

₱ 13.4 million for the detailed design works and ₱ 25.5 million for the construction supervisory works. The consultant(s) will technically assist and advice the governmental staff during the detailed design and construction supervision periods.

5) Land acquisition cost

Around 2.3 ha of land will be acquired or affected for the construction works. Total land acquisition cost is estimated at about ₱ 2.1 million.

6) Physical contingency

As described in Section 1.1, the physical contingency is fixed at 10 % of the total of the above five items.

7) Price contingency

As also mentioned in Section 1.1, the price contingency is fixed at 4 % for the foreign currency portion and 8 % for the local currency portion.

Summary of the Project cost is estimated at around ₱ 347.3 million as summarized in Table IX.2.1.

2.3 Annual O&M Costs

The annual operation and maintenance (O&M) costs are composed of salaries of the project staff, project office expenses, the materials and labor cost for repair and maintenance of the project facilities and O&M equipment (see Table IX.2.10). Total O&M costs are roughly estimated at ₱ 6.0 million per annum. The detailed estimates are shown below:

Operation and Maintenance Cost of the Project Facilities

(Unit: ₱ '000)	
Facilities	Annual O&M cost
1) Irrigation Facilities	970
2) Rural Roads	120
3) Trading Posts	1,870
4) Horticulture/Irrigation Center	2,170
5) Soil Conservation Center	870
Total	6,000

Note: O&M cost of domestic water supply system is negligibly small amount.

1) Irrigation facilities

Irrigation facilities are comprised of concrete intakes, farm ponds, steel pipelines, and hydrant valves, and flow control devices. Replacement of pipelines and hydrant valves will be required to smoothly attain O&M activities. The amount of those works are estimated at ₱970,000 per annum, which is equivalent to 2.0 % of total pipe length and valves replacement.

2) Rural roads

Road maintenance cost is estimated at ₱120,000 per annum on condition that re-pavement and repair of drainage canals/culverts will be made for 0.1 % of total constructed road length including drainage canals/culverts and bridges.

3) Trading posts

O&M cost for trading posts is estimated at ₱1,870,000 per annum. Detail requirements for staff salary, labor wages and other expenses are as follows:

Items	O&M Cost
a. Staff salary 2 persons × ₱36,000 × 15 posts	₱1,080,000
b. Labor cost 5 persons × ₱150/day × 15 posts × 12 months	₱135,000
c. Annual operation cost of 2 % of machinery/equipment	₱49,000
d. Annual maintenance cost of 10 % of machinery/equipment (equivalent to 10 year depreciation period)	₱243,000
e. Fuel and office expenses ₱2,000 × 15 posts × 12 months	₱360,000
Total	₱1,867,000
round off	₱1,870,000
(per trading post	₱125,000)

4) Upland Horticulture and Irrigation Technology Center

O&M cost for the Upland Horticulture and Irrigation Technology Center is estimated at ₱2,170,000 per annum. Detail requirements for staff salary, labor wages and other expenses are as follows:

Items	O&M Cost
a. Staff salary 7 persons × ₱72,000	₱504,000
b. Expenses for trainer/lecturer 5 persons × ₱500 /day × 100 days	₱250,000
c. Administrative Staff 2 persons × ₱36,000=72,000	₱72,000
d. Labor cost 6 persons × ₱150/day × 250 days	₱225,000
e. Annual operation cost of 2 % of machinery/equipment	₱135,000
f. Annual maintenance cost of 10 % of machinery/equipment (equivalent to 10 year depreciation period)	₱674,000
g. Training materials	
Farm inputs ₱50,000/ha × 3 times/year	₱150,000
Text distribution	₱45,000
Other materials	₱20,000
h. Fuel and office expenses ₱8,000 × 12 months	₱96,000
Total	₱2,171,000
round off	₱2,170,000

5) Soil Conservation

Soil conservation activities of the Project are composed of the extension services of soil conservation skill held at the Soil Conservation Extension Center and demonstration activity in the existing farmlands with its total area of 12.2 ha, being scattered in the Municipalities of Nagcarlan (3.6 ha), Liliw (7.3 ha) and Majayjay (1.2 ha). O&M cost required for the Soil Conservation Center is estimated at ₱870,000 per annum. Detail requirements for staff salary, labor wages and other expenses are as follows:

Items	O&M Cost
a. Staff salary 3 persons × ₱72,000	₱216,000
b. Administrative Staff 1 person × ₱36,000	₱36,000
c. Labor cost 5 persons × ₱150/day × 200 days	₱150,000
d. Annual operation cost of 2 % of machinery/equipment	₱61,000
e. Annual maintenance cost of 10 % of machinery/equipment (equivalent to 10 year depreciation period)	₱307,000
f. Seedling farm inputs	₱30,000
g. Fuel and office expenses ₱6,000 × 12 months	₱72,000
Total	₱872,000
round off	₱870,000

Financial capability of each responsible O&M body including beneficiaries' organizations is examined in accordance with their annual budget allocation of each governmental agency and incremental benefits by the Project.

1) O&M of irrigation

As examined in farm budget analysis in page IV-18, Appendix-IV, payment capability of farm household in irrigated area is estimated at ₱60,500 per annum. Meanwhile, O&M cost for irrigation is estimated at about ₱1,400 per farm household assuming that the number of household is 700. It is, therefore, concluded that the farmers are able to bear O&M cost because its requirement is less than 2 % of their payment capabilities in average.

2) O&M of roads

O&M cost for improved roads is estimated at about ₱120,000 in total. Roads maintenance with total pavement length of 18 km is carried out by the Municipal governments (15 km) and partly by the Provincial government of Laguna (3 km). Annual budgets of related three Municipalities tabulated in Table IX.2.16(3,4/4) is much enough to burden proposed O&M cost for roads.

In addition, the road construction and maintenance fund were used to be procured by the Provincial and National government, i.e., PGL and DPWH as occasionally required, for example, the expenditures for road maintenance in the Municipality of Liliw were ₱398,000 (1991), ₱2,264,000 (1992), and ₱615,000 (1993). Accordingly, it is concluded that the budget required for road maintenance will be surely provided by the related governments with proper annual budget allocation.

3) O&M of trading posts

O&M cost of trading posts management is burdened by the beneficial farmers, and collected through marketing cooperatives as a due. Required due of one cooperative member (household) is estimated at about ₱1,400 per annum, assuming that the total cooperative member is 1,340 household. As examined in farm budget analysis, payment capability of farm household is estimated at ₱60,500 in irrigated area, and ₱25,700 in rainfed area, respectively. It is, therefore, concluded that the farmers are able to bear O&M cost because its requirement is 2 to 5 % of their payment capabilities for both of farmers in irrigated and rainfed areas.

4) Upland Horticulture and Irrigation Technology Center

Regarding the Upland Horticulture and Irrigation Technology Center, total amount of ₱2,170,000

for annual O&M can be reasonably provided by DA without strain because the proposed amount is not excessively large comparing with DA's annual budgets for agricultural research and training/extension budget appropriations as shown in Table IX.2.16(1,2/4). Because of the transferring of training and extension services responsibility from national to provincial, municipal level, its budget of DA had temporarily decreased in 1993. In this connection, budget allotment between national governments and Local Government Units will be properly achieved according to Local Government Code.

5) Soil Conservation Extension Center

Regarding the Soil Conservation Extension Center, total amount of ₱870,000 for annual O&M can be reasonably provided by PENRO through DENR Region IV office. Annual budgets of DENR, PENRO, and attached Bureaus of DENR are shown in Table IX.2.16(2/4). As shown in table, PENROs, CENROs and Municipal offices have a important role of environmental preservation in provincial and municipal level, and its annual budget have been gradually increased. PENROs are comprised of 75 offices distributed in nationwide, and operation and management budget of each office, including its attached CENRO and Municipal offices is assumed at ₱22.8 million in average. PENRO Laguna is responsible office for the environmental research, evaluation, and project implementation in the Province of Laguna, and will undertake soil conservation scheme of the Project. Required O&M fund for the Soil Conservation Extension Center can be shouldered by PENRO, comparing with the annual budget of PENRO, including CENRO and Municipal offices.

2.4 Annual Fund Requirements

Annual fund requirements were estimated as listed in Table IX.2.2 in conformity with the project implementation schedule. Total amount of ₱0.4 million for pre-construction works in 1995, ₱148.3 million for the detailed design and construction works in 1996, and ₱198.6 million for construction works in 1997 including physical and price contingencies are required as scheduled.

Table IX.2.1 Summary of Project Cost

(unit: '000 pesos)

Items	Description	Project Cost		Total
		Foreign Portion	Local Portion	
I	Pre-construction Works/Detailed Design			
	1) Administration Cost	48	1,745	1,793
	2) Engineering Cost	10,010	3,420	13,430
	Sub-Total I	10,058	5,165	15,223
II	Construction Works			
	1) Irrigation Construction Works	43,626	31,664	75,290
	2) Road Improvement Works	53,537	59,594	113,131
	3) Trading Post Construction	4,761	7,192	11,953
	4) Horticulture/Irrigation Center	2,597	5,898	8,495
	5) Soil Conservation Works	657	3,179	3,836
	6) Rehabilitation Works for Domestic Water System	1,228	665	1,893
	Sub-Total II	106,406	108,192	214,598
III	O&M Equipment	10,021	2,210	12,231
IV	Administration Cost	72	2,870	2,942
V	Engineering Cost	20,790	4,740	25,530
VI	Land Acquisition & Compensation	0	2,065	2,065
	Sub-Total (III+IV+V+VI)	30,883	11,885	42,768
	Sub-Total (I+II+III+IV+V+VI)	147,347	125,242	272,589
VII	Physical Contingency (10%)	14,734	12,524	27,258
	Sub-Total	162,081	137,766	299,847
VIII	Price Contingency (4.0% of Foreign Portion) (8.0% of Foreign Portion)	16,886	30,547	47,433
	Total (Financial Cost)	178,967	168,313	347,280

Table IX.2.2 Annual Fund Requirement

Items	Description	(unit: 000 pesos)											
		1995		1996		1997							
		F/C	L/C	Total	F/C	L/C	Total						
I Detailed Design													
1)	Administration Cost	24	346	370	24	1,399	1,423	48	1,745	1,793			
2)	Engineering Cost				10,010	3,420	13,430		10,010	3,420	13,430		
	Sub-Total I	24	346	370	10,034	4,819	14,853		10,058	5,165	15,223		
II Construction Works													
2 Construction Works													
1)	Irrigation Construction Works				20,605	12,932	33,537	23,021	18,732	41,753	43,626	31,664	75,290
2)	Road Improvement Works				16,598	16,897	33,495	36,939	42,697	79,636	53,537	59,594	113,131
3)	Trading Post Construction				2,539	3,836	6,375	2,222	3,356	5,578	4,761	7,192	11,953
4)	Horticulture/Irrigation Center				1,039	2,359	3,398	1,558	3,539	5,097	2,597	5,898	8,495
5)	Soil Conservation Works				558	1,811	2,369	99	1,368	1,467	657	3,179	3,836
6)	Rehabilitation Works for Domestic Water System				491	266	757	737	399	1,136	1,228	665	1,893
	Sub-Total II-2				41,830	38,101	79,931	64,576	70,091	134,667	106,406	108,192	214,598
3)	O&M Equipment				10,021	2,210	12,231				10,021	2,210	12,231
4)	Administration Cost				24	1,197	1,221	48	1,673	1,721	72	2,870	2,942
5)	Engineering Cost				8,470	1,910	10,380	12,320	2,830	15,150	20,790	4,740	25,530
6)	Land Acquisition & Compensation				0	2,065	2,065				0	2,065	2,065
	Sub-Total II-(3+4+5+6)				18,515	7,382	25,897	12,368	4,503	16,871	30,883	11,885	42,768
	Sub-Total II-(1+2+3+4+5+6)	24	346	370	70,379	50,302	120,681	76,944	74,594	151,538	147,347	125,242	272,589
7)	Physical Contingency (10 %)	2	35	37	7,038	5,030	12,068	7,694	7,459	15,153	14,734	12,524	27,258
	Sub-Total	26	381	407	77,417	55,332	132,749	84,638	82,053	166,691	162,081	137,766	299,847
8)	Price Contingency (4.0 %:Foreign Portion) (8.0 %:Local Portion)	1	30	31	6,317	9,207	15,524	10,568	21,310	31,878	16,886	30,547	47,433
	Total	27	411	438	83,734	64,539	148,273	95,206	103,363	198,569	178,967	168,313	347,280

F/C: Foreign Cost, L/C: Local Cost

Table IX.2.3 Cost Estimates of Irrigation Facilities (1/2)

(unit:'000 pesos)

Items	Description	Unit	Quantities	Construction Cost		
				Foreign Cost	Local Cost	Total
1 Nagcarlan Irrigation System						
(a) Intake System						
1)	Intake facilities	site	1	257	436	693
2)	Conduit installation (ø100mm-ø250mm)	m	8,600	10,138	3,380	13,518
3)	Energy dissipator	site	1	93	100	193
4)	Material transportation	LS	1	0	881	881
Sub-Total (a)				10,488	4,798	15,285
(b) Irrigation Block (N-1)						
1)	Farm pond (Distribution tank)	site	1	546	973	1,519
2)	Pipe installation (ø80mm-ø125mm)	m	3,090	1,732	732	2,465
3)	On-farm facilities (Hydrant valves)	pcs	18	0	45	45
4)	Material transportation	LS	1	0	562	562
Sub-Total (b)				2,279	2,311	4,590
(c) Irrigation Block (N-2)						
1)	Farm pond (Distribution tank)	site	1	546	973	1,519
2)	Pipe installation (ø80mm-ø125mm)	m	5,870	3,193	1,365	4,557
3)	Energy dissipator	site	1	93	100	193
4)	On-farm facilities (Hydrant valves)	pcs	22	0	55	55
5)	Material transportation	LS	1	0	905	905
Sub-Total (c)				3,832	3,397	7,229
(d) Irrigation Block (N-3)						
1)	Farm pond (Distribution tank)	site	1	546	973	1,519
2)	Pipe installation (ø80mm-ø150mm)	m	4,710	3,460	1,332	4,793
3)	On-farm facilities (Hydrant valves)	pcs	25	0	63	63
4)	Material transportation	LS	1	0	59	59
Sub-Total (d)				4,007	2,426	6,433
(e) Irrigation Block (N-4)						
1)	Farm pond (Distribution tank)	site	1	546	973	1,519
2)	Pipe installation (ø80mm-ø100mm)	m	3,770	2,169	908	3,076
3)	On-farm facilities (Hydrant valves)	pcs	16	0	40	40
4)	Material transportation	LS	1	0	917	917
Sub-Total (e)				2,715	2,837	5,552
(f) Irrigation Block (N-5)						
1)	Farm pond (Distribution tank)	site	1	546	973	1,519
2)	Pipe installation (ø80mm-ø100mm)	m	2,640	1,610	660	2,270
3)	On-farm facilities (Hydrant valves)	pcs	14	0	35	35
4)	Material transportation	LS	1	0	1,000	1,000
Sub-Total (f)				2,156	2,667	4,823
Sub-Total (Nagcarlan Irrigation System)				25,476	18,436	43,912

Table IX.2.3 Cost Estimates of Irrigation Facilities (2/2)

(unit:000 pesos)

Items	Description	Unit	Quantities	Construction Cost		Total
				Foreign Cost	Local Cost	
2 Liliw Irrigation System						
(a) Intake System						
1)	Intake facilities	site	1	257	436	693
2)	Conduit installation (ø100mm-ø250mm)	m	3,950	4,375	1,490	5,865
3)	Material transportation	LS	1	0	186	186
Sub-Total (a)				4,632	2,112	6,744
(b) Irrigation Block (L-1)						
1)	Farm pond (Distribution tank)	site	1	546	973	1,519
2)	Pipe installation (ø80mm-ø150mm)	m	3,950	2,613	1,041	3,654
3)	Energy dissipator	site	1	93	100	193
4)	On-farm facilities (Hydrant valves)	pcs	12	0	30	30
5)	Material transportation	LS	1	0	14	14
Sub-Total (b)				3,252	2,158	5,410
(c) Irrigation Block (L-2)						
1)	Farm pond (Distribution tank)	site	1	546	973	1,519
2)	Pipe installation (ø80mm-ø150mm)	m	3,100	1,912	781	2,693
3)	On-farm facilities (Hydrant valves)	pcs	16	0	40	40
4)	Material transportation	LS	1	0	380	380
Sub-Total (c)				2,459	2,173	4,632
(d) Irrigation Block (L-3)						
1)	Farm pond (Distribution tank)	site	1	546	973	1,519
2)	Pipe installation (ø80mm-ø125mm)	m	3,370	2,126	861	2,987
3)	On-farm facilities (Hydrant valves)	pcs	14	0	35	35
4)	Material transportation	LS	1	0	791	791
Sub-Total (d)				2,673	2,660	5,332
(e) Irrigation Block (L-4)						
1)	Farm pond (Distribution tank)	site	1	546	973	1,519
2)	Pipe installation (ø80mm-ø125mm)	m	3,460	2,152	876	3,027
3)	Energy dissipator	site	1	93	100	193
4)	On-farm facilities (Hydrant valves)	pcs	14	0	35	35
5)	Material transportation	LS	1	0	39	39
Sub-Total (e)				2,791	2,022	4,813
(f) Irrigation Block (L-5)						
1)	Farm pond (Distribution tank)	site	1	546	973	1,519
2)	Pipe installation (ø80mm-ø125mm)	m	3,240	1,798	763	2,560
3)	On-farm facilities (Hydrant valves)	pcs	22	0	55	55
4)	Material transportation	LS	1	0	313	313
Sub-Total (f)				2,344	2,103	4,447
Sub-Total (Liliw Irrigation System)				18,150	13,228	31,378
Total				43,626	31,664	75,290

Table IX.2.4 Cost Estimates of Farm-to-Market Roads (1/2)

(unit: '000 pesos)

Items	Description	Unit	Quantities	Construction Cost		
				Foreign Cost	Local Cost	Total
1 San Francisco - Bukal Road						
(a)	Earth works	cum	4,860	858	182	1,040
(b)	Road Pavement					
1)	5m Concrete pavement with gutters	m	1,524	4,244	3,746	7,989
2)	4m Concrete pavement with gutters	m	4,515	10,346	9,770	20,117
3)	L-shape drainage gutters	m	581	185	497	682
(c)	Bridge construction	brdg	1	124	232	357
(d)	Drainage Culverts	sites	40	841	2,469	3,311
	Sub-Total 1			16,598	16,897	33,495
2 Sinipian - Silangan Lazaan Road						
(a)	Road Pavement					
1)	4m Concrete pavement with gutters	m	1,610	1,751	1,653	3,404
2)	L-shape drainage gutters	m	4,421	1,676	4,507	6,182
(b)	Bridge construction	brdg	1	124	232	357
(c)	Drainage Culverts	sites	16	254	764	1,018
	Sub-Total 2			3,805	7,156	10,961
3 Malinao - Kanlurang Lazaan Road						
(a)	Road Pavement					
1)	4m Concrete pavement with gutters	m	1,523	3,490	3,296	6,786
2)	L-shape drainage gutters	m	127	40	109	149
(b)	Drainage Culverts	sites	5	46	155	201
	Sub-Total 3			3,577	3,559	7,136
4 Kanlurang Lazaan - Bukal Road						
(a)	Road Pavement					
1)	4m Concrete pavement with gutters	m	2,144	4,913	4,639	9,553
(b)	Bridge construction	brdgs	2	249	465	713
(c)	Drainage Culverts	sites	5	233	693	926
	Sub-Total 4			5,395	5,797	11,192
5 Ibabang Sungai - Ilayang Sungai Road						
(a)	Earth Works	cum	11,895	2,100	445	2,545
(b)	Road Pavement					
1)	4m Concrete pavement with gutters	m	976	2,237	2,112	4,349
2)	L-shape drainage gutters	m	3,424	1,089	2,930	4,019
(c)	Drainage Culverts	sites	19	251	782	1,033
	Sub-Total 5			5,677	6,269	11,946

Table IX.2.4 Cost Estimates of Farm-to-Market Roads (2/2)

(unit:'000 pesos)

Items	Description	Unit	Quantities	Construction Cost		
				Foreign Cost	Local Cost	Total
6 Novaliches - Luquin Road						
(a) Road Pavement						
1)	5m Concrete pavement with gutters	m	1,607	4,475	3,950	8,424
2)	4m Concrete pavement with gutters	m	1,603	3,673	3,469	7,142
3)	L-shape drainage gutters	m	2,490	792	2,130	2,923
(b) Drainage Culverts						
		sites	22	280	841	1,122
Sub-Total 6				9,221	10,390	19,611
7 Pangil - Bukal Road						
(a) Road Pavement						
1)	4m Concrete pavement with gutters	m	3,883	8,898	8,403	17,301
2)	L-shape drainage gutters	m	397	126	340	466
(b) Drainage Culverts						
		sites	5	241	783	1,024
Sub-Total 7				9,265	9,526	18,791
Total				53,538	59,593	113,131

Table IX.2.5 Cost Estimates of Trading Posts

(unit:'000 pesos)

Items	Description	Unit	Quantities	Construction Cost		
				Foreign Cost	Local Cost	Total
1	Trading Posts (Nagcarlan)	sites	8	2,539	3,836	6,375
2	Trading Posts (Liliw)	sites	5	1,587	2,397	3,985
3	Trading Posts (Majayjay)	sites	2	635	959	1,594
Total				4,762	7,192	11,954

Table IX.2.6 Cost Estimates of Upland Horticulture and Irrigation Technology Center

(unit:'000 pesos)

Items	Description	Unit	Quantities	Construction Cost		
				Foreign Cost	Local Cost	Total
1 Demonstration Farm						
1)	Earth Works	LS	1	186	64	250
2)	Green Houses	LS	1	473	1,418	1,890
3)	Irrigation Facilities (Pump/sprinkler systems)	LS	1	313	608	921
	Sub-Total 1			972	2,090	3,061
2 Center Building Construction						
1)	Center Building (Floor area: 264 sq.m)	bldg	1	832	2,841	3,673
2)	Storage/garage Building (Floor area: 56 sq.m)	bldg	1	142	376	518
3)	Fence Works	m	800	0	160	160
4)	Road Construction (Road width: 4.0 m)	m	330	651	432	1,083
	Sub-Total 2			1,625	3,808	5,434
	Total			2,597	5,898	8,495

Table IX.2.7 Cost Estimates of Soil Conservation Construction

(unit:'000 pesos)

Items	Description	Unit	Quantities	Construction Cost		
				Foreign Cost	Local Cost	Total
1 Demonstration Fields Construction						
		ha	12.2	0	1,263	1,263
	Sub-Total 1			0	1,263	1,263
2 Center Building Construction						
1)	Center Building (Floor area: 264 sq.m)	bldg	1	416	1,435	1,851
2)	Storage/garage Building (Floor area: 56 sq.m)	bldg	1	142	376	518
3)	Fence Works	m	200	0	40	40
4)	Road Construction (Road width: 4.0 m)	m	50	99	65	164
	Sub-Total 2			657	1,916	2,573
	Total			657	3,179	3,835

Table IX.2.8 Cost Estimates of Domestic Water Supply System

(unit:'000 pesos)

Items	Description	Unit	Quantities	Construction Cost		
				Foreign Cost	Local Cost	Total
1	Rehabilitation works of Inlet Facilities					
	Inlet Concrete Tanks	sites	2	143	310	454
	Sub-Total 1			143	310	454
2	Conduit and Steel Works	m	540	1,085	355	1,440
	Sub-Total 2			1,085	355	1,440
	Total			1,229	665	1,894

Table IX.2.9 Procurement Cost of O&M Machinery/Equipment

(unit:'000 pesos)

Items	Description	Construction Cost		
		Foreign Cost	Local Cost	Total
1	Trading Posts			
	(a) O&M office equipment/vehicles	1,557	869	2,426
	Sub-Total 1	1,557	869	2,426
2	Upland Horticulture and Irrigation Technology Center			
	(a) Experiment equipment	71	18	89
	(b) Meteorological observation equipment	479	0	479
	(c) O&M office equipment/vehicles	5,447	723	6,170
	Sub-Total 2	5,997	741	6,738
3	Soil Conservation Extension Center			
	(a) O&M office equipment/vehicles	2,467	600	3,067
	Sub-Total 3	2,467	600	3,067
	Total	10,021	2,210	12,231

Table IX.2.10 List of O&M Machinery and Equipment

O&M Machinery/Equipment	Q'ty	Unit	Remarks
1 Trading Post			
1) Office tools (tables/chairs)	15	sets	
2) 2 ton truck	1	car	
3) Pickup car	1	car	
4) 4-wheel jeep	1	car	
5) Motor bike	2	units	
6) Weight Measurements	15	sets	
7) Spair parts	1	LS	
2 Upland Horticulture and Irrigation Technology Center			
(a) Experiment instrument			
1) Soil test equipment	1	LS	
2) Spair parts	1	LS	
(b) Meteorological observation equipment			
1) Rainfall recorder	1	set	Automatic recording
2) Wind velocity/direction	1	set	Automatic recording
3) Sunshine duration meter	1	set	Automatic recording
4) Evaporation pan	1	set	Automatic recording
5) Temperature/Humidity	1	set	Automatic recording
6) Spair parts	1	LS	
(c) O&M equipment			
1) Office tools			
Tables/chairs	5	sets	
Desks/chairs	15	sets	
Lockers	12	sets	
2) Accomodation furniture	8	sets	
3) Computers incl. printer	2	sets	
4) Copy machine	1	set	
5) Tractors	3	cars	
6) 2 ton truck	1	car	
7) Pickup car	1	car	
8) 4-wheel jeeps	2	cars	
9) Motor bikes	2	units	
10) Spair parts	1	LS	
3 Soil Conservation Extension Center			
1) Office tools			
Tables/chairs	4	sets	
Computer incl. printer	1	set	
Copy machine	1	set	
2) Farm tool	1	LS	
3) 2 ton truck	1	car	
4) Pickup car	1	car	
5) 4-wheel jeeps	2	cars	
6) Motor bikes	2	units	
7) Spair parts	1	LS	

Table IX.2.11 Administration and Engineering Costs

(unit: '000 pesos)

Items	Description	Unit	Quantities	Construction Cost		Total
				Foreign Cost	Local Cost	
1 Pre-construction Works (Administration Cost)						
1)	Staff salary	M/M	32	-	250	250
2)	Office expenses	LS	1	24	96	120
	Sub-Total 1			24	346	370
2 Detailed Design						
(a) Administration Cost						
1)	Staff salary	M/M	72	-	563	563
2)	Office expenses	LS	1	24	836	860
	Sub-Total 2(a)			24	1,399	1,423
(b) Engineering Services						
1)	Engineering fee	M/M	27	6,890	140	7,030
2)	Direct cost	LS	1	3,120	2,080	5,200
3)	Laboratory tests/topographic survey	LS	1	0	1,200	1,200
	Sub-Total 2(b)			10,010	3,420	13,430
	Sub-Total 2			10,034	4,819	14,853
3 Construction Supervisory Works						
(a) Administration						
1)	Staff salary	M/M	206	-	1,611	1,611
2)	Office expenses	LS	1	72	1,258	1,330
	Sub-Total 3(a)			72	2,869	2,941
(b) Engineering Services						
1)	Engineering fee	M/M	69	14,310	420	14,730
2)	Direct cost	LS	1	6,480	4,320	10,800
	Sub-Total 3(b)			20,790	4,740	25,530
	Total 3			20,862	7,609	28,471
Total				30,920	12,774	43,694

Total M/M of construction supervisory works in 1996, 1997 is shown in Table.

Table IX.2.12 Required Man-Months of Administrative Staff

(unit:M/M)

Items	Description	Implementation Stage				Total
		Pre-const.	D/D	C/S (1996)	C/S (1997)	
1)	Managing Staff					
	1 Project Manager	1	6	6	12	25
	2 Senior Officer	1	6	6	12	25
2)	Technical/Administrative Staff					
	1 Irrigation Engineer		3	3	6	12
	2 Irri. Dev't Officer	6	3	3	6	18
	3 Civil Engineer		6	6	12	24
	4 Architect		3	6	2	11
	5 Agricultural Engineer		3	4	6	13
	6 Agricultural Technician		6	6	6	18
	7 Environmentalist		3	3	3	9
	8 O&M planner	18	3	5	3	29
	9 Account and Cashier		6	6	12	24
	10 Secretary, typist, and clerk	6	12	12	24	54
	11 Driver		12	12	24	48
	Total	32	72	78	128	310

Pre-const. : Pre-construction stage

D/D : Detailed design stage

C/S (1996) : Construction supervisory works in 1996

C/S (1997) : Construction supervisory works in 1997

Table IX.2.13 Required Man-Months of Consultant Engineers

(unit: M/M)

Items	Description	Man-Months		Total
		Foreign Consultant	Local Consultant	
I. Detailed Design Stage				
1	Project Director	1		1
2	Team Leader	2		2
3	Irrigation Engineer	3	4	7
4	Design Engineer	3	4	7
5	Cost/Planning Engineer	2	3	5
6	Topo-survey Engineer	1	2	3
7	Equipment Engineer	1	1	2
	Sub-Total I	13	14	27
II. Construction Supervisory Stage				
1 Construction in 1996				
1	Project Director	1		1
2	Team Leader	1		1
3	Design Engineer	1	6	7
4	Construction Engineer	6	6	12
5	O&M Planner		1	1
6	Equipment Engineer	1		1
7	Specialists as required	1	2	3
	Sub-Total II-1	11	15	26
2 Construction in 1997				
1	Project Director	1		1
2	Team Leader	1		1
3	Design Engineer	1	12	13
4	Construction Engineer	12	12	24
5	O&M Planner		1	1
6	Equipment Engineer			0
7	Specialists as required	1	2	3
	Sub-Total II-2	16	27	43
Total		40	56	96

Table IX.2.14 Unit Wages of Labours

(unit: pesos)

Items	Unit	Cost	Component		Unit Cost	
			Foreign (%)	Local (%)	Foreign portion	Local portion
1 Labour	md	173.89	0	100	0	173.89
2 Foreman General	md	234.92	0	100	0	234.92
3 Carpenter	md	215.71	0	100	0	215.71
4 Head of Carpenter(Labour)	md	234.00	0	100	0	234.00
5 Mason Worker	md	200.12	0	100	0	200.12
6 Head of Mason	md	289.17	0	100	0	289.17
7 Steel Worker	md	173.89	0	100	0	173.89
8 Head of Steel Worker	md	289.17	0	100	0	289.17
9 Asphalt Mix Worker	md	173.89	0	100	0	173.89
10 Driver(Light Equipment)	md	200.12	0	100	0	200.12
11 Operator(Heavy Equipment)	md	224.78	0	100	0	224.78
12 Mechanical	md	224.78	0	100	0	224.78
13 Electric Worker	md	215.71	0	100	0	215.71
14 Head of Mechanical	md	289.17	0	100	0	289.17
15 Driller	md	200.00	0	100	0	200.00
16 Blaster	md	200.00	0	100	0	200.00
17 Watchman	md	173.89	0	100	0	173.89
18 Janitor	md	173.89	0	100	0	173.89
19 Driver(General)	md	207.31	0	100	0	207.31

Source: National Irrigation Administration (mid-1994)

Table IX.2.15 Unit Prices of Construction Materials (1/2)

(unit: pesos)

NO.	Items	Unit	Cost	Component		Unit Cost	
				F(%)	L(%)	Foreign Cost	Local Cost
1	Aggregate						
	(a) Sand	cum	360	37	63	133	227
	(b) Gravel	cum	430	37	63	159	271
	(c) Boulder	cum	400	37	63	148	252
2	Sod		150	0	100	0	150
3	Lumber						
	(a) Form Lumber Ro	cum	13,770	0	100	0	13,770
	(b) Lumber KD	cum	16,950	0	100	0	16,950
	(c) Plywood 1/4&4*8	cum	17,535	0	100	0	17,535
	(d) Plywood 1/2&4*8	cum	18,134	0	100	0	18,134
	(e) Plywood 3/4&4*8	cum	17,078	0	100	0	17,078
4	Reinforced Iron Bar	kg	21	80	20	17	4
5	Nail,Bolt,Nut	kg	30	80	20	24	6
6	Hardware	kg	30	80	20	24	6
7	Cement(1bag=40kg)	bag	90	75	25	68	23
8	Bituminus coat or Tack Coat	kg	3	50	50	1	1
9	Asphalt	kg	26	50	50	13	13
10	Fuel						
	(a) Gasoline	lit	10.0	50	50	5.0	5.0
	(b) Diesel	lit	6.5	50	50	3.3	3.3
11	RC Pipe(l=1.00m)					0	0
	(a)D=150(6")	pc	120	57	43	68	52
	(b)D=200(8")	pc	150	57	43	86	65
	(c) D=250(10")	pc	200	57	43	114	86
	(d)D=300(12")	pc	300	57	43	171	129
	(e)D=350(14")	pc	400	57	43	228	172
	(f)D=450(18")	pc	480	57	43	274	206
	(g)D=600(24")	pc	700	57	43	399	301
	(h)D=700(28")	pc	900	57	43	513	387
	(i)D=800(32")	pc	1,250	57	43	713	538
	(j)D=900(36")	pc	1,500	57	43	855	645
	(k)D=1050(42")	pc	1,760	57	43	1,003	757
	(l)D=1200(48")	pc	2,000	57	43	1,140	860
	(m)D=1350(54")	pc	2,150	57	43	1,226	925
	(n)D=1500(60")	pc	2,500	57	43	1,425	1,075
12	Cement Products					0	0
	(a) Concrete Hollow Block 6"	pc	7	57	43	4	3
	(b) do 4"	pc	6	57	43	3	2

Source: JICA Study Team

Table IX.2.15 Unit Prices of Construction Materials (2/2)

(unit: pesos)

NO.	Items	Unit	Cost	Component		Unit Cost	
				F(%)	L(%)	Foreign Cost	Local Cost
13	Steel Plate	kg	37	80	20	29	7
14	H-Beam (kg/m)	kg	37	80	20	29	7
	(a) H-100*100*8.5 (17.6)	m	642	80	20	514	128
	(b) H-125*125*9.5(24.3)	m	887	80	20	710	177
	(c) H-150*150*10.5(32.0)	m	1,168	80	20	934	234
	(d) H-175*175*13.5(46.7)	m	1,705	80	20	1,364	341
	(e) H-300*200*12(64.2)	m	2,343	80	20	1,875	469
	(f) H-300*300*12(84.1)	m	3,070	80	20	2,456	614
	(g) H-400*400*12.5(146.0)	m	5,329	80	20	4,263	1,066
	(h) H-500*400*12.5(157.0)	m	5,731	80	20	4,584	1,146
	(i) H-500*400*6(185.0)	m	6,753	80	20	5,402	1,351
15	L-Beam (kg/m)	kg	37	80	20	29	7
	(a) L-20*20*3 (0.885)	m	32	80	20	26	6
	(b) L-25*25*5 (1.76)	m	64	80	20	51	13
	(c) L-30*30*5 (2.16)	m	79	80	20	63	16
	(d) L-40*40*5 (2.95)	m	108	80	20	86	22
	(e) L-50*50*6 (4.43)	m	162	80	20	129	32
	(f) L-60*60*7 (6.21)	m	227	80	20	181	45
	(g) L-70*70*8 (8.29)	m	303	80	20	242	61
16	Steel Pipe(SGP,l=5.5m)						
	1/2"	pc	270	80	20	216	54
	3/4"	pc	360	80	20	288	72
	1"	pc	520	80	20	416	104
	1 1/4"	pc	700	80	20	560	140
	1 1/2"	pc	870	80	20	696	174
	2"	pc	1,150	80	20	920	230
	2 1/2"	pc	1,740	80	20	1,392	348
	3"	pc	2,260	80	20	1,808	452
	4"	pc	3,170	80	20	2,536	634
	6"	pc	6,090	80	20	4,872	1,218
	8"	pc	7,300	80	20	5,840	1,460
	10"	pc	9,000	80	20	7,200	1,800

Source: JICA Study Team

Table IX 2.16 Budget Appropriations of the Governments Concerned (1/4)

(1) Annual budget appropriations of DA

1) Total budget

(in P'000)

	1990	1991	1992	1993	1994
Total	1,738,801	1,630,244	1,957,304	959,646	n.a.
- Agricultural Statistics	64,744	59,509	75,689	78,038	80,249
- Training od Extension	64,254	62,622	75,507	74,850	n.a.
- Coordination of Agriculture Research	7,665	8,019	10,792	11,368	n.a.
- Dev't. of the Livestock, Poultry & Dairy Products	82,947	81,720	89,908	89,953	58,411
- Dev't. of Plant Industry	55,443	52,720	59,940	64,952	n.a.
- Water Management and Soil Conservation and Development	63,690	58,666	64,678	70,255	n.a.
- Dev't of Fisheries / Aquatic Resources	58,039	55,413	63,359	61,566	n.a.
- Regional Operations	1,341,749	1,251,575	1,517,431	508,664	n.a.

n.a.: not available

2) Agricultural RESEARCH budget appropriations, DA

(in P'000)

Office	1988	1989	1990	1991	1992	1993
I. Regional Office	4,649	7,529	6169	5,493	17,658	14,951
II - do-	4,767	8,620	9364	8,398	9,625	23,614
III - do-	3,494	3,859	4,694	2,780	5,197	7,590
IV - do-	<u>8,190</u>	<u>12,592</u>	<u>12,600</u>	<u>11,230</u>	<u>19,398</u>	<u>20,958</u>
V - do-	4,314	8,256	9,000	8,098	10,245	7,815
VI - do-	5,696	6,307	8,529	7,690	15,831	16,025
VII - do-	3,911	4,566	4,813	4,701	20,197	20,215
VIII - do-	3,517	4,248	4,913	4,489	6,315	16,809
IX - do-	3,049	3,413	5,378	4,917	6,700	7,026
X - do-	3,227	5,605	6,138	5,727	10,859	8,662
XI - do-	3,565	5,380	6,484	5,878	6,331	6,810
XII - do-	2,503	2,959	4,630	4,082	5,847	3,545
CAR	-	691	5,703	4,105	4,629	2,099
BPI	11,125	5,309	22,864	n.a.	n.a.	n.a.
BSWM	3,579	6,859	6,547	n.a.	n.a.	n.a.
BAI	5,685	7,475	84,611	n.a.	n.a.	n.a.
BFAR	7,418	4,572	5,734	3,407	4,414	3,192
FIDA	n.a.	4,177	4,012	3,882	5,761	5,831
SRA	n.a.	10,670	7,983	55,000 a/	64,897	91,000 a/
PCA	n.a.	n.a.	54,780	69,165	78,962	86,067 a/
NAPHIRE	n.a.	3,884	5,000	4,439	6,153	-
PHILRICE	n.a.	40,730 a/	50,218 a/	55,592 a/	52,342 a/	65,000 a/

a/:Includes budget for training and extension

Source: On-Farm Research Manual, Overview and Directions of Agricultural Research

n.a.: not available

Table IX 2.16 Budget Appropriations of the Governments Concerned (2/4)

3) Agricultural TRAINING and EXTENSION budget appropriations, DA

(in ₱'000)

Office	1992	1993
I Regional Office	80,790	9,932
II - do-	66,085	66,45
III - do-	119,898	17,943
IV - do-	<u>128,294</u>	<u>13,207</u>
V - do-	93,717	14,920
VI - do-	88,162	8,785
VII - do-	67,778	6,278
VIII - do-	77,338	6,525
IX - do-	74,786	17,272
X - do-	78,440	9,206
XI - do-	71,039	8,139
XII - do-	70,819	15,660
CAR	39,905	7,682

Operational budget of Regional Offices has been directly distributed to Local Government Units since 1993.

(2) Annual budget appropriations of DENR

(in ₱'000)

Office	1990	1991	1992	1993	1994
DENR	4,549,610	3,737,663	3,057,019	3,562,754	4,838,731
PENROs, CENROs, City and Municipal Offices	861,926	807,763	1,069,768	1,259,993	1,712,942
Forest Management Bureau	351,324	330,104	420,051	470,066	893,964
Land Management Bureau	138,019	129,624	183,312	251,653	358,467
Mines & Geo-Science Bureau	46,755	42,559	59,395	57,919	94,965
Environmental management and Protected Areas & Wildlife Bureau	49,123	45,035	35,988	114,006	292,049
Ecosystem research & Dev't Bureau	32,190	29,195	38,745	38,108	73,497

Table IX 2.16 Budget Appropriations of the Governments Concerned (3/4)

(3) Annual budget of Municipalities

1) Nagcarlan

(a)	Revenue by source, general fund					(₱)
Revenue source	1990	1991	1992	1993	1994	
Revenue from taxation	1,758,470	2,681,872	5,436,065	9,001,495	12,369,164	
Operating & miscellaneous	629,500	632,000	192,100	738,583	509,000	
Total	2,387,970	3,313,872	5,628,165	9,740,078	12,878,164	

(b)	Distribution of expenditures, general fund					(₱)
Expenditure Function	1990	1991	1992	1993	1994	
General public service	1,242,805	1,820,278	4,011,910	9,483,932	9,387,327	
Economic services	233,400	347,364	1,302,160	72,000	1,845,827	
Other purpose	911,270	1,092,581	314,000	184,148	1,645,000	
Total	2,387,475	3,260,223	5,628,070	9,740,080	12,878,154	

2) Liliw

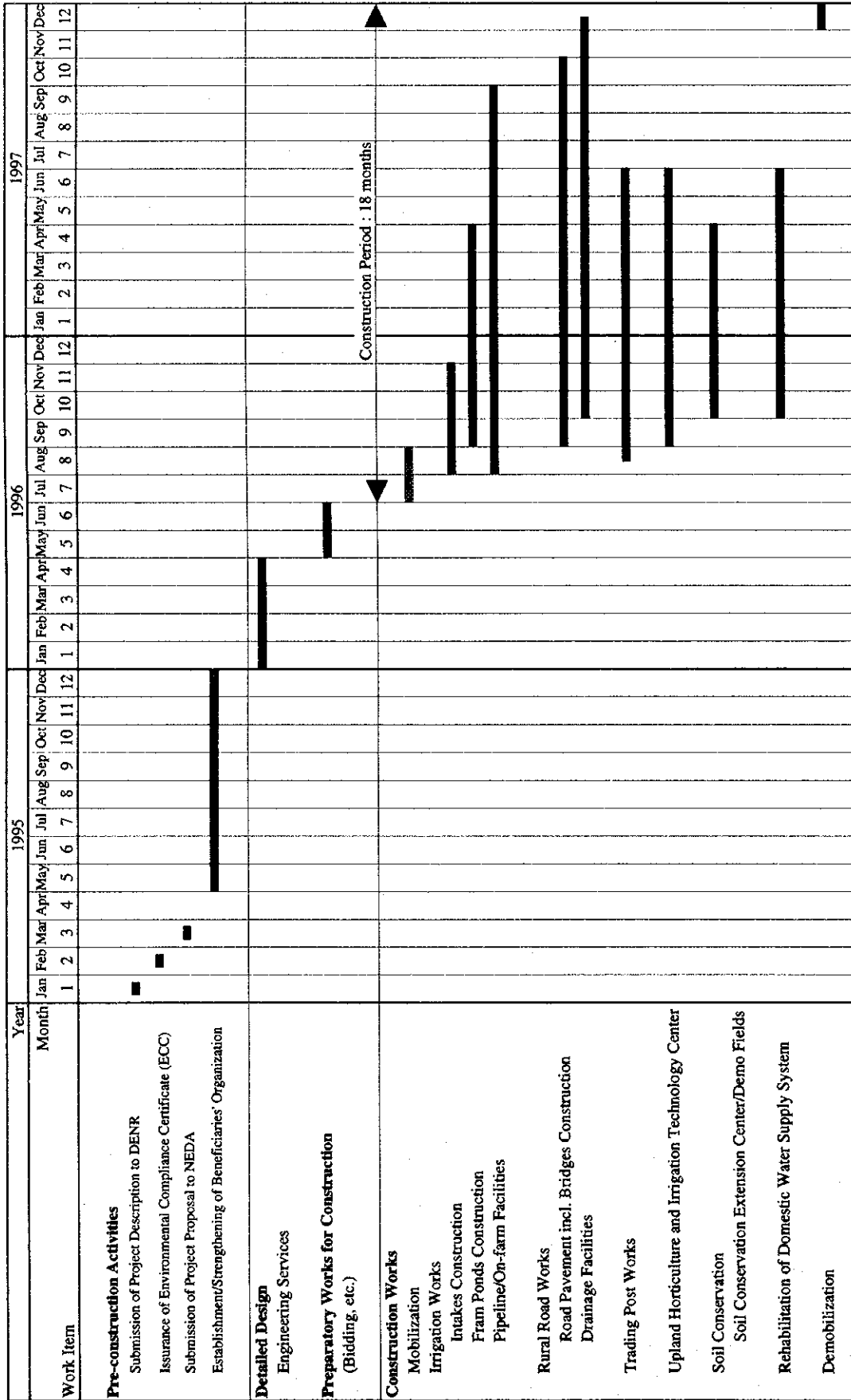
(a)	Revenue by source, general fund					(₱)
Revenue source	1990	1991	1992	1993	1994	
Revenue from taxation	1,643,235	2,438,111	3,452,161	5,662,140	8,088,811	
Operating & miscellaneous	377,826	522,700	733,500	713,086	589,638	
Total	2,023,061	2,960,811	4,158,661	6,375,226	8,678,449	

(b)	Distribution of expenditures, general fund					(₱)
Expenditure function	1990	1991	1992	1993	1994	
General public service	1,509,882	2,126,137	2,412,319	3,337,275	4,431,587	
Economic services	161,425	283,319	1,239,249	2,857,490	4,046,542	
Other purpose	136,088	406,203	204,655	31,100	209,320	
Total	1,807,396	2,815,659	3,856,225	6,225,865	8,688,449	

Table IX 2.16 Budget Appropriations of the Governments Concerned (4/4)

3) Majayjay

(a)	Revenue by source, general fund			(P)
Revenue source	1990	1991	1992	1993
Revenue from taxation	1,158,287	1,687,645	2,904,229	4,917,672
Operating & miscellaneous	306,339	462,841	386,925	579,876
Total	1,464,526	2,150,486	3,291,154	5,497,548



Project proposal shall be submitted to NEDA Central office with endorsement of Provincial Development Council (PDC), Laguna Lake Development Authority (LLDA) and Regional Development Council (RDC). Special permission issued by DENR Region office is required prior to commencement of construction works.

Fig. IX.1.1 Proposed Implementation Schedule

**FEASIBILITY STUDY ON
THE UPLAND IRRIGATION AND
RURAL DEVELOPMENT PROJECT
IN SOUTHERN LUZON**

APPENDIX-X

ENVIRONMENT

**FEASIBILITY STUDY
ON
THE UPLAND IRRIGATION AND RURAL DEVELOPMENT PROJECT
IN SOUTHERN LUZON**

**APPENDIX-X
ENVIRONMENT**

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APPENDIX-X ENVIRONMENT

1 Introduction

1.1 General

The Study area is located on the foot of Mt. Banahaw, where valuable natural ecosystem remains untouched and development has been proceeded. Development of the area is controlled by laws and regulations but it's necessary to uplift the living standard of the area. The development must be sustainable and attained without destruction of the environment, however.

In this feasibility study, the development plan was carefully formulated taking seriously environmental effects of the plan into account. This appendix explains the development issues of the uplands that had been deliberated in the study as well as the formulation process of the environmentally sustainable development plan. The detailed natural condition of the area such as flora and fauna is not described in this appendix. Extensive study must be performed to grasp these condition. This is beyond the scope and objective of the Study.

1.2 Department of Environment and Natural Resources (DENR)

The DENR was established in 1987 by reorganizing the Department of Environment, Energy and Natural Resources (DENR). It's task is to ensure the sustainable use, development, management, renewal and conservation of country's forest, mineral lands, offshore areas and other natural resources, including the protection and enhancement of the quality of the environment. The DENR is composed of eight Staff Offices, six Staff Bureaus, and the Field Offices which are composed of the regional, provincial (PENRO) and community natural resources offices (CENRO). The six Staff Bureaus and their major functions are:

- 1) Forest Management Bureau
Reforestation, range management, watershed rehabilitation, forest protection, timber management, and implementation of ISF program
- 2) Land Management Bureau
Land disposition, land surveys, and land record management
- 3) Mines and Geo-Sciences Bureau
Geological surveys and mining rights application and processing

- 4) Environmental Management Bureau
EIA processing and environmental quality monitoring
- 5) Ecosystem Research and Development Bureau
Technology generation and verification on the restoration, development and rehabilitation of deteriorating ecosystems and natural resources
- 6) Protected Areas and Wildlife Bureau
Management of protected areas, preservation of biological diversity, and maintenance of recreational sites

The organization structure of the DENR is given in Fig. X.1.1.

The Study area is under the jurisdiction of Region 4 office, PENRO Laguna, and CENRO Los Baños. With relation to the Project, the regional office is responsible for evaluating environmental impact documents and an application for the development of the Public Forest lands. The regional executive director has the authority to issue an Environmental Clearance Certificate (ECC) and a development clearance.

1.3 Environmental Impact Assessment System

The legal framework for environmental impact assessment (EIA) originated in the enactment of Presidential Degree No.1151 of 1977. A system for the preparation of environmental impact statement (EIS) was subsequently adopted pursuant to P.D. No.1586 of 1978. Further, Presidential Proclamation No.2146 of 1981 declared a number of environmentally critical projects and areas for which environmental impact documents must be prepared. At present project proponents are required to submit an EIS or Project Description (PD) when the projects fall within the following criteria:

- I. Environmentally Critical Projects (ECP)
 - A. Heavy Industries
 1. Non-Ferrous Metal Industries (the capacity \geq 3,000 ton/year)
 2. Iron and Steel Mills (the capacity \geq 30,000 ton/year)
 3. Petroleum and Petrochemical Industries (the capacity \geq 30,000 barrels/year)
 4. Smelting Plants (the capacity \geq 15,000 ton/year)
 - B. Resource Extracting Industries
 1. Major Mining and Quarrying Projects
 2. Forestry Projects (only for commercial-scale logging and wood processing project)
 3. Dikes for/and Fishpond Development Projects

C. **Infrastructure Projects**

1. Major Dams (the storage volume \geq 20 million m³)
2. Major Power Plants (the capacity \geq 10 MW, the capacity \geq 6 MW for hydro-power only)
3. Major Reclamation Projects (\geq 1.0 ha)
4. Major Roads and Bridges

II **Environmentally Critical Areas (ECA)**

- A. All areas declared by law as national parks, watershed reserves, wildlife preserves and sanctuaries
- B. Areas set aside as aesthetic potential tourist spots
- C. Areas which constitute the habitat for any endangered or threatened species of indigenous Philippine wildlife (flora and fauna)
- D. Areas of unique historic, archeological, or scientific interests
- E. Areas which are traditionally occupied by cultural communities or tribes
- F. Areas frequently visited and or hard-hit by natural calamities (geologic hazards, floods, typhoons, volcanic activities, etc.)
- G. Areas with Critical slope (\geq 40%)
- H. Areas classified as prime agricultural lands
- I. Recharged areas of aquifers
- J. Waterbodies (for domestic purposes and wildlife and fisheries activities)
- K. Mangrove areas
- L. Coral Reefs

For projects that fall within Environmentally Critical Project (ECP), project proponents must submit an EIS to Environmental Management Bureau (EMB) of DENR. For projects that are located in Environmentally Critical Area (ECA), project proponents must submit Project Description (PD) to DENR Regional Offices. The project proponents who submitted PD may be required later to submit an EIS if deemed necessary. The PD is a brief and inconclusive description of the project and its environmental impacts. On the contrary, the EIS is more comprehensive and includes the detailed description of the project, the prediction and assessment of impacts and project alternatives.

The EIS Unit of EMB is responsible for processing EISs of ECP. The EIS Unit of DENR Regional offices is responsible for those projects that fall within the ECA. During the evaluation process, an ocular inspection and further review by the EIS Review Committee may be carried out if necessary. Public hearing may also be conducted when the project would affect a large number of people or when public opposition against the project is great. An Environmental Compliance Certificate (ECC) is issued by the DENR Secretary or Regional Executive Directors to a project after having satisfied the process. Compliance monitoring will be conducted for all ECPs by the EMB and all other projects by the DENR Regional Offices.

1.4 Integration of Environmental Considerations into Project Formulation

In the traditional project planning, specific objectives were at first set-forth and then an project proposal were prepared based on the evaluation of alternatives. However, the evaluation was tended to focus on maximizing short term economic gains but neglect long-term environmental liabilities. This exercise often resulted in formulating environmentally unaccepted projects, as having been widely criticized.

"The Philippines Strategy for Sustainable Development (PSSD)" was approved by the Cabinet in 1989. The PSSD is the country's response to the world-wide call for undertaking development without destruction. It aims to achieve and maintain economic growth without depleting the stock of natural resources and degrading environmental quality. There are ten major strategies in the PSSD. Among them, "Integration of Environmental Considerations in Decision-Making" is particularly important in the formulation of development plans. (see Section 2.2 for the details of the PSSD)

In this feasibility study, the following steps were taken so as to ensure the implementation of the said strategy — integration of environmental quality considerations early in the project formulation.

1. Clarification of development potentials of the Study area
2. Clarification of problems and constraints for development
3. Setting project objectives
4. Identification of project components
5. Preparation of project alternatives
6. Identification of environmental, social and economical impacts
7. Identification of measures to mitigate or minimize the environmental impacts
8. Evaluation of alternatives
9. Formulation of the preliminary development plan
10. Consultation with related governmental agencies and project beneficiaries
11. Formulation of the final development plan

Particular emphasis was placed on early identification of environmental impacts and mitigation measures and coordination with DENR. Modification of development plan has been exercised to minimize negative environmental impacts while maintaining the expected positive impacts. Resulting development plan is expected to enhance economic development of the area without long-term environmental destruction, as described in chapters 4 and 6.

2 Issues and National Policies for Upland Development

2.1 Upland Development Issues in the Philippines

2.1.1 Uplands defined

The uplands is constituted of the mountain and foothill portions of the landscape. The uplands is defined as the lands with more than 18% slope by the former Bureau of Forest Management (the predecessor of the Forest Management Bureau of DENR). There is about 15.5 million ha of uplands in the Philippines, equivalent to about 52% of the country. The uplands was thought to be unsuitable for farming partly because soil erosion starts to become excessive when lands above 18% slope are cultivated, but be suitable only for forests and pasture.

2.1.2 Land classification

Revised Forestry Code of the Philippines (PD No.705, 1975) classifies public lands into two categories: Alienable and Disposable (A&D) lands and Public Forest lands. In principle, all public lands under 18% in slope are classified as A&D lands given to private ownership for agricultural, residential and industrial purposes. The rest, public lands above 18% in slope, are classified as Public Forest lands (or Timberland) and reserved for perpetual public ownership, unless they were categorized as one of the followings as of the effective of this Code:

1. lands covered by existing titles
2. lands covered by approved public land applications such as free patent under the Public Land Act
3. lands actually occupied openly, continuously, adversely and publicly for a period of more than 30 years

Forest lands are not necessarily for forest purposes. But, utilization of the Public Forest lands such as timber harvesting, grazing, crop cultivation, etc. is prohibited without a permission. Regarding the agricultural uses of the Public Forest lands, it is allowed under certain conditions when certified by the Integrated Social Forestry (ISF) Program. (see section 2.4 for the detailed explanation of ISF Program)

There is a great difference between the classification system and the substance. According to the land classification system, the uplands can be classified as Forest lands. Nevertheless, in practice, about 3.6 million ha of the uplands have been classified as A&D lands. This is about 23% of the total area of the uplands, or about 27% of the total area of A&D lands. Conversely, about 0.8 million ha of Forest lands is estimated to have slope under 18%, although most of this is found at higher altitudes.

2.1.3 Land use in uplands

The uplands were covered by thick forest long ago. However recently, large tract of sloping lands, which were once unsuitable for agriculture due to erosion hazard, are now put under cultivation due to limited arable land in lowland and population pressure on land. As of 1987, forests cover only 36% of the uplands, while 7.9 million ha or 51% of the upland are covered by grassland/bushland and other extensive land use. Intensive land use like croplands occupies 2.0 million ha or 13% of the uplands. It is estimated that 8-10 million of the Philippine total population are farming on the uplands.

Land use in the uplands in 1987

Land use	Area (million ha)	Proportion (%)
Forest	5.61	36.1
- Virgin forests	1.06	7.1
- Residual forests	2.92	18.7
- Mossy forests	1.39	9.0
- Pine forests	0.24	1.3
Grasslands/Bushlands	7.91	51.0
- Large grasslands	1.05	6.5
- Mixed with other uses	6.86	44.5
Croplands	2.00	12.9
Total	15.52	100.0

Source: The Master Plan for Forestry Development, DENR, 1990

2.1.4 Land tenure issues

Under the national law, the uplands are public and inalienable and are not subject to private ownership. At the local level, however, long-term residents can claim ownership rights of the public lands by virtue of their length of residency, tax declarations, and land improvements. Local courts frequently treat tax declaration as equivalent to titles, despite constitutional reservation of Public Forest lands to perpetual public ownership. Because of the unsecured land titles, farmers in the upland generally lack access to credit and extension support. Further, the lack of secure tenure or titling provides the farmers no incentive for land improvement or nutrient maintenance. This has led to the abandonment of large areas of forest lands after their fertility has been exhausted and their conversion to grasslands or bushlands.

The policy of central and local governments toward these squatters are not to expel them but to direct them to use the valuable natural resources in ecologically sustainable ways. So far, the Integrated Social Forestry (ISF) Program is an only program that enable to secure them for the rights to continuously occupy the Public Forest lands. National Physical Framework Plan (1993-2022) provides another possibility. It states that "Public Forest lands not classified under NIPAS can be utilized for agricultural purposes subject to soil conservation measures" although it also states that these lands shall not be classified as A&D lands. These program and plan well reflect the result of previous studies that secure land tenure most affect adoption or non-adoption of soil conservation measures.

2.1.5 Land degradation and socio-economic disadvantage

The farmers in uplands mainly employ traditional farming practices characterized by up-and-down slope tillage and clean and weed free culture. With high rainfall intensities, steep slope and lack of soil protection, soil erosion rates are very high there. Erosion leads to abandonment of fields and compensatory conversion of further forest areas to cultivation. In the downstream, erosion and unchecked rainfall runoff contributes to siltation in rivers and lakes, causes alternate floods and water shortages. In addition, many farmers cultivate crops in the uplands without legal right of doing so. This lack of secure tenure or titling in the uplands provides the farmers no incentive for land improvement or nutrient maintenance.

The socio-economic conditions in the uplands is worse than the lowlands. Agricultural production depends on rainfall. The cost of farm inputs is high. Access to credit is hardly available. Infrastructures are very limited and the delivery of basic services is difficult. Marketing of farm produces is inadequate and this puts the farmers at a disadvantage since they do not have good price information. Consequently, they get very low prices for their produces and their economic condition remains at the subsistent level.

2.2 Philippines Strategy for Sustainable Development

In February 1989, the Cabinet of the Philippines approved the conceptual framework of the "Philippine Strategy for Sustainable Development (PSSD)" in its Resolution No.37. The PSSD is the country's response to the "Sustainable Development" as defined by the World Commission on Environment and Development (WCED). The PSSD aims to achieve and maintain economic growth without adverse impacts on environment. There are ten strategies in the PSSD as follows:

- 1) Integration of environmental consideration in decision-making
- 2) Proper pricing of natural resources
- 3) Property rights reform
- 4) Conservation of biodiversity
- 5) Rehabilitation of degraded ecosystems
- 6) Strengthening of residual management
- 7) Control of population growth
- 8) Inducing growth in the rural areas
- 9) Promotion of environmental education
- 10) Strengthening of citizen's participation

The Cabinet resolution directs all the pertinent agencies to review their development programs and projects for consistency with the PSSD framework.

2.3 National Integrated Protected Area System (NIPAS)

In the Philippines, national parks and other protected areas such as bird and wildlife sanctuaries, watersheds, etc. have been subject to conflicting land uses: many were partially settled, logged or have been subject to illegal exploitation. Little information is available on the condition of the most protected areas, however.

The Congress of the Philippines enacted "National Integrated Protected Area System Act of 1992," so-called NIPAS Act. The objectives of the Act are to update data on protected areas in the Philippines and determine existing protected area which will continue to be protected and identify additional sites to be proclaimed as protected areas for biodiversity conservation, protected area management and sustainable development. The DENR subsequently issued Administrative Order No.25 which further set forth the rules and regulations governing implementation of NIPAS Act.

The NIPAS Act requires the DENR to evaluate the suitability of all the designated protected areas for inclusion in the NIPAS Act. At present the evaluation is undertaken with the fund of Global Environmental Facility (GEF) of the World Bank. After the evaluation and public hearings, the DENR will prepare final recommendations for the President and the Congress on the areas for inclusion as initial components under the NIPAS Act. The disestablishment of protected areas from the initial components will likewise be recommended to the President. The Congress will enact a law declaring such recommended areas as part of the integrated protected area system. Additional areas might afterward be included in the system if the areas have outstanding physical features valuable to protect. The component areas of the NIPAS will be administered by the DENR to protect and enhance the permanent preservation of its natural condition. Nature-destructive activities will be strictly controlled within the protected areas. Fines and penalties will be imposed for those who violate this Act or DENR's rules and regulations pursuant to this Act in addition to the requirements of restoration or compensation to the damage.

The NIPAS Act intends to strictly protect the remaining valuable natural environment as well as to help the present users of protected areas. For the latter purposes, the Act will establish multiple-use zones around some protected areas to be reestablished. For example, present agricultural use of the national park may be allowed to some extent if the area will be covered by the multiple-use zones and the use is consistent with the management plan of the protected areas. Land tenure may be granted to the users of the land.

2.4 Integrated Social Forestry Program

The Integrated Social Forestry (ISF) Program was launched in 1982 by Letter off Instruction (LOI) No.1260. The ISF program consolidated all social forestry programs initiated in 1970s such as Forestry

Occupancy Management Program (1975), Family Approach to Reforestation Program (1976), and Communal Tree Farming Program (1979). The major objectives of the ISF program are to improve the socio-economic conditions of upland farmers and communities, maximize upland productivity and enhance ecological stability.

The program can be adopted only in the area inside the Public Forest lands. The major features of the program are:

- Participants can enjoy the security of tenure over the land allocated to them for a period of 25 years, renewable for another 25 years, through the issuance of Certificate of Stewardship Contract (CSC).
- Participants are allocated the whole areas actually and directly cultivated by them but not exceed five hectares
- Participants are allowed to cultivate and develop the allocated land without fee provided that these activities do not result in the destruction of forest resources.
- Participants are not allowed to expand their clearings.

In addition to these, participant farmers are encouraged to develop farms combining trees and agricultural crops and protect adjacent forest areas. They can receive several services and assistance as a reward. These services include planting stock provision, training, infrastructure support, and credit assistance. The credit may be provided to income-generating projects to be carried out by the organizations of participants. The stewardship rights is canceled when program participants do not follow specific requirements such as protecting forest ecosystem.

The DENR is the responsible national government agency of the ISF program. Since the Local Government Code became effective, however, the implementation of the most of ISF projects has been undertaken by the municipalities subject to the supervision, control and review by the DENR. The DENR only implements at least one project per province as a model project. Other national government agencies also supports the ISF program when the programs provide technical and material assistance i.e., infrastructure development and educational and health care facilities. Major functions of the DENR and municipalities are summarized below:

DENR

- Identification and delineation of ISF projects
- Parcellary surveys
- Processing and issuance of the Certificate of Stewardship Contract (CSC)
- Monitoring and evaluation of all ISF projects
- Provision of information and education materials
- Training of participant farmers

Municipalities

- Information drive to encourage the participation
- Listing of participants
- Preparation of development plans
- Agroforestry development including adoption of soil and water conservation measures
- Training of participant farmers jointly undertaken with the DENR
- Strengthening community organization
- Provision of infrastructure and other program assistance in coordination with concerned national agencies

Until 1992, 204,419 CSCs were awarded in the Philippines in total. In cooperation with the Land Bank of Philippine (LBP) and other financial institution, credit and financial assistance was extended to 36 income generating projects benefiting 1,313 participants. Since the enactment of Comprehensive Agrarian Reform Law (CARP), ISF program is one of the main programs of CARP that do not effect land transfer but provide rights of use.

In spite of these achievement, the ISF program has hampered by lack of DENR's staff supervising ISF projects, lack of local government's fund required for the provision of infrastructure and other services. Therefore, the objectives of the program — improvement of the socio-economic and environmental condition of the uplands — have not been attained enough.

3 Present Environmental Conditions of the Study Area

3.1 Physical Environment

3.1.1 Climate

The Study area is classified as climate Type IV having distinct dry and rainy seasons. The dry season starts in November and ends in April, while the rainy season lasts from May to October. Mean Monthly rainfall and temperature in and around the Study area are shown below:

Mean Monthly Rainfall (mm) and Temperature (°C)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Rainfall													
Los Baños	46.2	20.9	29.9	35.1	160.7	237.6	267.7	254.8	242.1	274.8	251.0	159.3	1,980.2
Liliw	67.2	31.0	33.2	121.8	219.6	327.3	276.1	134.4	279.2	368.8	321.2	204.5	2,384.3
Temperature													
Los Baños	25.1	25.6	26.8	28.4	29.0	28.3	27.7	27.5	27.4	27.1	26.5	25.5	27.1

Observation period of Liliw was 3 years (1979 to 1981)

3.1.2 Water resources

There are seven (7) rivers, namely, the San Diego and the Nagcarlan rivers in Nagcarlan Municipality, the Oples, the Liliw and Bancal rivers in Liliw Municipality, and the Maimpis and the Olla rivers in Majayjay Municipality. Out of these rivers, the San Diego, the Olpes and the Bancal rivers dry up in the dry season, whereas the Nagcarlan, the Liliw, the Maimpis, and the Olla rivers are perennial. The discharges of the Liliw and Maimpis rivers during the dry season are 0.23 to 0.25 cu.m/sec and 0.30 to 0.35 cu.m/sec respectively.

In the Study area, there are four springs having considerable yield: Bukal spring in Nagcarlan with the yield of 0.040 to 0.045 cu.m/sec, lower Luquin spring with 0.200 cum/sec, upper Luquin spring with 0.070 cu.m/sec, and Maimpis river spring with 0.200 cu.m/sec. Currently the water from the springs are used for domestic purposes only.

3.1.3 Land resources

(1) Soil

The soils of the Study area are derived from pyroclastic and volcanic tuffaceous materials. Three soil series are identified in the Study area, namely, Abo, Alipit and Bukal soil series. The areas of each soil series are shown below:

Soil Classification of the Study Area

Soil Series	(Unit: ha)			
	Nagcarlan	Liliw	Majayjay	Total
Abo Series	505	200	0	705
Alipit Series	70	465	175	710
Bukal Series	975	0	0	975
Miscellaneous Land	230	305	75	610
Total	1,780	970	250	3,000

Source: Soil survey carried out by the JICA Study Team.

Remark: Miscellaneous land includes residential area, rivers/creeks and river terrace escarpment. The area of the National park is tentatively included to municipal area.

The characteristics of the soils are fine in texture except Bukal series, moderately deep, and well drained.

(2) Land suitability

Land suitability for crop cultivation is largely determined by land slope. According to the results of the land suitability classification for diversified crop cultivation, the land in the Study area can be classified as moderately suitable (about 900 ha), marginally suitable (660 ha) and not suitable (about 830 ha) as shown below:

Land Suitability Classification for Vegetable Cultivation

Land Suitability Class	Nagcarlan	Liliw	Majayjay	National Park	Total (Unit: ha)
Moderately Suitable	504	178	164	59	905
Marginally Suitable	283	245	3	129	660
Not Suitable	164	84	0	577	825
Miscellaneous Land	231	265	83	31	610
Total	1,182	772	250	796	3,000
				790	

Source: Soil survey carried out under Phase I period.

Remarks: Miscellaneous Land includes settlement area, river/creek and river terrace escarpment.

(2) Land slope

More than 60% of the lands in the Study area have more than 18% slope as shown below:

Land Slope Classification

Land Slope	Nagcarlan	Liliw	Majayjay	Total (%)
3 - 8%	228	13	9	250 (8)
8 - 15%	311	193	111	615 (21)
15 - 18%	105	91	29	225 (7)
18% <	1,136	673	101	1,910 (64)
Total	1,780	970	250	3,000 (100)

Remarks: Based on the topographical maps (1/4,000).

The area of the National park is tentatively included to municipal area.

The Study area is potentially susceptible to severe soil erosion because of the steep slope, although the present erosion hazard is slight or moderate due to existence of surface cover such as forests, coconut and weeds. For the intensive agricultural use of the lands, farmers must adopt adequate soil conservation measures to minimize soil erosion.

3.1.4 Soil erosion

The Erosion Map prepared by Bureau of Soils and Water Management in 1990 shows that the high-altitude areas including the national park and a part of Public Forest lands have slight erosion potential, despite its very steep topography. This could be due to the thick vegetation cover. On the other hand, the map indicates that coconut and vegetable farms have moderate to severe erosion potential.

According to the field reconnaissance and interviews to farmers, however, it is speculated that vegetable farms located in denuded steep slopes (between El. 650 and 900 m) are the most susceptible to soil erosion because the farms, not all the farms, are not protected by vegetation covers or soil conservation measures and thus exposed to heavily intensified rain in the rainy season. Actually the evidences of gully erosion are observed in some areas. On the contrary, it is also speculated that the soil loss from the coconut farms and vegetable farms under coconut trees is not high due to the vegetation covers.

No soil loss measurement has been undertaken in the Study area. However, the soil loss measurements done by UPLB under the conditions similar to the Study area can be referred to in order to understand the relationship between soil loss and farming practices. The measurements was conducted in Tranka, municipality Bay, Laguna during the period between 1989 and 1991. They were carried out on the sites with 15 to 29% in slope and with the soils of Lipa Clay Loam. Four cropping treatments including a traditional practice of upland farmers were tested. The results are as follows:

Results of Soil Loss Measurements

Treatment	(unit: t/ha)		
	1989	1990	1991
T1	124	198	99
T2	40	25	4
T3	3	5	0.4
T4	0.2	5	0.1
Rainfall (mm/yr)	2,220	2,769	2,072
T1:	Farmers' practice involving up-and-down slope tillage operation and clean or weed free culture		
T2:	Alley cropping with contour tillage, and the crop and weed residues were removed from the soil		
T3:	Alley cropping with contour tillage, and the hedgerow trimmings and crop residues were used as mulch		
T4:	Alley cropping with no tillage, and the hedgerow trimmings and crop residues were used as mulch		

The results show that soil loss is very large in the traditional farmer's practice (T1), while it is markedly reduced when conservation tillage and surface cover are combined. Adoption of soil conservation measures is overemphasized from the results.

According to the municipal agricultural technician of Municipality Nagcarlan, farmers began to adopt soil conservation measures such as contour cropping and soil loss from the farms has been decreasing, particularly in the lower part of the Study area.

3.1.5 National park in the Study area

The Study area includes a part of Mts. Banahaw-San Cristobal National Park, which covers about 800 ha of the Study area, as shown in Fig. X.3.1. The national park was once selected as priority protected areas by DENR-NGO sponsored technical workshop on IPAS because of its valuable biodiversity. Mts. Banahaw-San Cristobal National Park has an area of 11,133 ha. It had been managed by DENR until 1987. However, Executive Order No.224 (July, 1987) gave the National Power Corporation (NAPCOR) the complete jurisdiction, control and regulation over the Makiling-Banahaw Geothermal Reservations, which covers about 70% of the National Park area including the whole Study area (Fig. X.3.2). This implies, at present, about 30% of the National Park area is under DENR, the remaining 70% under NAPCOR. The National Park within the Study area is currently under jurisdiction of NAPCOR.

A national law prohibited any development activities within national parks without a permit. Nevertheless, the land of the national park within the Study area have been partly cleared and used for vegetables and tree crop cultivation by illegal occupants coming from the downstream area. The number of the occupants, the area occupied and average length of occupancy by related barangays are tabulated below:

Forest Occupants

Barangay	No. of occupants	Total occupied area (ha)	Ave. occupied area (ha)	Ave. length of occupancy
Illayang Sungi, Liliw	19	49.1	2.6	12.8 yrs
Luquin, Liliw	27	26.1	1.0	11.0 yrs
Novaliches, Liliw	17	12.5	0.7	8.4 yrs
Bukal, Nagcarlan	87	122.5	1.4	21.1 yrs

Source: Census/Inventory of Forest Occupants within Mts. Banahaw-San Cristobal National Park, CENRO, Los Baños, Laguna, 1991

Remarks: It is not clear if all of these areas are located within the Study area.

The land use survey in this Study estimates that there are about 95 ha of farm land in the national park within the Study area.

3.1.6 Water pollution

There is an increasing concern, particularly in vegetable producing area, that the overuse of agro-chemicals and fertilizers could affect water quality. However, farmers in the Study area have been advised to use more organic fertilizer such as chicken manure than chemical ones, or apply less agro-chemicals. Therefore, it is unlikely that the use of agricultural inputs causes serious water pollution in the Study area.

3.1.7 Pesticide residues in vegetables

Over application of pesticides pose health risks to consumers in the form of high accumulation of pesticide residues in food. A study by the National Crop Protection Center in Laguna and Calamba (1987) shows that occasionally vegetables (string beans) sold in market may contain residue level that are higher than maximum residue levels set by FAO/WHO. It happens because farmers tend to apply more frequently when harvesting neared. This indicates the necessity of extension services teaching vegetable-producing farmers proper farming practices.

3.2 Biological Environment

3.2.1 Vegetation

The Study area is classified into two: Public Forest lands including the area of Mts. Banahaw-San Cristobal National Park and A&D Lands. The Public Forest lands are located at higher elevation (approximately beyond El. 650 m) and covers about 40 % of the Study area (See Fig. X.3.1). The Public Forest lands on the slope of Mt. San Cristobal, south-western part of the Study area, are covered with grass and shrubs. The lower

portion of the Public Forest lands on the foot of Mt. Banahaw (approximately between El. 650 m and 900 m) is denuded by forest occupants. Some area is used for vegetables and tree crops production while others are abandoned, according to the field survey. The mossy and old-growth dipterocarp forests are observed in Mt. Banahaw with the elevation beyond about 900 m. It covers about 5 % of the Study area. The major species in the forests are red lauan, white lauan, marave, tanguile, and mayapis. According to DENR, there is no rare, endangered, or threatened flora in and around the Study area.

In A&D lands, coconut farms are dominant land use. Banana, lanzones, coffee and vegetables are inter-cropped with coconut.

Two reforestation projects and one agro-forestry projects have been planned or implemented in and around the Study area as shown in Fig. X.3.1. They are all small-scale projects with the targeted areas of between 30 and 50 ha.

3.2.2 Wild animals

Wild animals are rarely observed in the lower portion of the Study area because the most of them inhabits within the forest of Mts. Banahaw-San Cristobal National Park. According to DENR staff, the major species are round lizard, wild pig, wild owl, and wild pigeon. Wild deer widely inhabited in the area was almost cleared out due to hunting. At present, there is no endangered or threatened wild animals in and around the Study area.

3.3 Socio-economic Environment

3.3.1 Demography

The Study area covers parts of Nagcarlan, Liliw and Majayjay municipalities. Total population in the three municipalities is about 75,500 with 15,200 households as of 1990. The average household size is thus 5.0 persons. There are 15 barangay in the Study area with the estimated total population of about 8,000, according to the survey conducted by JICA in 1994. Out of 1,727 households in the Study area, 1,340 are farm households.

3.3.2 Economic conditions

According to the farmers' household survey, the average family income is estimated at about ₱50,000 per annum as follows:

Average Family Income

Source of Income	Average Income per Family (₱)	(%)
Vegetables	20,400	40.8
Coconuts / Tree crops	6,100	12.2
Livestock / Poultry	1,500	3.0
Off-farm income	22,000	44.0
Total	50,000	100.0

Source: Based on the farmers' household survey carried out by JICA Study Team under Phase I

Taking the estimated family income and average family size (4.65 persons/family) in the Study area into account, per capita net income is calculated at ₱10,700 per annum. It is about 46% higher than the national poverty threshold income in 1991.

3.3.3 Land tenure and holding size

The lands of the Study area are public lands (lands of public domain). According to a land classification map (scaled 1/60,000) of FMB (Forest Management Bureau of DENR) prepared in 1987, it is estimated that the A&D and Public Forest lands in the Study area are 1,810 ha and 1,190 ha, respectively. Out of the Public Forest lands (1,190 ha), about 800ha belongs to Mts. Banahaw-San Cristobal National Park as shown Fig. X.3.1.

In the A&D lands, the ownership of present users has been recognized by municipalities by means of free patent, titles, or tax declaration. The A&D lands are subject to land redistribution under the Comprehensive Agrarian Reform Program (CARP). Contrary to the A&D lands, ownership of the Public Forest lands is a bit complicated. Under national law, the present users of the Public Forest lands do not have any rights on land in spite of the fact that they have been cultivated the lands for decades. However, at the local level, the ownership right of the present users has been recognized by virtue of tax declaration and length of residency.

Average land holding size of farm household is estimated at 1.5 ha based on the area of total agricultural land and total farm household in the Study area.

4. Environmental Considerations in Project Formulation

4.1 Needs of the Project

(1) Development issues and constraints

Development constraints in the Study area are summarized as follows:

(1) Lack of irrigation system

Vegetables are grown only during the dry cool season from December to April. In this main cropping season, serious drought damages of crops are observed due to lack of irrigation facilities. Most of farmers have very small farm ponds or water tank and use the limited water for irrigation only during the time of transplanting. Availability of water for irrigation is very limited.

(2) Poor farm-to-market road network

Farm-to-market road network in the area is poor. Most of the existing main roads in the area are ragged (not cemented), and are not passable by jeep during the rainy season. There is no secondary road connecting farms and main roads. Only very limited number of narrow and steep foot paths exist in the Study area.

(3) Low cropping intensity during rainy season

Vegetable cultivation during the rainy season is very limited. Only sweet potato and other water-resistant crops can be grown under the prevailing technologies. Major reasons for low cropping intensity are (1) lack of suitable varieties of vegetables for the rainy season, (2) lack of appropriate technologies for pest and diseases control, (3) lack of appropriate structure to present the crops from continuous rainfall, and (4) lack of soil erosion control measures in case that farmers grow vegetables during the rainy season.

(4) Predominance of steep land with a slope more than 18%

More than 60% of land in the area have steep slopes more than 18%. However, any erosion control measures have not been taken so far. Soil erosion during the rainy season is serious.

(5) Low crop yield

Despite the endowed favorable natural conditions, crop yields are generally low. Reasons for the present low yields are manifold, however, decisive factors are (1) lack of irrigation facilities, (2) high cost of farm inputs and thereby low level of input use, and (3) use of low quality seeds.

(6) Low farm-gate prices of vegetables

Vegetable production in the Philippines is highly seasonal, because most of marketable vegetables come from seasonal cropping in lowland after rice/corn harvest during the period from January to May. The prices of vegetables are low during this main harvesting season and become very high during off-season from June to December. Harvesting season of vegetable in the area coincides with low price season.

(7) Poor marketing system

During the harvesting season, vegetables are carried by farmers from farm to the nearest trading posts, and sold directly to the wholesalers and/or their agents who come from outside mainly from Manila at the trading posts. Prices are determined solely by the buyers. Farmers are very weak in position for determining the prices, because they have no facilities to store their products and are isolated from the latest information on wholesale prices in Manila. Farmers have no transportation means to carry their products to Manila.

Combined effects of the above constraints, as commonly observed in the uplands in the Philippines, are as follows:

- 1) Destruction of forest resources in Mts. Banahaw-San Cristobal National Park.
- 2) Land degradation due to the combination of high erosion potential of the lands and prevailing farming practices that are not oriented to soil conservation.
- 3) Socio-economic disadvantages due to lack of infrastructure and unfavorable natural conditions.

(2) Needs of the Project

There are many discussions on the issues and manifold measures such as ISF program and reforestation programs are executed. However, in parallel with these on-going programs, the fundamental issue that general poorness of the farmers causes the above-mentioned problems in the uplands should be considered. Security of land tenure that the ISF program provides is needed, but it alone can not solve various problems of the uplands. Provision of various infrastructures such as farm-to-market roads and irrigation facilities is also needed for uplifting the upland rural incomes so that the farmers can live on within the limited farmland, without further destruction of the forests. Ancillary works and services for supporting the farmers to realize the improved farming and marketing are also needed at the same time. In other words, an integrated all-in-one project including all the necessary components is needed in order to improve the welfare and livelihood of the upland farmers and thereby to preserve or even enhance the quality of the natural environmental resources in the area.

4.2 Environmental Considerations

In the light of the PSSD, the strategies for project formulation from the point of view of environmental preservation were set-up as follows:

- 1) Economic as well as environmental concerns should be addressed simultaneously in the process of project formulation.
- 2) Remaining natural forest in the area should be untouched. Restoration must be thoroughly carried out if it is damaged by the project.
- 3) The agricultural development potential of the area should be maximized through combination of the extension of appropriate farming practices, provision of infrastructure, and establishment of institutional support.
- 4) Extension and demonstration of soil conservation practices should be included in the Project to enable farmers understand the importance and the effectiveness of the practices.
- 5) Farmers' participation in project formulation should be promoted to enable them recognize problems and the solutions and to ensure their active cooperation to project implementation.

Besides the alleviation of various development constraints, following matters were seriously considered in formulating the project for the environmental preservation and ecologically sustainable agriculture:

- 1) prohibiting further destruction of natural forest
- 2) restoring sites damaged by the project
- 3) thorough application of soil conservation measures to vegetable farming
- 4) encouraging minimum use of chemical fertilizers and the use of organic fertilizers
- 5) establishing farming practices or varieties that enable minimum use of agro-chemicals
- 6) providing access rights over the use of the Public Forest lands to the present occupants

4.3 Initial Project Components

Initial project components proposed at the end of Phase-1 study were as follows:

- 1) Irrigation development
- 2) Improvement of marketing activities
 - Improvement of existing Barangay roads
 - Construction of secondary roads which connect farms to Barangay roads
 - Construction of skyline cables
 - Construction of trading posts
- 3) Agricultural research and extension
 - Construction of demonstration and research farms and related facilities
- 4) Soil conservation
 - Establishment of demonstration farms of soil conservation measures
- 5) Rehabilitation of domestic water supply system

In the course of the feasibility study, the above project components were re-considered and modified. The final features of the project components were developed through the process of integrating environmental consideration in project formulation, as described hereinafter.

4.4 Identification of Probable Environmental Impacts and Mitigation Measures

Among the project components described in the previous section, only irrigation and road improvement may impose significant negative environmental impacts unless mitigation measures are taken. The prospective environmental impacts of irrigation and road improvement, and their mitigation measure are tabulated in Tables X.4.1 and X.4.2 and explained hereinafter.

(1) Irrigation development

The proposed irrigation component consists of two different systems: one covers the areas of Municipality of Nagcarlan; another covers Municipality of Liliw. The both system will involve the construction of a intake structure, pipelines and concrete storage tanks. In addition, the Nagcarlan irrigation system might need a new access road because there is no road to the proposed intake site. The Nagcarlan system will have the intake structure right below the Bukal spring at El. 900 m. The spring is located within the Mts. Banahaw-San Cristobal National Park and has been used for domestic water sources of Municipality of Nagcarlan. The Liliw system will have a intake structure right below the Luquin springs at El. 600 m. The springs are presented within A&D lands.

The construction will cause alterations of existing topography and removal of vegetation. The resulting environmental impacts would be soil erosion. Construction in the rainy season or improper construction methods can particularly cause significant soil erosion. Efforts will be needed to minimize the adverse impacts and to restore the damaged environment after the construction. The access road in the Nagcarlan system, if constructed, might accelerate illegal logging in and migration to the National Park area, which lead to further destruction of natural vegetation. Special care must be taken to prevent these activities.

Environmental impacts of irrigation on the quantity of water would be small. In Bukal spring, the water has been used for drinking and other domestic purposes. Since the proposed intake for irrigation will be constructed in the downstream of the existing intake for domestic water supply, the quality of the domestic water would not be affected. The Bukal spring is estimated to yield 0.04 cu.m/sec in the dry season. Downstream use of the spring water is unknown because the water is underflowed at El. 800 m after running down the Nagcarlan river. No river water is observed in the Nagcarlan river between El. 800 m and 450 m in the dry season. It is speculated, however, that the use of the spring water for irrigation and domestic purposes would not affect the availability of water in the downstream because of the small quantity of the spring discharge.

On the other hand, deterioration of river water quality below the proposed irrigated area would also be moderate. But this can be overcome by minimizing use of water, fertilizer and agro-chemicals.

The main positive environmental impact would be increase in vegetable production. This would lead to substantial increase in the income of beneficiaries and result in improvement of their life style.

(2) Road improvement

The preliminary plan proposed to improve all the existing Barangay roads in the Study area (main roads) and newly construct the roads connecting the existing Barangay roads with farms (secondary roads). Both roads will be concrete-paved and related structure such as drainage ditch and culverts will be constructed. Slope protection works were proposed to perform when necessary. In addition, the construction of skyline cables was proposed to improve marketing activities in remote areas.

The major negative environmental impact associate with the road construction and rehabilitation is soil erosion. Construction in the rainy season, or improper construction methods which leave soil exposed unnecessarily, would cause significant soil erosion. Drainage from roads would impose adverse impacts on adjacent lands and rivers, if drainage system will not be designed properly. The disposal of cut and fill materials must also be made in a right way to prevent adverse impacts. Special care must be taken for the siting of secondary roads, otherwise large-scale destruction might occur through slips and landslides.

The road improvement would directly contribute to ease transportation workloads. It would also reduce crop damages during transportation and thus increase the crop values. It would indirectly activate marketing,

promote the development of adjacent areas, and improve the living condition of the area. In addition, construction of the project would offer more employment opportunity.

4.5 Public Consultation

For the sustainability of the project, participation of beneficiary farmers in plan formulation is inevitable. It could ensure their active cooperation to project implementation. Public consultation was conducted during the Phase-2 study period after preparing preliminary development plan. This was done following a strategy for the formulation of this project.

In the public consultation, the development concept and proposed plan were explained and a discussion with the prospective beneficiaries of the Project was made. Almost all attendants at the public consultation meetings showed good understanding and general acceptance on the plan. They also expressed their opinion for further improvement of the development concept and plans. These opinions were carefully examined to make the development plan more realistic, attractive and acceptable to the prospective beneficiaries. The major opinions given to the Study Team and the Team's considerations on them are summarized in Table X.4.3.

4.6 Modification of Project Designs

In addition to the public consultation, meetings were held with the NIA, the concerned agencies and the local government offices in due course. On the basis of the foregoing, modification of the project components were made as stated below.

(1) Irrigation development

According to the public consultation survey, 11 % of the farmers did not accept the proposed irrigation component because they will not be beneficiaries. Since the water resources are limited, it is decided not to change the original plan.

(2) Improvement of marketing activities

The results of the public consultation survey indicate that only 4 % of the farmers opposed to the proposed road components. However, the construction of secondary roads and skyline cables were canceled because they may accelerate the access to National Park area and further clearance of the Public Forest lands.

(3) Agricultural research and extension

One of the project components, agricultural research and extension , was revised to function as agricultural training and extension.

(4) Soil conservation

It is decided to establish a tree nursery center in Municipality of Liliw in order to encourage adoption of soil conservation measures by distributing nursery to farmers. Operation and maintenance of the center will be made by PENRO under DENR.

(5) Rehabilitation of domestic water supply

Domestic water supply systems are well facilitated in the Study area. But, rehabilitation of water diversion works and uppermost conduits at the Nagcarlan and the Liliw rivers will be made for efficient use of water.

The major changes on the Project components are summarized in Table X.4.4. In addition to the modification of project components, it was decided to employ some impacts mitigation measures to minimize negative impacts as explained below:

(1) Irrigation

The creation of new construction road reaching the Bukal spring was canceled due to the significant direct and indirect environmental impacts as well as the request from the concerned municipalities. The construction of irrigation facilities would be done employing the mitigation measures proposed in Table X.4.1.

Deterioration of river water quality below the proposed irrigation area would be small because proposed irrigation practice envisaged in the Project would use only small quantity of water per hectare and the proposed farming practices would encourage minimum use of fertilizer and agro-chemicals.

(2) Road improvement

The major negative environmental impacts associate with the road improvement is soil erosion. The mitigating measures would be taken to minimize it: Construction would be undertaken employing proper construction methods to avoid significant soil erosion. Drainage system of the proposed roads would be designed and constructed properly. The disposal of cut and fill materials would be made in a right way to prevent adverse impacts.

5 Plan for Soil Conservation

5.1 General

Located in mountain slope and with seasonally concentrated rainfall and frequent typhoons, the Study area are susceptible to soil erosion. Vegetable farms have the highest erosion potential in the area due to the

scarce vegetation cover and the prevailing farming practices which are not oriented to soil conservation. Adoption of soil conservation techniques particularly in vegetable farming is a must in the Study area in order to achieve sustainable agricultural development.

The promotion of soil conservation measures is an important project component. The conservation measures can be seen as a part of farming practices in characteristics and thus farmers must apply them by their own efforts. Thus, the proposed project should support the farmers for the adoption by means of demonstration and transfer of the techniques through extension.

5.2 Proposed Soil Conservation Measures

There are three types of soil erosion control measures, namely (1) vegetative measures, (2) structural measures, and (3) cultural measures. They all have merits and demerits. To identify measure(s) suitable for the proposed project area, following matters was particularly taken into account:

- 1) the measure(s) shall be simple and less costly so as to enable farmers to adopt
- 2) the measure(s) shall target not only soil erosion control but also nutrient replenishment and moisture conservation

The descriptions of soil erosion control measures and their merits and demerits are summarized in Table X.5.1. The measures are illustrated in Fig. X-5.1 to X.5.4. In general, vegetative measures are easy and less expensive to establish and repair compared with structural measures. In addition, vegetative measures can improve the soils if nitrogen fixing trees are used for hedgerow and the leaves and cuttings are used as green manure and mulching materials. On the other hand, they are less effective in very steep slopes and difficult to attain erosion control effect immediately after the establishment. The structural measures have the characteristics almost opposite to the vegetative measures, i.e., difficult and expensive to construct and maintain but become effective right after the establishment. The cultural measures are the ones already or potentially mingled in the vegetative and structural measures.

In the Philippines, adoption of vegetative measures, particularly SALT, has been promoted by both Department of Agriculture and DENR because of the easy and cheap natures of the measures. In Laguna province, PENRO has promoted the adoption of SALT and contour hedgerow in ISF projects. Taking into account of these experiences and a fact that the most of the existing vegetable farms are not located in very steep slope in the Study area, vegetative measures such as contour hedgerow, wattling and SALT should be taken as proposed soil conservation measures in the Project.

5.3 Plan for Demonstration and Extension of Soil Conservation Measures

(1) Demonstration farms

The proposed project will create demonstration farms of soil erosion control technologies at several sites in the area. The main objectives are field trials/demonstration and easy understanding of the soil erosion control technologies by farmers through learning by showing. This approach is based on the philosophy that farmers readily adopt to new methods if they are shown how to do and results are readily observed. The adoption should be further encouraged through extension support.

The proposed sites were chosen from the existing farms taking into account followings:

- 1) existing farms located in steep slope
- 2) easy accessibility for high demonstration effects, and
- 3) willingness of the owners of the sites to cooperate.

A total of 12.2 ha of demonstration farms was chosen at nine (9) sites comprising of 3.6 ha in Nagcarlan, 7.3 ha in Liliw and 1.2 ha in Majayjay.

The technologies to be demonstrated were selected from ones mentioned in the previous section, depending on the physical condition of the sites. More than two measures should be demonstrated at a site to enable the target farmers to select one(s) fit to them. The demonstration farms should be run by the owners under the technical assistance of extension agents. The owners will be trained beforehand to manage the farms.

(2) Soil Conservation Extension Center

In order to effectively transfer the technologies to the farmers, it is proposed to establish "Soil Conservation Extension Center". This Center will function not only to train farmers but also as to produce tree nurseries to be provided to farmers and as a base of extension agents. The Center is proposed at Liliw because:

- 1) Many existing farms in Liliw are located in very steep land.
- 2) ISF program was already started and CENRO established a temporary office to supervise the program in Liliw.

Preliminary designs of the Soil Conservation Extension Center are given in Appendix-VIII.

5.4 Operation and Management Plan

The proposed demonstration farms will be operated and maintained by the owners under the technical and material support from PENRO in Laguna province of DENR. PENRO will train the owners to properly manage the farms. In addition, PENRO will periodically provide extension services to target farmers.

PENRO will have prime responsibility for the operation and maintenance of the proposed Soil Conservation Extension Center. Municipal offices of Nagcarlan, Liliw and Majayjay must cooperate for the O&M.

In order to ensure the objectives, it is proposed that DENR assign experts and technicians for training and supervising farmers, managing the Center, growing tree nursery, and distributing the nursery and other necessary materials to farmers. The O&M costs shall be born by DENR and Municipal governments but by beneficiaries in order not to discourage the adoption of soil conservation measures. To support these activities, the Project will provide truck, 4-wheel drive pickup and jeep, etc. as O&M equipment.

6 Recommendations

Because development plan was modified to minimize negative environmental impacts while maintaining expected positive impacts, there is no major environmental impacts resulting from implementation of the development plan. However, execution of mitigation measures and employment of proper construction methods must be overemphasized to ensure not to harm the environment. Followings are recommendations for attainment of sustainable agriculture as well as the preservation of the environment.

- (1) Maximum attention should be paid to construction method to avoid severe soil erosion.
- (2) Security of land tenure is an important factor that influence the success of soil conservation. It is , therefore, recommended that farmers who own farms within the Public Forest Lands apply for ISF program.
- (3) Further development in National Park lands should be strictly controlled for the perpetual preservation of the remaining natural ecosystem.
- (4) Restoration of environment damaged by the project implementation must be carried out in a right way.
- (5) DENR should allocate enough budget and staff for the proper operation and maintenance of Soil Conservation Extension Center to be established by the Project.
- (6) Farmers' participation should be encouraged at the detailed design and implementation stages in order to ensure their active cooperation to project implementation.
- (7) Monitoring and evaluation of forest resources in the Public Forest Lands and the National Park area shall be carried out periodically.

Table X.4.1 Prospective Environmental Impacts without Mitigating Measures (Irrigation)

Prospective Impacts	Significance without mitigating measures	Mitigating Measures
- Negative Impacts -		
<i>During Construction</i>		
1 New construction roads, if established, will destruct vegetation and result in soil erosion.	Major	<ul style="list-style-type: none"> ● Manual transportation of materials and construction equipment. ● Restoration of land by reseeding or replanting.
2 Construction activities will disturb soil surface and increase susceptibility to water erosion.	Major	<ul style="list-style-type: none"> ● Limitation of construction works in the rainy season. ● Use of low impact construction methods. ● Reestablishment of vegetation cover as soon as possible after disturbance. ● No clearing on steep and unstable slopes.
<i>Permanent</i>		
3 Soil erosion	Major	<ul style="list-style-type: none"> ● Adoption of soil conservation measures.
4 Deterioration of river water quality below the proposed irrigation area.	Moderate	<ul style="list-style-type: none"> ● Avoidance of overwatering. ● Control of agro-chemicals and fertilizers.
<i>Indirect</i>		
5 Unplanned or illegal land clearing using construction roads.	Major	<ul style="list-style-type: none"> ● Restoration of construction roads to original condition to extent possible. ● Prohibition of the use of the roads.
6 Increase in population in-migration	Moderate	<ul style="list-style-type: none"> ● Administrative control of in-migration.
- Positive Impacts -		
7 Increase in crop production	Major	

Table X.4.2 Prospective Environmental Impacts without Mitigating Measures (Road)

Prospective Impacts	Significance without mitigating measures	Mitigating Measures
- Negative Impacts -		
<i>During Construction</i>		
1 Erosion from fresh road cuts and fill, particularly in secondary road construction	Major	<ul style="list-style-type: none"> ● Limitation of construction in the dry season ● Proper disposition of cut and fill materials ● Protection of most susceptible soil surface with mulch.
<i>Permanent</i>		
2 Destruction of present vegetation and land use. (secondary roads only)	Major	<ul style="list-style-type: none"> ● Restoration of sites to original condition by reseeding or replanting. ● Compensation given to present landowners
3 Erosion of lands below the roadbed receiving concentrated outflow carried by drains.	Major	<ul style="list-style-type: none"> ● Increase in number of drain outlets. ● Drain outlets so as to avoid cascade effects. ● Lining of receiving surface .
4 Landslides and slips in road cut, particularly in secondary roads.	Major	<ul style="list-style-type: none"> ● Change of route alignment avoiding unstable areas. ● Design of drainage works. ● Stabilization of road cuts with structures.
<i>Indirect</i>		
5 Unplanned or illegal land clearing	Moderate	<ul style="list-style-type: none"> ● Education ● Monitoring and control
6 Increase in population in-migration	Moderate	<ul style="list-style-type: none"> ● Control of in-migration.
- Positive Impacts -		
7 Reduction of crop damages during transportation	Major	
8 Activation of marketing activities.	Major	
9 Improvement of living condition	Major	
10 Enhancement of extension services	Major	

Table X.4.3 Consideration on Major Opinions of the Beneficiaries

Major Opinions of the Beneficiaries	Considerations of the JICA Study Team
<p>1 Irrigation development</p> <ul style="list-style-type: none"> - Enlargement or expansion of irrigable area is proposed. - Need for training on irrigation practices. - Irrigation facilities should be constructed in the Public Forest land. - Right-of-way problem. 	<p>Irrigation area is planned based on water resources assessment. To maximize the irrigation area, water-saving irrigation method is recommended and hence no further expansion is possible.</p> <p>"Upland Horticulture and Irrigation Technology Center" is planned to perform training programs on irrigation and horticultural technologies.</p> <p>Irrigation development is proposed in the area within A&D lands and the existing upland fields alone within the Public Forest lands.</p> <p>Pipeline is proposed for water distribution. Pipeline is installed under ground to minimize right-of-way problem.</p>
<p>2 Improvement of marketing activities</p> <ul style="list-style-type: none"> - Municipalities should support transactions of vegetables at trading posts. - Right-of-way problem for the construction of secondary roads. 	<p>Principal operational works are performed with technical collaboration of the Municipal Agricultural Offices.</p> <p>Secondary roads and skyline cables are deleted in a view point of nature preservation in the critical environmental area.</p>
<p>3 Agricultural research and training</p> <ul style="list-style-type: none"> - Accessibility to the proposed Center on agricultural research and extension is not good. - Need to increase the number of extension workers. - Right-of-way for the construction of the Center. - The Center should emphasize extension services rather than research works. 	<p>The Center is constructed along the Barangay road at Bukal, Nagcarlan, considering its accessibility.</p> <p>Training of agricultural extension workers on the new technologies is one of its major functions.</p> <p>The area of the Center is 2 ha. Existing demonstration farm located at Bukal, Nagcarlan is proposed site for the Center.</p> <p>The main activity of the Center is training and extension but not for research.</p>
<p>4 Soil conservation</p> <ul style="list-style-type: none"> - No perception of necessity on soil conservation. - Farmers want to get materials from the government to adopt soil conservation measures. - Selection of demonstration field sites is important to attain high demonstration effects. - Financial support to the demonstration fields is necessary from governmental agencies. 	<p>Steep and denuded upland farmlands are subjected to soil erosion. Proper countermeasures to prevent soil erosion should be taken.</p> <p>"Soil Conservation Extension Center" is planned to transfer technical countermeasures, and provide tree nursery. Necessary materials are procured by the Project.</p> <p>Several demonstration fields are planned close to existing roads in consideration of accessibility and demonstration effects to the beneficiaries.</p> <p>Nursery for transplanting in demonstration field is provided as a component of the Project with initial financial support from related governments.</p>
<p>5 Rehabilitation of domestic water supply system</p> <ul style="list-style-type: none"> - The Project should not limit to the rehabilitation of the existing system, but include the construction of additional water system. - Concern if they could get water during the rehabilitation period. - Increase in the quantity of water supply is needed. 	<p>Rehabilitation work aims at replacement of timeworn existing facilities, such as intakes and conduits.</p> <p>Water supply is secured by temporary works during the rehabilitation period.</p> <p>Rehabilitation work also aims at increase of water supply capacity.</p>

Table X.4.4 Major Changes on Project Components

Items	Initial Plan	After Modification	Reasons of Changes
1 Irrigation			
- Number of irrigation blocks	Nagcarlan: 5 blocks (23 - 50 ha) Liliw: 3 blocks (34 - 70 ha) Total: 8 blocks	Nagcarlan: 5 blocks (21 - 41 ha) Liliw: 5 blocks (28 - 42 ha) Total: 10 blocks	Smaller area of a irrigation block is recommended to attain easiness of water management and distribution.
- On-farm facilities	Facilitation of one (1) common hydrant per 2 - 3 ha	Facilitation of one (1) common hydrant per 1 - 3 ha	Provision of proper number of on-farm hydrants, facilitating in small size farmlands minimizes laborious works and farmers' expenses for water conveyance.
2 Roads			
- Existing roads		No change	
- Secondary roads	Construction of 8 routes with a total length of 9.8 km	Excluded from the plan	To prevent negative environmental impacts, especially in Public Forest land. High cost requirement comparing with prospected benefit. Right-of-way problem.
- Skyline cables	Under consideration	Excluded from the plan	To prevent negative environmental impacts, especially in Public Forest land. Difficulty on O&M.
3 Trading post No changes were made			
		No change	
4 Upland Horticulture and Irrigation Technology Center			
- Objective	Research & extension	Training & extension	Consideration of present farming level in the area. Response to farmers' strong request to provide practicable training program on horticulture and irrigation technology.
5 Soil conservation			
- Soil conservation measures	Contour hedgerow, Wattling, SALT and drainage canals	Contour hedgerow, Wattling, and SALT	Results of screening of the most effective and suitable measures amongst several measures. DENR promotes extension of proposed measures in similarly affected area by soil erosion.
- Soil conservation extension center	Under consideration	Establishment of the Center and nursery	To extend soil conservation technologies to the farmers. To provide tree nursery necessary for adoption of the soil conservation measures.
6 Rehabilitation of domestic water supply system			
- Domestic water supply systems to be rehabilitated	To be selected during Phase 2	Liliw: Gawanaw RWSS Bukal:	Liliw: Urgent rehabilitation works are required due to the deterioration and hydraulic engineering defect of timeworn facilities.

Table X.5.1 Comparison of Soil Erosion Control Measures (1/2)

Descriptions	Merits	Demerits
VEGETATIVE MEASURES		
1. CONTOUR HEDGEROW		
<p>Vegetative (trees) rows or strips established along the contour. Trees serve as live barrier to surface runoff and soil erosion. Nitrogen fixing trees, if used, can improve the soil. (See Fig. X.5.1)</p>	<ol style="list-style-type: none"> 1. Economical (less costly) 2. Adaptable to various conditions 3. Easier to establish and repair 4. Durable if maintained properly 5. Improve the soil if nitrogen fixing trees are used 	<ol style="list-style-type: none"> 1. It takes at least one year to attain benefits. 2. Less effective when slope is too steep 3. Hedgegrows may pose competition with crops
2. RANDOMIZED MIXED PLANTING		
<p>This refers to the growing of crops with trees or horticultural crops. Vegetation covers intercept the rainfall and serve as protection cover against soil erosion. Rooting characteristics of tree crops enable the soil to increase the water infiltration capacity. (See Fig. X.5.1)</p>	<ol style="list-style-type: none"> 1. Any available planting materials including indigenous species could be planted. 	<ol style="list-style-type: none"> 1. The effectiveness is limited to more stable soil and less steep areas. 2. Difficult to find vegetation species that conserve soil and yield economic benefits.
3. WATTLING		
<p>It is vegetative structure established in contour line or intermittently along the contour. It is used to trap the soil particles that are eroded down with surface runoff. Cuttings of brushwoods are interwoven to form fence. (See Fig. X.5.1)</p>	<ol style="list-style-type: none"> 1. Very effective and stable 2. Early achievement of protection 3. When the brushwoods sprout, the leaves can be used as green manure or mulching materials 	<ol style="list-style-type: none"> 1. Difficult to find suitable sprouting brushwood rods. 2. Difficult to construct
4. FASCINES		
<p>They are structure consisting of sprouting brushwoods bundled and secured to a wooden pegdriven into the ground. They are laid horizontally following the contour in trenches to enhance sprouting. Fascines can trap the eroding soil particles by reducing the velocity of surface runoff. (See Fig. X.5.2)</p>	<ol style="list-style-type: none"> 1. Easy to establish 2. Less expensive 3. Protection is achieved right after the establishment 	<ol style="list-style-type: none"> 1. They require large quantities of brushwood. 2. They are liable to dry out.
5. SALT (SLOPING AGRICULTURAL LAND TECHNOLOGY)		
<p>Similar to contour hedgerow. It involves growing annual and perennial woody crops on contour strips between hedgerows composed of leguminous shrub. (See Fig. X.5.2)</p>	<ol style="list-style-type: none"> 1. Economical (less costly) 2. Easy to repair 3. It provide short-term (annual crops) and long-term income (tree crops). 4. Leguminous trees replenish soil nitrogen. 	<ol style="list-style-type: none"> 1. It takes at least one year to attain benefits. 2. Less effective when slope is too steep

Table X.5.1 Comparison of Soil Erosion Control Measures (2/2)

Descriptions	Merits	Demerits
STRUCTURAL MEASURES		
6. BALABAG		
<p>Similar to wattling, it is fence-like structures consisting of wooden stakes driven into the ground. The difference is that balabag does not use live wood. (See Fig. X.5.3)</p>	<ol style="list-style-type: none"> 1. Become effective as soon as the establishment 	<ol style="list-style-type: none"> 1. It requires a large amount of pegs and poles. 2. It lasts only up to four or five years.
7. ROCKWALLS		
<p>They are walls of stones running across the slope at regular intervals. The walls provide an effective barrier to the downward movement of soil and water. (See Fig. X.5.3)</p>	<ol style="list-style-type: none"> 1. Effective right after the establishment 2. Permanent structure 	<ol style="list-style-type: none"> 1. Require high labor input to construct. 2. Require a large amount of rocks.
8. CONTOUR DITCHES AND DRAINAGE CANALS		
<p>They are digging structures established in the hillsides to check the erosive power of surface runoff by tapping soil particles. Drainage canals are larger and deeper than contour ditches and established along the boundaries of farms. Both structures are often constructed with checkdams. (See Fig. X.5.4)</p>	<ol style="list-style-type: none"> 1. Relatively easier to construct compared with other structures. 2. Ditches and canals can be good water impoundment structures that can hold water for plants. 	<ol style="list-style-type: none"> 1. The effectiveness is limited when used in very steep slopes. 2. The effectiveness is limited when heavy rains continue long.
9. BENCH TERRACES		
<p>They are series of level or nearly level strips running across the slopes supported by steep risers. (See Fig. X.5.4)</p>	<p>The most effective among erosion control measures in minimizing soil erosion.</p>	<ol style="list-style-type: none"> 1. They require a lot of time and manpower to construct. 2. Soil erosion during construction stage may be high. 3. Not suitable for the sites in which topsoils only have thin layer.
CULTURAL MEASURES		
10. CONTOUR PLOWING		
<p>It's a plowing method to create furrows following the contour of the land. (See Fig. X.5.4)</p>	<ol style="list-style-type: none"> 1. It increases water absorption capacity of the soil. 2. It also reduces both the quantity and velocity of surface runoff. 	<ol style="list-style-type: none"> 1. A bit difficult to plow properly.
11. CONTOUR PLANTING		
<p>It's a planting method following the contour of the land. The crops planted act as barriers to the force of surface runoff.</p>	<ol style="list-style-type: none"> 1. Easy to adopt 	

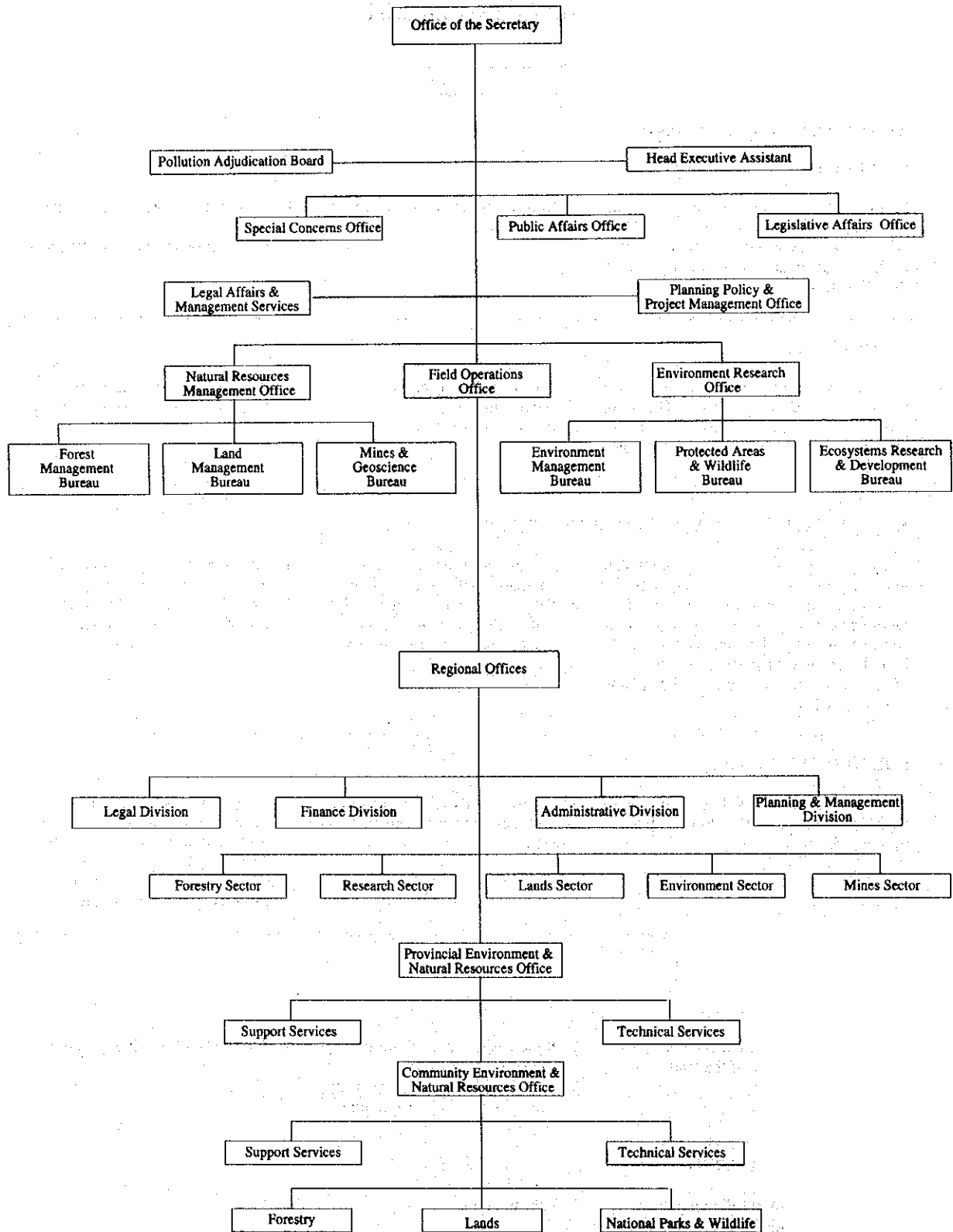


Fig. X.1.1 Organization Chart of Department of Environment and Natural Resources

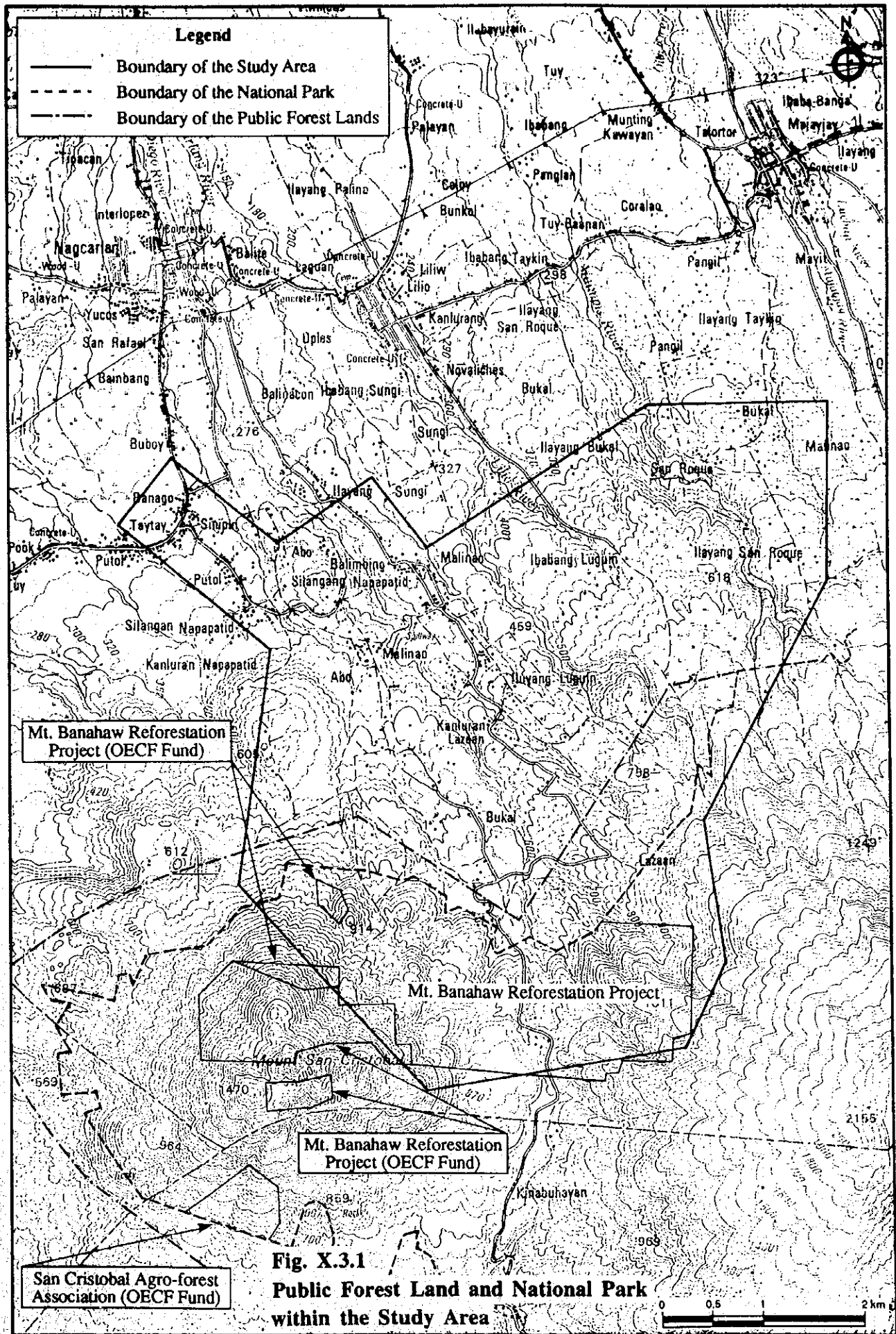
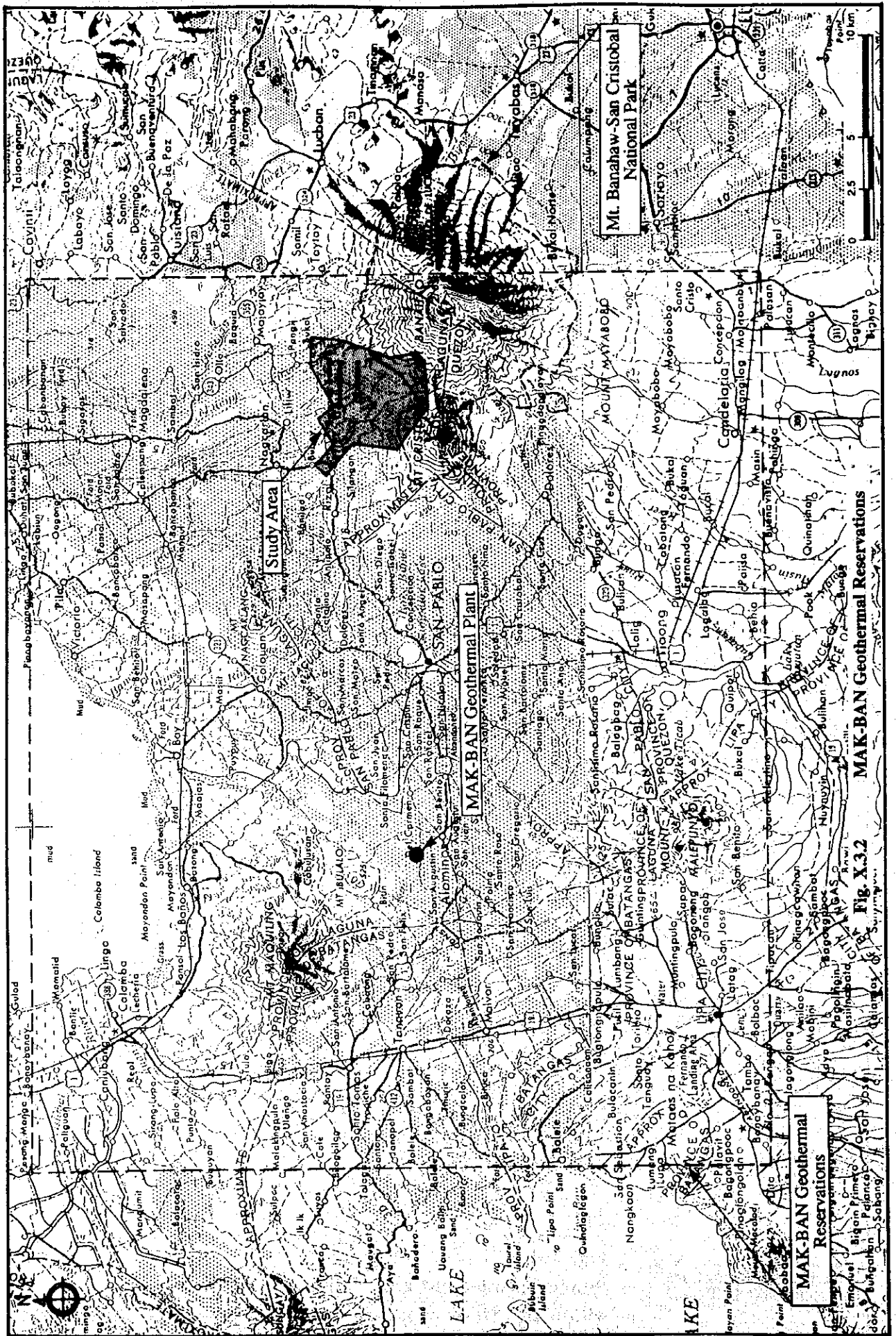
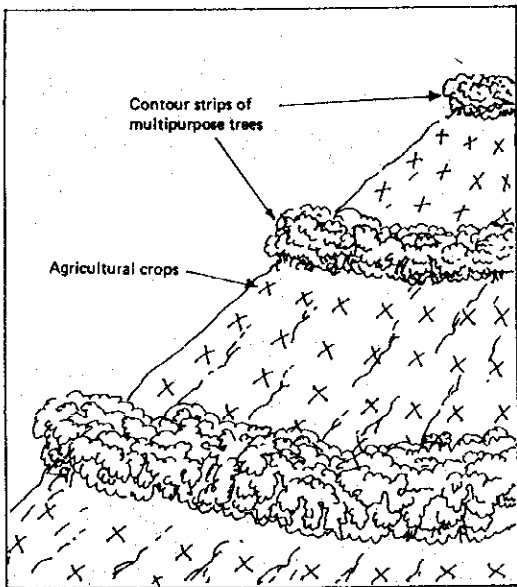


Fig. X.3.1
Public Forest Land and National Park
within the Study Area

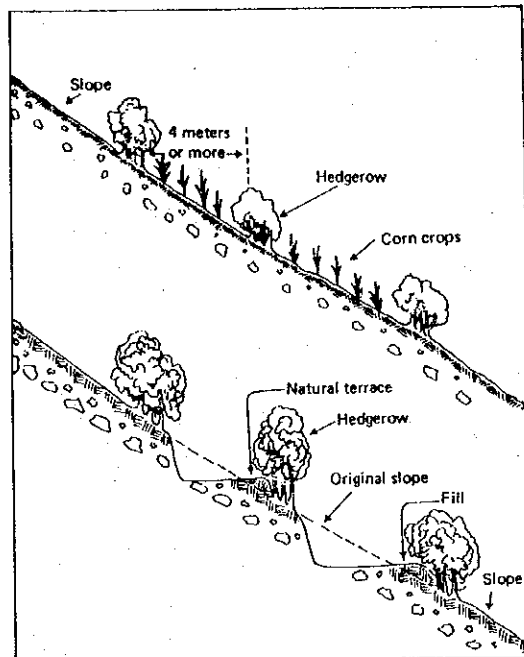


MAK-BAN Geothermal Reservations

Fig. X.32

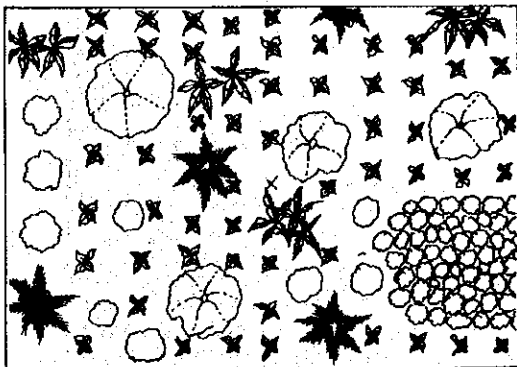


Contour hedgerows of trees on a sloping landscape.
(Based on Ramirez, 1988)



The natural terracing process that occurs after a few years as a result of contour hedgerow planting. (Based on Vergara, 1982)

Contour Hedgerow



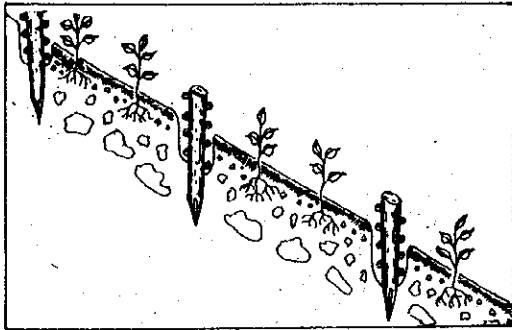
An illustrated example of a randomly-mixed planting scheme.
(Based on Vergara, 1982; and Ramirez, 1988)

- Legend:
- climax tree species
 - coffee, cacao or other fruit trees
 - coconut
 - fast-growing legume trees
 - short-term agricultural crops
 - banana

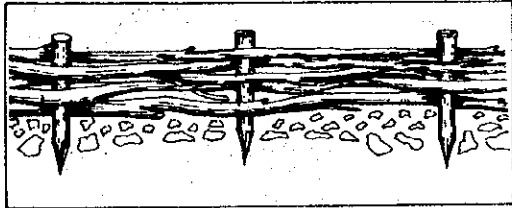
Randomized Mixed Planting

Source: Soil Erosion Control Measures for the Upland
Philippine Upland Resource Center, 1990

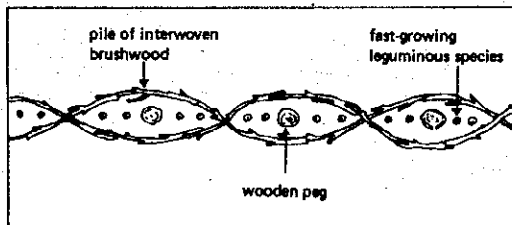
Fig. X.5.1 Soil Erosion Control Measures



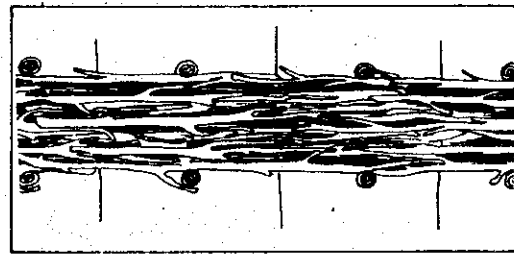
Side view of wattling structures. (Based on Unkel and Endangan, 1975)



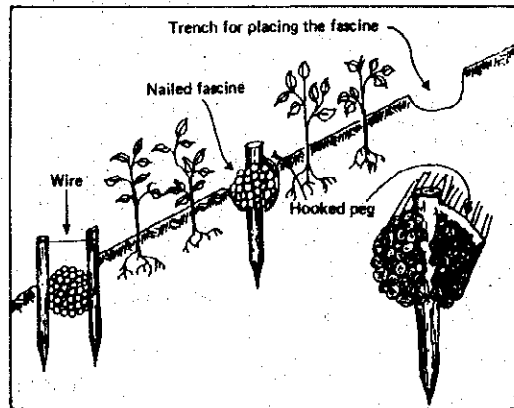
Closer view of interwoven brushwood around wooden pegs in a wattling structure. (Based on Unkel and Endangan, 1975)



Fast-growing legume trees inside the wattling can strengthen the structure. (Based on Unkel and Endangan, 1975)

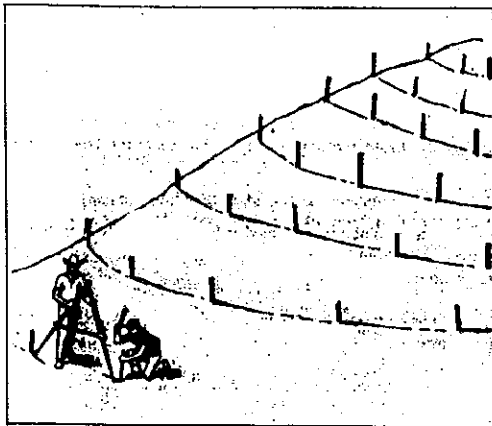


Piles of brushwood ready for fascine construction. (Based on Unkel and Endangan, 1975)



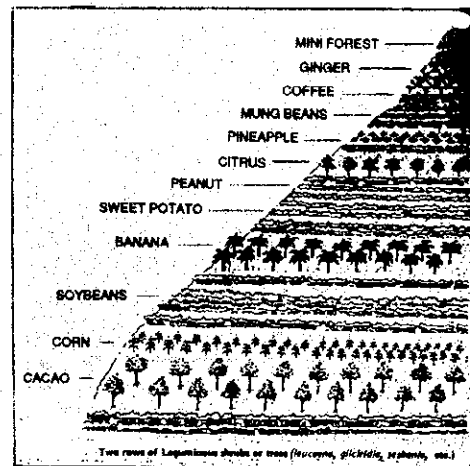
Fascine structures laid out on a sloping landscape using hooked pegs or straight pegs. (Based on Unkel and Endangan, 1975)

Wattling



Use of an A-frame in laying out contour lines.

Fascines



Crop layout following the SALT management.

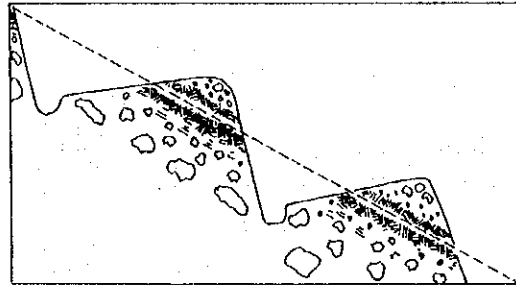
SALT (Sloping Agricultural Land Technology)

Source: Soil Erosion Control Measures for the Upland
Philippine Upland Resource Center, 1990
Technology!, PCARRD

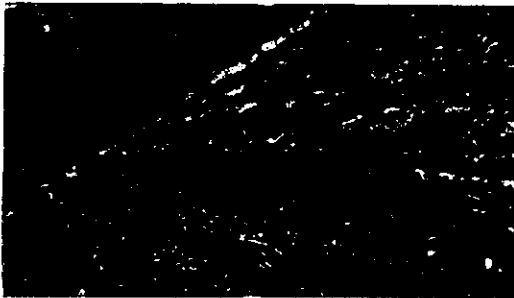
Fig. X.5.2 Soil Erosion Control Measures



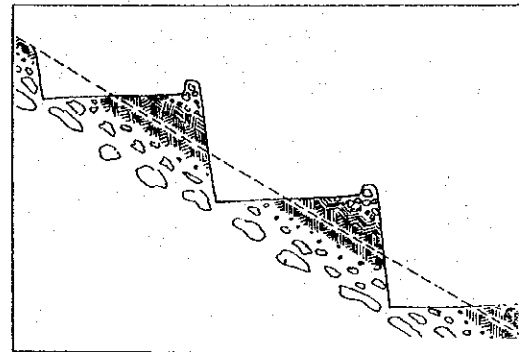
Stacked wooden poles secured by the pegs ("balabag" structures). (Courtesy of Ramirez, 1988)



Reversed-slope bench terraces with drainage canals below the risers.



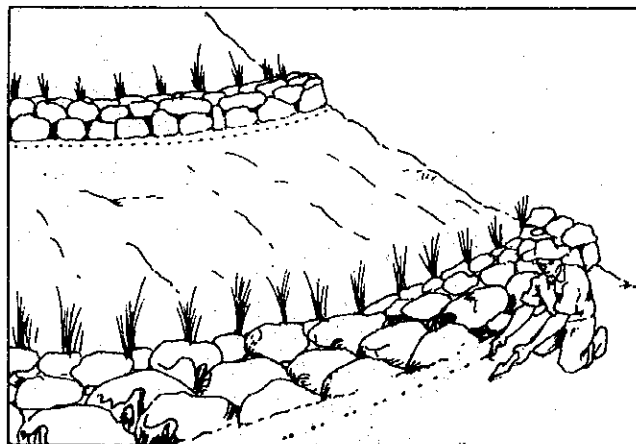
Balabag structures on the sloping farm lands in Naalad, Naga, Cebu. (Courtesy of Ramirez, 1988)



An illustration of level benches.

Balabag

Bench Terraces



Rockwalls reinforced with grasses at the upslope portion and fast-growing legumes at the downslope portion.

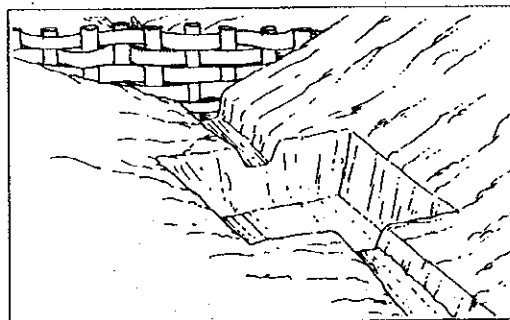
Rockwalls

Source: Soil Erosion Control Measures for the Upland
Philippine Upland Resource Center, 1990

Fig. X.5.3 Soil Erosion Control Measures

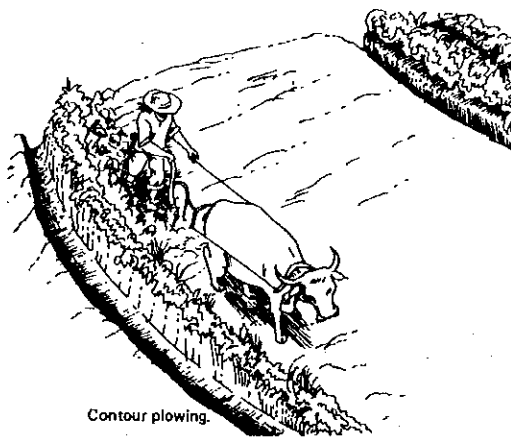


A drainage canal reinforced with grasses.
(Courtesy of the UPLB-IDRC Project, 1986)



An illustration of a mini check dam and a soil trap constructed in series along a drainage canal.

Contour Ditches and Drainage Canals



Contour plowing.

Contour Plowing

Source: Soil Erosion Control Measures for the Upland
Philippine Upland Resource Center, 1990

Fig. X.5.4

Soil Erosion Control Measures

**FEASIBILITY STUDY ON
THE UPLAND IRRIGATION AND
RURAL DEVELOPMENT PROJECT
IN SOUTHERN LUZON**

APPENDIX-XI

ORGANIZATION AND MANAGEMENT

**FEASIBILITY STUDY
ON
THE UPLAND IRRIGATION AND RURAL DEVELOPMENT PROJECT
IN SOUTHERN LUZON**

**APPENDIX-XI
ORGANIZATION AND MANAGEMENT**

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APPENDIX XI ORGANIZATION AND MANAGEMENT

1 Existing Organization Related to Project Implementation and O&M

As the Project is comprised of several components aiming at agricultural and infrastructural improvement, various government agencies and beneficiaries' organizations are expected to participate in the implementation and O&M activities of the proposed Project. Major governmental organizations related to the project implementation and O&M stages are National Irrigation Administration (NIA) as a leading agency, Department of Agriculture (DA), Department of Environment and Natural Resources (DENR), Department of Agrarian Reform (DAR), Provincial Government of Laguna (PGL), and related Municipal governments of Nagcarlan, Liliw and Majayjay. Existing and newly established beneficiaries' organizations such as IAs and marketing cooperatives also have important functional roles as a beneficiary participation into the project implementation and O&M activities. Accordingly, the proposed Project requires inter-coordination amongst agencies and beneficiaries' organizations concerned because these agencies and organizations have different functions and jurisdiction in government services, etc. The organization structure and activities of the governmental agencies are mentioned below.

1.1 National Irrigation Administration (NIA)

NIA has established in 1964 under Public Act 3601 as a semi-autonomous agency responsible for planning, constructing, operating and maintaining all National Irrigation Systems (NISs). NIA was empowered to investigate and study all national water resources for irrigation purposes. In 1974, Presidential Decree No. 552 provided NIA with broader power and authority to undertake related projects, such as flood control, drainage, land reclamation, hydropower development, domestic water supplies, road construction, reforestation and other activities to maintain the ecological balance, in coordination with other agencies.

NIA aims to develop water resources for irrigation and provide corollary services in line with the agricultural development program. In accordance with latest version of NIA Corporate Plan (1993 - 2002), the general objectives, thrusts and strategies in several duration terms are as follows:

Objectives of NIA

- 1) development of irrigation systems in support of the National Food Production Program
- 2) provision of adequate level of service
- 3) enhancement of economic and social growth in the rural areas
- 4) maintenance of the operation of the agency as a stable and autonomous corporate entity

Thrusts and strategies

1) Short term

- acceleration of on-going project completion
- realization of sustainability of O&M of the irrigation systems by mean of strengthening of IAs organization

2) Medium term

- implementation of small-scale irrigation projects
- support of the Comprehensive Agrarian Reform Program (CARP)
- delivery of adequate and satisfactory level of service
- support IAs development and strengthening of IAs' participation
- establishment of intensified revenue generation programs
- promotion of diversified crops irrigation

3) Long term

- pursuit of irrigation development to the fullest extent feasible to support food production
- enhancement of socio-economic growth in the rural areas
- promotion of diversified crops irrigation

Organizational structures of NIA at national, regional and provincial level are referred to Fig. XI.1.1, 2, 3. At its central office at Manila, NIA's organizational structure includes four units: 1) Project Development and Implementation, 2) System Operation and Equipment Management, 3) Finance and Management, and 4) Personnel and Administrative Services. NIA has 11 Regional Irrigation Offices (RIOs). Each RIO is headed by a Regional Irrigation Director (RID). Some 100 Irrigation System Offices (ISOs) are each responsible for one NIS, or a cluster of NISs, and headed by an Irrigation Superintendent (IS). Other 67 Provincial Irrigation Offices (PIOs), each headed by a Provincial Irrigation Engineer (PIE), are responsible for communal irrigation development. ISs and PIEs are directly supervised by the RID of the region.

Region IV office of NIA is located at Pila, Laguna. Region IV office is responsible for the formulation of the irrigation and water resources development programs/projects, investigation, construction supervisory works and evaluation/monitoring covering whole of Region IV. Region IV office is responsible for the project implementation and technical assistance of O&M activities regarding the irrigation component of the Project.

1.2 Department of Agriculture (DA)

DA is the principal agency of the Philippine government responsible for the promotion of the country's agricultural growth and development as the sound foundation for real industrialization. Its efforts focus on the upliftment of the quality of human lives, especially those of the small farmers and fishermen, and on the long-term sustainability of resource productivity.

In 1901, the Insular Bureau of Agriculture was created under the Department of the Interior. After several reorganizations, DA was reorganized under Executive Order 292 in 1987. In 1992, the Local Government Code (LGC) was implemented bringing significant changes in the organization and functions of DA. The extension function of DA were devolved to the concerned Local Government Units (LGUs), from the provincial down to the municipal level. Thus, the Regional offices of DA now only concentrate on providing technical assistance to the LGUs and to farmers and fisherfolk on a need basis.

In June 1994, DA Secretary issued Special Order No. 407 describing the Interim Management Structure which is in preparation for the implementation of DA's streamlining program. The present set-up provides for three Undersecretaries: 1) Finance and Administrative Services and Special activities, 2) Crops, Regional Operations, Research and Training, and 3) Fisheries, Livestock and Legislative/Executive Liaison (see Fig. XI.1.4).

The following are the general functions of DA:

- 1) creation of a policy environment conducive to increased incomes in agriculture
- 2) Production, verification and dissemination of information relevant to productivity and development
- 3) production, testing and dissemination of superior plant and animal germplasm
- 4) facilitation of market access and the promotion of agro-based enterprises
- 5) implementation of empowerment programs to provide access to the benefits of development

DA has 13 Regional offices. Region IV office of DA in Quezon City is charged with implementing extension at regional and provincial levels. Staff Bureaus and their major functions are:

- 1) **Bureau of Agriculture Statistics: BAS**
Provision of agricultural statistics to support planning at the national, regional and provincial levels
- 2) **Bureau of Agricultural Research: BAR**
Coordination of research works for vegetable cultivation and demonstration trials of newly developed varieties
- 3) **Bureau of Soils and Water Management: BSWM**
Soil research, resource conservation and implementation of water utilization development program
- 4) **Agricultural Training Institute: ATI**
Technical assistance and training for farm families, subsistence fishermen, and cultural communities

5) **Bureau of Fisheries and Aquatic Resources: BFAR**

Coordination of activities on development of fisheries and aquatic resources

6) **Bureau of Animal Industry: BAI**

Production, testing and dissemination of animal industry and animal germplasm, production and distribution of breeds of livestock

7) **Bureau of Plant Industry: BPI**

Coordination of activities on development of new varieties and seed production

DA, through the Agricultural Training Institute (ATI), conducts multi-level training for agricultural extension workers and their clientele; the farmers, fisherfolk and their families. It ensures that research results are communicated to the farmers through appropriate training and execution activities in order to promote and accelerate agricultural and rural development. Programs for technical and vocational education are categorized in; i) agricultural manpower development program, ii) center network development program, iii) development support communication program, and iv) training research program.

Meanwhile, DA encourages beneficiaries' participation in the formulation and reform of policies affecting agricultural and in the planning, implementation, and monitoring of agricultural programs and projects. It extends full support to beneficiaries' organization in their efforts to gain access to, and control, all aspects of the farm business from the supply of farm inputs and management of financial resources, to the acquisition of post-harvest facilities and marketing of produce. DA works with NGOs, LGUs, private sector, and other governmental agencies serving rural populace, traders, input suppliers, and other private entities involved in the agricultural business.

1.3 Department of Environmental and Natural Resources (DENR)

DENR was established in 1987 by reorganizing the Department of Environment, Energy and Natural Resources (DEENR). Its task is to ensure the sustainable use, development, management, renewal and conservation of country's forest, mineral lands, offshore areas and other natural resources, including the protection and enhancement of the quality of the environment. DENR is composed of eight Staff Offices, six Staff Bureaus, and the Field Offices which are composed of the Regional, Provincial Environmental and Natural Resources Offices (PENROs) and Community Environmental and Natural Resources Offices (CENROs). The six Staff Bureaus and their major functions are:

1) **Forest Management Bureau: FMB**

Reforestation, range management, watershed rehabilitation, forest protection, timber management, and implementation of ISF program

- 2) Land Management Bureau: LMB
Land disposition, land surveys, and land record management
- 3) Mines and Geo-Sciences Bureau: MGSB
Geological surveys and mining rights application and processing
- 4) Environmental Management Bureau: EMB
EIA processing and environmental quality monitoring
- 5) Ecosystem Research and Development Bureau: ERDB
Technology generation and verification on the restoration, development and rehabilitation of deteriorating ecosystems and natural resources
- 6) Protected Areas and Wildlife Bureau: PAWB
Management of protected areas, preservation of biological diversity, and maintenance of recreational sites

The organization structure of DENR is given in Fig. XI.1.5. The following are explanations of organization and functional role of Regional office of DENR, PENROs, CENROs and other attached corporations and agencies.

Regional Environmental and Natural Resources Offices

The Regional Environment and Natural Resources Offices shall each maintain an Information Staff, Planning and Management Division, Finance Division, Administrative Division, and Legal Division to support the financial, legal, planning, and administrative operating needs of the region. These divisions shall work in close collaboration with the other organizational units of the region and coordinate closely with the planning, financial, legal and administrative units of the Department Proper.

Provincial Environmental and Natural Resources Offices (PENROs)

PENROs shall be headed by a Provincial Environmental and Natural Resources Officer who shall be responsible for planning, coordinating, controlling, preparing and/or updating plans for the protection of the environment, and development and conservation of natural resources; coordinating environmental and natural resources management activities in the provinces, enforcement of environment and natural resources laws, rules and regulation; investigating and recommending appropriate action to resolve claims and conflicts involving natural resources; supervising activities of holders of environment and natural resources permits, leases and/or licenses; evaluating the performance of personnel to determine efficiency and effectiveness and performing other administrative and financial services to CENRO operations. In provinces where there are no established CENROs, PENRO shall undertake and implement projects for the protection, conservation and development of natural resources

and enhancement of the environment and perform other related functions that may be assigned by higher authority.

Community Environmental and Natural Resources Offices (CENROs)

CENROs shall be headed by a Community Environmental and Natural Resource Officer who shall undertake and/or implement projects for the development and conservation of natural resources at the community level; implement/enforce laws, rules and regulation for the protection of the environment and the conservation of natural resources; conduct measurement, assessment and grading of timber and other forest products; maintain up-to-date data on environmental and natural resources conditions; file in court criminal cases against violators of environment and natural resources laws; undertake surveys of areas covered by applications for lease and permits; collect and account for fees due to government from users of natural resources; initiate the settlement of conflicts between or among users of natural resources and perform other related function that may be assigned by higher authority.

CENROs shall be strategically located in the various communities including Metro Manila and other highly urbanized cities. There shall be established initially 174 CENROs, the locations of which are subject to change depending on the assessment of the needs of the communities.

The following corporations and agencies are attached to DENR.

Natural Resources Development Corporation (NRDC)

NRDC is the corporate arm of DENR and shall be responsible for promoting natural resources development and conservation through involvement in pioneering and potentially viable production/and marketing ventures or projects using new innovative technologies, systems, strategies, and embarks financed natural resources development projects undertaken by the private sector.

National Mapping and Resource Information Authority (NAMRIA)

NAMRIA acts as the central mapping agency catering to the needs of the line services of DENR and other governmental agencies with regard to information and researches. It is also tasked with the production and maintenance of maps, charts and similar photogrammetry and cartography materials.

The Study area is under the jurisdiction of Region IV office, PENRO Laguna, and CENRO Los Baños. With relation to the Project, the Regional office is responsible for evaluating environmental impact documents and an application for the development of the Public Forest lands. The Regional Executive Director has the

authority to issue an Environmental Compliance Certificate (ECC) and a development clearance. PENRO Laguna will be responsible for the operation and maintenance of the demonstration fields of soil conservation measures to be established by the Project. There are two (2) Social Forestry Officers in PENRO who are working for seven (7) ISF programs in the Province of Laguna. Their functions are to organize farmers participated in the ISF programs, transfer of technologies on upland cultivation and agro-forestry, distribution of tree seedlings required for hedgerow and agro-forestry, and overall supervision of the ISF programs. It is expected that PENRO/CENRO perform the same functions for the demonstration fields of the Project.

1.4 Department of Agrarian Reform (DAR)

DAR has a main function of implementation of Comprehensive Agrarian Reform Program (CARP) commenced in 1987. DAR performs a nationwide agrarian reform in the Philippines under its basic operating law of Comprehensive Agrarian Reform Law (CARL, Republic Act No. 6657). DAR has 12 Regional offices, 76 Provincial offices and about 1,500 Municipal offices. The organization structure of DAR Central office located in Quezon City is comprised of the following three major units under the Secretary, as shown in Fig. XI.1.6.

- 1) **Policy and planning**
 - Prepare plans and programs of agrarian reform
 - Policy analysis on an appropriate agrarian reform implementation
 - Maintain an information system in coordination with the established monitoring system
- 2) **Field operation and support**
 - Provide technical assistance to Regional offices
 - Review and evaluate reports and other documents submitted by Regional offices
 - Coordinate with other government and private agencies
 - Conduct operation, research and evaluation of agrarian reform implementation
- 3) **Legal, finance and administration**
 - Provide legal assistance on CARP implementation
 - Manage financial issues
 - Provide administrative services

There exist five bureaus under the these Undersecretaries; Bureau of Agrarian Reform Information and Education, Bureau of Agrarian Reform Beneficiaries Development, Bureau of Land Development, Bureau of Land Acquisition and Distribution, and Bureau of Agrarian Legal Assistance.

In the Study area, most of A&D lands are still in a status of unreleased public land, although the farmers in the such lands have claimed their land patents for many years. The certain parts of the Study area have actually been subjected to CARP scheme. Therefore, DAR is expected to support legal and technical matters on land transference to the farmers.

1.5 Provincial Government of Laguna (PGL)

The Province of Laguna has 29 Municipalities and one City (San Pablo), and a total 671 Barangays. There are four (4) political districts. Regarding three (3) Municipalities relevant to the Study area, Nagcarlan and Liliw are categorized in District 3, and Majayjay is in District 4. The Provincial Government is headed by the Governor. Several offices under the office of the Governor are performing managerial, technical and general administrative support services. This section deals specifically with aspects of local administration; the formulation, approval, funding, implementation and monitoring of plans, geared towards local development. Organization structure for the Provincial Government of Laguna is shown in Fig. XI.1.7.

As for the Project planning/implementation, the following responsible bodies are organized:

Provincial Development Council (PDC)

Provincial Development Council (PDC) headed by the Governor and members of Municipal/City Mayors, chairman of the Appropriations Committee of the Board members (Sangguniang Panlalawigan), regional heads of different government departments/agencies and representative from the private and NGOs has functions as follows:

- 1) formulates socio-economic development policies, and public investment programs,
- 2) appraises and prioritizes the socio-economic development programs and projects,
- 3) formulates local investment incentives to promote the inflow of private investment capital,
- 4) coordinates, monitors and evaluates programs and project, and
- 5) perform other functions as may be provided for by law or competent authority.

Provincial Planning and Development Office (PPDO)

Provincial Planning and Development Office (PPDO) is charged with the preparation of the overall economic development plan of the Province for consideration of PDC and approval of the Governor. Its functions include gathering of statistical data for development programs, financial resources, preparation of feasibility studies, monitoring of programs, development of operational systems, and preparation of materials for information and publicity campaigns.

1.6 Municipal Governments

There exist three (3) Municipalities in the Study area, namely Nagcarlan, Liliw and Majayjay. The executive body of each Municipal government is headed by the Municipal Mayor and supported by the offices of Municipal Administrator, Municipal Councilors and Municipal Planning and Development Coordinator

(MPDC) with the cooperation of the officials and staff from the Mayor's Office and different separating units, the Mayor's Office, the Budget Office, Treasurer's Office, Assessors Office and the Office of the Local Civil Register. MPDC and Municipal Agricultural Officer (MAO) have responsibility for the planning and implementation of the programs/projects, agricultural extension services, respectively. Fig. XI.1.8 presents structural organization of the Municipal governments.

1.7 Internal Coordination among Governmental Agencies

The following coordination authorities are responsible for the project planning and implementation at the regional, provincial and municipal levels. Regional Development Council (RDC), comprising of Provincial governors, regional heads of departments/agencies and representatives from the private sector, serves as a forum for inter-agency coordination, for evaluation and endorsement of project implementation, and for reviewing development projects. Furthermore, RDC ensures i) the concrete specification of responsibility and authority among the agencies, ii) a clear functional delineation of the various agencies involved, and iii) the formulation of a sufficient program of technical assistance participated in by relevant agencies, iv) design the necessary coordinative mechanism between the LGUs and the regional line agencies. The following are the authorities and functional role of each authority:

- i) **Regional Development Council (RDC)**
Formulation of socio-economic development policies, necessary coordination between the LGUs and regional line agencies, and appraisal of the socio-economic development programs and projects at regional level
- ii) **Provincial Development Council (PDC)**
Formulation of socio-economic development policies, and public investment programs, and appraises and prioritizes the socio-economic development programs and projects at provincial level
- iii) **Laguna Lake Development Authority (LLDA)**
Functioning as an overall coordination body among the governmental agencies for all projects in the Laguna Lake area.
- iv) **Municipal Resolutions**
Evaluation and endorsement of socio-economic development programs and projects at municipal level

The Local Government Code (LGC) was enacted in October 1991 to carry out the government's commitment to genuine local authority and people empowerment. LGC allocates a substantive portion of government funds and develops extensive powers to the Local Government Units (LGUs).

Aiming at establishment of coordinative linkages amongst regional and field offices of national agencies,

- i) strengthening of regional and local development councils to serve coordinating the formulation on, prioritization, implementation and monitoring of development programs and projects,
- ii) strengthening of RDC's role in the allocation of public investment in accordance with the priority programs and projects of the region

shall be accelerated in line with the development policies as described in the Medium Term Philippine Development Plan (1993 - 1998).

In relation to the above, necessity of functional strengthening of RDC was prescribed in Executive Order 505 (February 1992) to attain more responsive empowerment of RDC according to the increased needs of the LGUs for technical programming and projects development.

2 Project Implementation

2.1 Implementing Agencies

The Project is composed of several components, i.e., irrigation development, marketing activities improvement (farm-to-market roads and trading posts), agricultural training and extension (Upland Horticulture and Irrigation Technology Center), soil conservation and rehabilitation of the existing rural water supply systems. Effects by means of development of irrigation system, farm to market roads, trading posts and rural water supply system will be expected in a short period after the completion of the construction works of the Project. However, obvious effects of agricultural extension and soil conservation schemes will gradually arise through efforts and arising of consensus of the beneficiaries. Furthermore, several O&M agencies will be organized by the guidance from each governmental agency or private, beneficiaries' organizations.

Recognizing these facts, the project implementation arrangement shall be planned premising that the related governmental agencies mutually give technical and financial assistance in conformity with the project implementation plan and schedule, and also these implementing/cooperating agencies shall assist the beneficiaries associations/cooperatives for its establishment and functional strengthening of organizations prior to the commencement of the construction works of the Project. Assistance for project implementation shall include sending of engineers and technicians for training of beneficiaries to strengthen their organization and also financial management.

To achieve smooth project implementation, thus, inter-coordination among governmental agencies and beneficiaries' organizations, NIA is responsible for coordination of the related agencies and beneficiaries' organizations. The Project Steering Committee (PSC) will be established to undertake overall implementation

works. PSC is composed of related governmental agencies, Department of Budget and Management (DBM), Region IV offices of NEDA, NIA, DA, DENR (PENRO), DAR, PGL, Municipal governments, chaired by the NIA Regional Irrigation Director. On the other hand, the Project area is composed of three jurisdictional administrations, viz., Municipalities of Nagcarlan, Liliw and Majayjay, regularity/uniformity regarding fortification of beneficiaries organizations, managerial function on engineering services such as planning/designing, and technical/financial supporting system for project implementation and field supervisory works shall be attained.

2.2 Project Implementation Arrangement

The implementation schedule consists of; 1) preparatory work stage for project implementation, 2) detailed design stage, and 3) construction and supervisory works stage. According to the preparatory work for project implementation, it is comprised of five work items such as a) preparation and submission of Project Description (PD) and project proposal, b) preparatory works for construction works, c) establishment and strengthening of beneficiaries' organizations, d) preparatory works for O&M, and e) financial arrangement on overall project implementation works. NIA, as a proponent agency, shall coordinate the following requirements with smooth coordination of PSC resolutions during the preparatory work stage for project implementation:

(a) Submission of Project Description and Project Proposal

i) Preparation and submission of the Project Description (PD) to DENR Regional office

Prior to the project implementation, PD shall be submitted to DENR Regional office to get Environmental Compliance Certificate (ECC). Issuance of ECC is mandate procedure for the implementation of the Project in the critical environmental area. Regional Executive Director of DENR is in charge of issuance of ECC through field investigation by DENR Regional office. In addition, Special Permission is necessary to be issued by DENR Regional office prior to the commencement of the actual construction works. However, Environmental Impacts Statement (EIS) is not necessary because the proposed development plan will not heavily affect to the environmental condition in the Project area including the Public Forest lands and National Park.

ii) Preparation and submission of the Project Proposal to NEDA Central office

NIA and relevant Municipal governments are responsible for preparation of the Project Proposal endorsed by Municipal Resolutions. Project Proposal shall be evaluated and endorsed through several governmental agencies and councils, such as Provincial Development Council (PDC), Laguna Lake Development Authority (LLDA), and Regional Development Council (RDC).

(b) Preparatory works for construction works

Prior to the commencement of the construction works, the following arrangements will be carried out to settle prospective hindrances during the construction works. In addition, formal discussions regarding project implementation arrangement and details of the proposed projected components will be held between the governmental agencies and beneficiaries to avoid discrepancy against the project requisites among them due to a precedence of project planning by the governmental side.

- i) Coordination of development concepts among different related governmental and beneficiaries' organizations
- ii) Dissemination of public information regarding the project implementation
- iii) Preparation of implementation regulations/guidelines of the Project
- iv) Preparation of design criteria, standard specifications and supervisory manuals
- v) Settlement of right of way, land acquisition/compensation problems
- vi) Acquirement of temporary yard for the construction works

In addition to the above, public consultation survey regarding the proposed development plans/components will be conducted in detail to reflect beneficiaries' requirements to the plan.

(c) Establishment/strengthening of beneficiaries' organizations

The proposed facilities shall be well operated and maintained by responsible governmental agencies and beneficiaries' organizations such as IAs for irrigation facilities, marketing cooperatives for trading posts. Meanwhile, majority of beneficiaries in the Project area will have agricultural and soil conservation training and extension services through the Project. Because the additive benefits of the Project will be not independently but compositely occurred among several proposed components, that appropriate financial arrangement plan according to proper distribution of the project benefits and financial allocation of O&M expenses shall be agreed between related O&M bodies. The following are mandate procedures to formulate the O&M organizations:

- i) Establishment of IAs by the Irrigation Development Officer (IDO) of NIA Region IV office in collaboration with Municipal governments
- ii) Establishment and strengthening of marketing cooperatives by NIA and Municipal governments with technical assistance of CDA
- iii) Strengthening of BWSAs in collaboration with NIA and Municipal governments
- iv) Acceleration of ISF program by PENRO and Municipal governments

(d) Preparatory works for O&M

Proposition of technical revise on proposed facilities considering of O&M easiness, and appropriate budget allocation in several governmental agencies and beneficiaries' organizations will be necessary to carry out

project preparatory and supervisory works on schedule. The following shall be settled during the implementation stage of the Project:

- i) Regularity/uniformity of guidelines on planning, design, and supervisory works in different administrative
 - ii) Allocation of necessary funds among governments, private and beneficiaries' organizations
 - iii) Making financial requirement schedule among O&M bodies, and subsidy program by the governments
- (e) Financial arrangement on overall project implementation works

Financial arrangement for overall project implementation works shall be planned in conformity with the implementation plan and schedule. NIA is responsible for coordination of financial proposal prepared by each implementation and O&M agencies. Budgetary plan for the project implementation, especially the supplementary budget by local resources shall be prepared for approvals by RDC and PDC.

Fig. XI.2.1 presents proposed managerial organization structure for the project implementation, and Fig. XI.2.2 explains the implementing agencies for each project component.

2.3 Beneficiary Participation

The beneficial participation to the project implementation is inevitable in the realization of rural development. The beneficiaries' organizations are effective channel to disseminate project information, to play significant role in the easement of right of way problems and land acquisition/compensation. IAs, marketing cooperatives and BWSAs forming principle beneficial participation to the project implementation are not only for expedite implementation, but share in the financial burden of the Project. PSC will facilitate the effective dissemination regarding the information about the project implementation schedule and appropriate procedures for establishment of the beneficiaries' organizations, furthermore, its important role contributed for project O&M activities. Meanwhile, importance of environmental preservation will be recognized through self-enlightenment of the beneficiaries, in other words, environmental preservation such as soil conservation, reforestation, maintenance of ground recharge, control of the Public Forest lands development, etc. is not afford to be realized without beneficiaries' participation to the Project.

The available planning options will be reviewed by beneficiaries' organizations during project implementation stage, and also effective benefit monitoring and evaluation will be studied by them to reflect the prospective results into further project formulation during the project implementation, construction periods, and continuously O&M period.

2.4 Land Acquisition Process

The land titles are categorized in four (4) types, viz., public land, private land, patented land including patent application land (A&D lands). Furthermore, a part of the Project area is identified as the Public Forest lands by DENR. Land acquisition shall be procured in conformity with the relevant law with financial assistance of NIA and related Municipal governments prior to the commencement of the construction works. Financial arrangement shall be settled by closed collaboration of PSC resolutions. To smoothly conduct land acquisition process including prospective compensation for the temporary construction work set-up, the following will be taken into consideration:

- a) adequate dissemination of the information regarding project implementation schedule and detailed proposed components
- b) establishment of public consultation and exchange of beneficiaries opinion among governmental agencies and beneficiaries
- c) confirmation of legislative procedure and governmental policies in connection to land distribution programs, e.g., CARP, ISFP, etc.
- d) provision of alternative lands or financial compensation for affected beneficiaries
- e) investigation of the possibility of land reclamation or exchange
- f) preparation of funds required for land acquisition and compensation, including annual fund requirement schedule

Land acquisition will be carried out under the supervision of NIA and related Municipalities. PSC will prepare a land acquisition report on the basis of the final results of detailed design. The report will contain land tenure map, qualification lists of land owners, payment/compensation schedule, land distribution plan, temporary construction plan, etc., based on each component and jurisdictional boundaries of related Municipalities. Progress reports will be also prepared to periodically evaluate its progress and to direct further activities.

3 Operation and Maintenance of Project Facilities

3.1 Key Issues on O&M Program

- (1) Internal coordination among governmental agencies and beneficiaries' organizations

Proposed project is composed of construction works of the irrigation and trading posts facilities directly operated and maintained by IAs and marketing cooperatives, rural roads and rural water supply systems by Provincial/Municipal governments, and buildings and extension farms which are maintained by governmental agencies such as DA and DENR to contribute for training and technical extension to the farmers regarding agricultural and soil conservation extension schemes. Proposed components have elaborately selected aiming at

agricultural promotion and improvement of living condition of the Project area. Accordingly, closed internal coordination of beneficiaries and related governmental agencies is inevitable for smooth project implementation.

IAs and marketing cooperatives, as prospective beneficiaries' organizations, shall form self-support primary community inside of each municipal government jurisdiction. Municipal governments shall form secondary community with close relation of beneficiaries' organizations, aiming at operational, managerial assistance to the beneficiaries. Besides, National governments such as NIA, CDA will technically support the beneficiaries' organizations and the Municipal governments, as a plenary support organization. Regarding rural roads, Provincial and Municipal governments are responsible for its maintenance works. Provincial government and DPWH shall technically and financially assist the Municipal governments for proper road maintenance works. Meanwhile, the Upland Horticulture and Irrigation Technology Center and the Soil Conservation Extension Center shall be well maintained by DA Regional office and PENRO (DENR Regional office). Project effects of agricultural extension and soil conservation schemes will be mainly expected as a results of efforts and arising of consensus of the whole beneficiaries through agricultural support services by those centers.

Project components	Primary community	Secondary community	Plenary community
Irrigation facilities	IAs	MGs	NIA Central office NIA Regional office
Rural roads	MGs/PGL	PGL	PGL (DPWH)
Trading posts	Marketing cooperatives	MGs	CDA
Horticulture Irrigation Center	DA Regional office	DA Regional office MGs	DA Central office
Soil Conservation Center Demonstration fields	PENRO (CENRO) beneficiaries	DENR Regional office PENRO	DENR Central office DENR Regional office
Rural water supply system	BWSAs	MGs	PGL, (DPWH)
(Agrarian reform)	DAR Municipal office	DAR Provincial office	DAR Regional office

As described above, internal coordination among beneficiaries and supporting governmental agencies is inevitable for smooth project implementation and O&M. Accordingly, O&M Committee (OMC) and Environmental Evaluation Unit (EEU) are proposed to establish to coordinate with several O&M agencies.

Fig. XI.3.1 presents proposed functional organization for O&M, and Fig. XI.3.2 explains responsible O&M agencies of the Project. As shown in Fig. XI.3.1, OMC comprising of Regional offices of NIA, DA, DENR (PENRO), PGL, and Municipal governments coordinates related O&M agencies. In addition, EEU, comprising of the Municipal governments and PENRO (DENR), is charged with supervision of development activities on environmental preservation aspect. Several governmental agencies and beneficiaries' organizations are responsible for the O&M activities of projected facilities. Furthermore, staff Bureau and institute of DA, viz., Bureau of Agricultural Research (BAR), Los Baños National Crop Research and Development Center, and University of Philippines (UPLB) and NGOs also contribute for the technical and operational assistance for the

Project. Accordingly, closed relation arrangement as to: i) financial, ii) technical, and iii) managerial assistance shall be attained in accordance with the solutions of OMC.

(2) Institution of O&M committee

After completion of the construction works, responsible governmental agencies and beneficiaries' organizations will undertake necessary O&M works for each facilities and supporting services for beneficiaries. O&M Committee (OMC) will be organized to provide overall activities necessary for the maximization of the entire project benefit from project facilities. OMC is composed of Regional offices of NIA, DA, DENR, and PGL, Municipal governments, chaired by Regional office of NIA. The following are principal roles of OMC:

- i) coordination of related O&M bodies and EEU
- ii) guidance and assistance of beneficiaries' organizations on its management
- iii) preparation of operation and maintenance program of all project facilities
- iv) maintenance and repair of project facilities
- v) training of staff for project management
- vi) periodical monitoring and evaluation

(3) Monitoring and evaluation of forest resources

As a part of the Project area is located in the Public Forest lands which are recognized as a critical environmental area, monitoring and field investigation shall be conducted for periodical evaluation. Monitoring, field investigation shall be conducted by related governments, Regional offices of NIA, DA, DENR (PENRO), and the Municipal governments. Monitoring and evaluation report shall be prepared by these governments, mainly by the Municipal governments and PENRO. The report will be also submitted to DENR Regional office, Laguna Lake Development Authority (LLDA), Provincial government, and DA Regional office (Bureau of Agricultural Research: BAR).

To achieve appropriate development process, especially for environmental aspect, related governments shall establish Environment Evaluation Unit (EEU), participating of staff from relevant Municipal governments and PENRO with its functional roles of:

- i) legislation regarding the farm activities in the Public Forest lands
- ii) preparation of environmental guideline
- iii) supervisory works of the Public Forest lands/National Park areas
- iv) monitoring and evaluation of development activities in the Public Forest lands
- v) project planning for Public Forest protection, including application to ISFP
- vi) counsel against illegal development activities, such as logging, land reclamation, etc.

The result of the evaluation will be utilized to review an environmental guideline and reflected to development direction about farming and other activities in the Public Forest lands. The following are detailed investigation items in connection to the environmental preservation:

1) Irrigation activities

- Investigation of irrigable area in A&D lands and the Public Forest lands
- Study of water requirement and irrigation methods
- Run-off data of surface water and ground water
- Maintenance condition of projected irrigation facilities
- Hearing of farmers' intention on further irrigation activities, etc.

2) Agricultural activities

- Farmland area and distribution condition of farmlands in A&D lands, the Public Forest lands and National Park
- Survey of agro-chemical and fertilizer use
- Production data in A&D lands, the Public Forest lands and National Park
- Examination of water quality for rural/irrigation water use
- Survey of illegal farming, logging and land reclamation
- Hearing of farmers' intention on further land use plan, etc.

3) Soil conservation activities

- Investigation of soil conservation activities, such as counter hedgerow, SALT
- Supply capacity of tree nursery to the farmers
- Soil erosion and land slide surveys
- Survey of farm activities in the dry/wet seasons
- Hearing of farmers' intention on soil conservation measures, etc.

The Soil Conservation Extension Center, which is operated by the Municipal government of Nagcarlan and PENRO (DENR), has functional roles of; i) extension and training of soil conservation technology, and ii) supply of tree nursery to the farmers. It is recommended to set-up EEU office in the Center building as a core of EEU's activities.

(4) O&M manual and training

O&M manuals for each project component shall be prepared for transferring of technical and management skills to the responsible O&M agencies and beneficiaries under the instruction of OMC. O&M manuals will include i) technical operation and maintenance guideline, ii) managerial guideline, such as fee collection, institutional references of O&M organizations, iii) mandate routine activities of each O&M agency, iv) regulation of maintenance schedule, etc. Operation manuals for procured O&M machinery/equipment are also provided through manufacturers.

OMC shall formulate the training plan of governmental staff and representatives from each beneficiaries' organizations related to the Project during the transition period of project implementation and O&M stage. Compositional governmental agencies, NIA, DA, DENR (PENRO), PGL and the Municipal governments shall send technical staff for the training in collaboration of other agencies of UPLB, BAR, NGOs.

3.2 Proposed O&M Plan

(1) O&M activities in each components

O&M plan is conceived in due consideration of the requirements to ensure expected project benefits. Governmental agencies and beneficiaries' organization relevant to the Project shall prepare O&M guidelines, and also delineate O&M activities among several O&M agencies. The activities to be undertaken by the O&M program include the items below:

- i) establishment and strengthening of beneficiaries' organizations,
- ii) routine operation and maintenance,
- iii) periodical maintenance, and
- iv) emergency maintenance.

Irrigation facilities

	O&M activities	Responsible agencies
Beneficiaries	Preparation of regulations as to IAs establishment Preparation of regulation and roles of IAs, and O&M activities Inventory survey, water fee collection and O&M management Preparation of evaluation report (revise plan of cultivation, and re-structure of IAs organization, etc.)	MGs, NIA IAs, NIA IAs IAs
Routine O&M	Irrigation water control, removal of sediment, maintenance of on-farm facilities (hydrant valve, etc.)	IAs
Periodical O&M	Maintenance of intake, pipelines, farm ponds, etc.	IAs, NIA
Emergency O&M	Rehabilitation works caused by natural disaster, etc.	IAs, MGs, NIA

Rural roads

	O&M activities	Responsible agencies
Routine O&M	Maintenance of road surface, removal of sediment in drainage	MGs, PGL
Periodical O&M	Maintenance of pavement, bridges, slopes of embankment, etc.	MGs, PGL
Emergency O&M	Rehabilitation works caused by natural disaster, etc.	MGs, PGL, DPWH

Trading posts

	O&M activities	Responsible agencies
Beneficiaries	Preparation of regulations as to marketing cooperatives establishment Preparation of regulation and roles of marketing cooperatives, and O&M activities Inventory survey, collection of dues and O&M management Preparation of annual report (revise plan of marketing, and re-structure of cooperatives organization, etc.)	MGs, CDA Cooperatives, MGs, CDA Cooperatives Cooperatives
Routine O&M	Inspection and easy repair of trading posts	Cooperatives
Periodical O&M	Inspection and repair of structural materials of trading posts, etc.	Cooperatives, MGs
Emergency O&M	Rehabilitation works caused by natural disaster, etc.	Cooperatives, MGs

Upland Horticulture and Irrigation Technology Center

	O&M activities	Responsible agencies
Office in charge	Extension of farm technology and training, seminar to farmers Testing of irrigation methods and new crop cultivation at demo-farm Survey and monitoring regarding agricultural extension services Preparation of annual report (revise plan of O&M activities, and re-structure of functional organization, etc.)	DA Regional office
Beneficiaries	Participation to training, seminar, and assistance for preparation of seminar, training, etc.	Farmers, MGs, NIA
Routine O&M	Inspection, easy repair of buildings, irrigation devices and green house	DA Regional office
Periodical O&M	Inspection and repair of structural materials of center, etc.	DA Regional office
Emergency O&M	Rehabilitation works caused by natural disaster, etc.	DA Regional office, MGs

Soil Conservation Extension Center and demonstration fields

	O&M activities	Responsible agencies
Office in charge	Extension of soil conservation technology and training, seminar to farmers Maintenance of demonstration fields, supply of tree nursery and promotion of ISF program Survey and monitoring regarding soil conservation extension services Preparation of annual report (revise plan of O&M activities, and re-structure of functional organization, etc.)	PENRO (DENR Regional office)
Beneficiaries	Participation to training, seminar, and assistance for preparation of seminar, training, etc.	Farmers, MGs
Routine O&M	Inspection, easy repair of buildings, nursery yards	PENRO
Periodical O&M	Inspection and repair of structural materials of center, etc.	PENRO DENR Regional office
Emergency O&M	Rehabilitation works caused by natural disaster, etc.	PENRO, MGs, DENR Regional office

Rural water supply system

	O&M activities	Responsible agencies
Routine O&M	Inspection of intake and conduits	MGs
Periodical O&M	Inspection and repair of structural materials	MGs
Emergency O&M	Rehabilitation works caused by natural disaster, etc.	MGs, PGL

(2) Financial framework of O&M

Responsible O&M agencies shall secure the financial resources to run the completed projects efficiently. O&M agencies shall acquire necessary O&M funds according to the detailed O&M requirements as described above.

Routine operation and maintenance funds are composed of i) staff salary, ii) operation and maintenance of vehicles, equipment and machinery, iii) office expenses, iv) expenses for seminar/training participation,

v) documentation/reporting expenses, etc. These expenses will be shouldered by respective O&M agencies. Constructive annual financial plan in proportion to the increase of O&M funds will contribute for sustainable O&M activities.

Periodical maintenance works for overall project facilities will be carried out by respective O&M agencies at the proper intervals to be determined for each structure. Its expenses also shall contribute for sustainable O&M activities. Large scale replacement of the project facilities will not be induced, because utilized materials, such as concrete and steel materials have quite long life span.

Emergency maintenance caused by natural disaster, as well shall be carried out by local resources with intervention of O&M Committee (OMC). Financial and technical assistance program is to be discussed amongst related O&M agencies prior to the commencement of the O&M activities.

Financial framework for each O&M activities are as follows. Establishment and strengthening of beneficiaries' organizations will be performed during the preparatory works for project implementation.

a) Establishment and strengthening of beneficiaries' organizations

Regarding establishment and strengthening of beneficiaries' organizations, such as IAs for irrigation facilities and marketing cooperatives for trading posts, National or Local governments shall bear initial funds for them, especially for their establishment. Principal work items, such as dissemination of information, preparation of required paper for registration, preparation of workshop implementation and assistance of organization set-up, will not be large amount, so that proper allocation of annual national/local fund resources will satisfy its requirements.

b) O&M fund for irrigation facilities

IDO and Municipal governments are responsible for managerial assistance, such as preparation of workshop implementation, accomplishment of Farmer Position Paper for establishment of IAs, as well. Necessary funds for the preparatory works shall be borne by NIA and related Municipal governments in line with the guideline of Local Government Units (LGUs).

Necessary funds for O&M shall be borne by IAs. Water fee or irrigation fee shall be collected from beneficiaries by IAs in accordance with IAs regulations prepared by IAs themselves. Water fee shall be collected for the use of managerial expenses of IAs, and also for routine/periodical O&M activities. IAs shall, in principle, shoulder the emergency fund for O&M.

NIA will provide technical assistance of the project facilities, including irrigation practices, i.e., provision of hydro-climatic data, principles in the development of a cropping calendar, water

management skill, water requirements calculation method, and other modern farming activities, etc. Regarding a demarcation of O&M responsibility, NIA, Municipal governments and IAs should identify specific duties and responsibilities of each organization in written form.

c) O&M fund for rural roads

Present O&M responsible agencies of roads, the Provincial government of Laguna and related three Municipal governments are responsible for these roads maintenance of the Project. Each agency shall take budgetary procedure as are necessary for the prospective routine and periodical O&M activities during the budget compilation. Provincial and Municipal governments shall have budgetary assistance from DPWH for emergency rehabilitation works of proposed roads corresponding to the budget requirement necessary for the works.

d) O&M fund for trading posts

Each Municipality has ownership of the trading posts. Meanwhile, operation of the trading posts is performed by the proposed marketing cooperatives. In this connection, operation costs of each trading post, such as for facilitation of production programming, marketing and transfer of production/marketing technologies, shall be borne by cooperatives, and minimum maintenance works, e.g., structure repair shall be shouldered by the Municipal governments concerned. Necessary fund for maintenance of the trading posts shall be provided by the Municipal governments from a revenue of user's fee of the trading posts. Cooperative member or farmers utilize trading posts shall pay cooperative dues or utility fee of trading posts to the cooperatives. User's fee borne by each cooperative shall be pursuant to prescription in cooperative O&M regulations, which are mutually agreed between Municipal governments and marketing cooperatives.

e) O&M fund for Upland Horticulture and Irrigation Technology Center

Necessary fund for O&M of the Upland Horticulture and Irrigation Technology Center broadly comprised of staff salary, office expenses, instrument for soil/crop testing, as well shall be borne by DA Regional office in principle. O&M requirement for the demonstration farms and green house collaboratively utilized by specialists from DA Regional office, UPLB, Laguna State Polytechnique College and NGOs, such as the Philippines Upland Resources Center (PURC) shall be demarcated on the basis of their annual operational plan. Preparation of seminar and training implementation will be made by the Municipal governments and NIA Regional office.