966	43,908	48,240
Mortality rate (%) 1/	0.85	0.85	0.85	0.85
No. of reported deaths	309	340	373	410
Annual wage rate 2/	7,500	7,500	7,500	7,500
WP income (mln pesos) 3/	2.32	2.55	2.80	3.08
Benefits (mln pesos)	0.93	1.02	1.12	1.23

Notes: (1) Mortality rate due to the incidence of water-borne diseases of diarrhea (0.46%) and pneumonia (0.37%) is reported in Appendix-I.
(2) Wage rate of 25 pesos at 300 working days is assumed.
(3) WP indicates with the project situation. Increase in income is expected from reduction in mortality by 40% under with the project situation.

3. Increase in Income due to Reduction in Morbidity

	1995	2000	2005	2010
Population	36,372	39,966	43,908	48,240
Morbidity rate (%) 1/	2.36	2.36	2.36	2.36
No. of reported morbidity	858	943	1,036	1,138
Annual wage rate 2/	7,500	7,500	7,500	7,500
WP income (mln pesos) 3/	6.44	7.07	7.77	8.54
Benefits (mln pesos)	2.58	2.83	3.11	3.42

Notes: (1) Morbidity rate due to the incidence of water-borne diseases of diarrhea (1.96%) and pneumonia (0.40%) is reported in Appendix-I.
(2) Wage rate of 25 pesos at 300 working days is assumed.
(3) WP indicates with the project situation. Increase in income is expected from reduction in morbidity by 40% under with the project situation.

Table K.3.6 Benefits of Rural Water Supply System (Medium Term)
(4/5)

1. Economic Value of Water

	2000	2005	2010
No. of families	2,907	3,194	3,509
Economic value of water	...54 pesos per month per Level II...		
Annual benefits in mln pesos	1.88	2.07	2.27

Notes: (1) Economic value of water in 1989 is estimated at 54 pesos per Level II on the basis of water fee of 40 pesos in 1984 multiplied by price indexes of 1.357.
(2) Population growth rate is assumed to be 1.9% per annum.

2. Increase in Income due to Reduction in Mortality

	2000	2005	2010
No. of families	2,907	3,194	3,509
Population	17,442	19,164	21,054
Mortality rate (%) 1/	0.85	0.85	0.85
No. of reported deaths	148	163	179
Annual wage rate 2/	7,500	7,500	7,500
WP income (mln pesos) 3/	1.11	1.22	1.34
Benefits (mln pesos)	0.44	0.49	0.54

Notes: (1) Mortality rate due to the incidence of water-borne diarrhea (0.46%) and pneumonia (0.37%) is reported in Appendix-I.
(2) Wage rate of 25 pesos at 300 working days is assumed.
(3) WP indicates with the project situation. Increase in income is expected from reduction in mortality by 40% under with the project situation.

3. Increase in Income due to Reduction in Morbidity

	2000	2005	2010
Population	17,442	19,164	21,054
Morbidity rate (%) 1/	2.36	2.36	2.36
No. of reported morbidity	411	452	497
Annual wage rate 2/	7,500	7,500	7,500
WP income (mln pesos) 3/	3.08	3.39	3.73
Benefits (mln pesos)	1.23	1.36	1.49

Notes: (1) Morbidity rate due to the incidence of water-borne diseases of diarrhea (1.96%) and pneumonia (0.40%) is reported in Appendix-I.
(2) Wage rate of 25 pesos at 300 working days is assumed.
(3) WP indicates with the project situation. Increase in income is expected from reduction in morbidity by 40% under with the project situation.

Table K.3.6 Benefits of Rural Water Supply System (Long Term)
(5/5)

1. Economic Value of Water

	2000	2005	2010
No. of families	6,577	7,226	7,939
Economic value of water	...54 pesos per month per Level II...		
Annual benefits in mln pesos	4.26	4.68	5.14

Notes: (1) Economic value of water in 1989 is estimated at 54 pesos per Level II on the basis of water fee of 40 pesos in 1984 multiplied by price indexes of 1.357.
(2) Population growth rate is assumed to be 1.9% per annum.

2. Increase in Income due to Reduction in Mortality

	2000	2005	2010
No. of families	6,577	7,226	7,939
Population	39,462	43,356	47,634
Mortality rate (%) 1/	0.85	0.85	0.85
No. of reported deaths	335	369	405
Annual wage rate 2/	7,500	7,500	7,500
WP income (mln pesos) 3/	2.51	2.77	3.04
Benefits (mln pesos)	1.00	1.11	1.22

Notes: (1) Mortality rate due to the incidence of water-borne diseases of diarrhea (0.46%) and pneumonia (0.37%) is reported in Appendis-I.
(2) Wage rate of 25 pesos at 300 working days is assumed.
(3) WP indicates with the project situation. Increase in income is expected from reduction in mortality by 40% under with the project situation.

3. Increase in Income due to Reduction in Morbidity

	2000	2005	2010
Population	39,462	43,356	47,634
Morbidity rate (%) 1/	2.36	2.36	2.36
No. of reported morbidity	931	1,023	1,124
Annual wage rate 2/	7,500	7,500	7,500
WP income (mln pesos) 3/	6.98	7.67	8.43
Benefits (mln pesos)	2.79	3.07	3.37

Notes: (1) Morbidity rate due to the incidence of water-borne diseases of diarrhea (1.96%) and penumonia (0.40%) is reported in Appendix-I.
(2) Wage rate of 25 pesos at 300 working days is assumed.
(3) WP indicates with the project situation. Increase in income is expected from reduction in morbidity by 40% under with the project situation.

Table K.3.7 Benefits of Rural Electrification Program (M/P)

	1992	1995	2000	2010
Total demand (MWH, year)	6,232	10,177	14,636	25,660
Electricity fee (kwh)	2.5	2.5	2.5	2.5
Annual benefits (million pesos)	15.58	25.44	36.60	64.15

Notes: (1) Total demand is estimated from Table I.3.2.
(2) Power demand is expected to grow at a rate of 17.8% per annum between 1990 and 1995.

Table K.3.8 Benefits of Aquaculture Development (M/P)

1. Shrimp Hatchery Plant

a. Average number of eggs	20 million/month with 200,000 mother shrimps
b. Shrimp fry production	10 million/month (recovery rate of 50%)
c. Unit price per 1,000 fries	70 pesos
d. Gross value of production	700,000 pesos
e. Production cost	410,000 pesos
f. Net value of production	290,000 pesos (0.29 million pesos)

2. Fish Meal and Feed Processing

a. Production volume	1,500 tons per year
b. Unit price per ton	17,440 pesos
c. Gross value of production	26.2 million pesos
d. Production cost	18.3 million pesos
e. Net value of production	7.9 million pesos per year

3. Processing Plant (with size of 16/20)

a. Gross value of production	109 million pesos (500 tons x 218,000 pesos)
b. Production cost	
i. Material	98 million pesos
ii. Processing cost	2.7 million pesos
Sub-total:	100.7 million pesos
c. Net value of production	8.3 million pesos per year

4. Total Annual Benefits: 16.49 million pesos

Table K.3.9 Economic Evaluation of the Master Plan

Unit: Million pesos

Year	Project Costs	O/M Costs	Total Costs	Benefits						
				(1)	(2)	(3)	(4)	(5)	(6)	Total
1991	350	0	350	0	0	0	0	0	0	0
1992	262	8	270	50	6	91	1	16	0	164
1993	262	8	270	74	6	91	3	16	0	190
1994	262	8	270	99	6	91	3	16	0	215
1995	262	8	270	124	6	206	10	25	0	371
1996	163	50	213	149	6	206	10	25	0	396
1997	163	50	213	174	6	206	10	25	0	421
1998	163	50	213	223	6	206	10	25	0	445
1999	163	50	213	248	6	206	10	25	0	470
2000	163	50	213	248	29	298	23	37	0	635
2001	132	66	198	248	6	298	23	37	17	629
2002	132	66	198	248	6	298	23	37	17	629
2003	132	66	198	248	6	298	23	37	17	629
2004	132	66	198	248	6	298	23	37	17	629
2005	132	66	198	248	6	298	25	64	17	658
2006	0	96	96	248	6	298	25	64	17	658
2007	0	96	96	248	6	298	25	64	17	658
2008	0	96	96	248	6	298	25	64	17	658
2009	0	96	96	248	6	298	25	64	17	658
2010	0	96	96	248	29	393	28	64	17	779
2011	0	96	96	248	6	393	28	64	17	756
2012	0	96	96	248	6	393	28	64	17	756
2013	0	96	96	248	6	393	28	64	17	756
2014	0	96	96	248	6	393	28	64	17	756
2015	0	96	96	248	6	393	28	64	17	756
2016	0	96	96	248	6	393	28	64	17	756
2017	0	96	96	248	6	393	28	64	17	756
2018	0	96	96	248	6	393	28	64	17	756
2019	0	96	96	248	6	393	28	64	17	756
2020	0	96	96	248	29	393	28	64	17	779

Economic Internal Rate of Return (EIRR) 26.2 %

Notes: (1) Agriculture and Irrigation
(2) Flood Control
(3) Rural Roads
(4) Village and Rural Water Supply
(5) Rural Electrification
(6) Aquaculture

Table K.3.10 Farm Financial Budgets

(1.0 ha coconut land and
1.0 ha paddy field)

	Present Condition (Rainfed)	Future without Project	Future with Project
1. Farm income			
Paddy, wet season	5,600	5,950	14,000
Paddy, dry season	2,240	2,380	10,500
Copra making (1 ha)	4,455	3,600	4,950
Sub-total	12,295	11,930	29,450
2. Farming expenditures			
Paddy, wet season	1,700	1,700	4,050
Paddy, dry season	680	680	3,038
Copra making (1 ha)	660	660	660
Sub-total	3,040	3,040	7,748
3. Net Farm Income	9,255	8,890	21,702