2) Apprises 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.

(2) 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.

8.1.6 Municipal governments

There exist three Municipalities in the Study area, viz., 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 Officers (MAOs) are responsible for the planning and implementation of the programs/projects, agricultural extension services, respectively. Fig. 8.1.6 presents structural organization of the Municipal governments.

8.1.7 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; 1) the concrete specification of responsibility and

authority among the agencies, 2) a clear functional delineation of the various agencies involved, and 3) the formulation of a sufficient program of technical assistance participated in by relevant agencies, and 4) design the necessary coordinative mechanism between LGUs and the regional line agencies. The following are the authorities and functional role of each authority:

1) Regional Development Council (RDC)
Formulation of socio-economic development policies, necessary coordination between LGUs and regional line agencies, and appraisal of the socio-economic development programs and projects at regional level

2) Provincial Development Council (PDC)
Formulation of socio-economic development policies, and public investment programs, and apprises and prioritizes the socio-economic development programs and projects at provincial level

3) Laguna Lake Development Authority (LLDA)
Functioning as an overall coordination body among the governmental agencies for all projects in the Laguna Lake area

4) Municipal Resolutions
Evaluation and endorsement of socio-economic development programs and projects at municipal level

8.2 Project Implementation

8.2.1 Implementing agencies

The Project are 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 (Soil Conservation Extension Center and demonstration fields) and rehabilitation of the rural water supply systems. Effects by means of development of irrigation system, farm to market roads, trading posts and domestic water supply system are 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, thus, inter coordination among these organizations is inevitable for the smooth project implementation.

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 strengthening 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, NIA is responsible for coordination of the related agencies. The Project Steering Committee (PSC) will be established undertaking 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) and DAR, PGL and Municipal governments. PSC is 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 construction supervisory works shall be attained.

8.2.2 Project implementation arrangement

The project implementation stages consist of; 1) preparatory works stage for the project implementation, 2) detailed design stage, and 3) construction supervisory stage. Preparatory works for the project implementation are divided into 1) submission of Project Description and project proposal, 2) preparatory works for construction works, 3) establishment/strengthening of beneficiaries organizations, 4) formulation of technical/managerial O&M guideline, and 5) financial arrangement for the four items described above. Structural organization chart on the project implementation is shown in Fig. 8.2.1. NIA, as a proponent agency, shall coordinate the following requirements during preparatory works for the project implementation stage:

1) Submission of Project Description and project proposal

a) 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" issued by DENR Regional office is necessary 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 the environmental condition in the Project area including the Public Forest lands and National Park.

b) Submission of the project proposal to NEDA Central office

NIA and relevant Municipal governments are responsible for preparation of the project proposal through endorsement of Municipal Resolutions. Project Proposal shall be evaluated and endorsed through several governmental agencies and councils, such as the Provincial Development Council (PDC), the Laguna Lake Development Authority (LLDA). Project proposal is to be submitted to NEDA Central office with approval of the Regional Development Council (RDC).

2) 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.

a) Coordination of development concepts amongst different related governmental and beneficiaries' organization
b) Dissemination of public information regarding the project implementation
c) Preparation of implementation regulations/guidelines
d) Preparation of design criteria, standard specifications and supervisory manuals
e) Settlement of right of way, land acquisition/compensation problems
f) 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.

3) Establishment/strengthening of beneficiaries' organizations

The following arrangements will be accomplished to formulate beneficiaries' organizations, such as IAs and marketing cooperatives.

a) Establishment of IAs by the Irrigation Development Officer (IDO) of NIA Region IV office in collaboration with Municipal governments
b) Establishment and strengthening of marketing cooperatives by NIA and Municipal governments with technical assistance of CDA
c) Strengthening of BWSAs in collaboration with NIA and Municipal governments
d) Acceleration of ISF program by PENRO and Municipal governments

4) Preparatory works for O&M

With regard to the O&M activities, the following arrangements will be settled during the implementation stage of the Project.

a) Preparation of regularity/uniformity of guidelines on O&M works in different administrative
b) Allocation of necessary funds for O&M among governments, private and beneficiaries' organizations
c) Making financial requirement schedule among O&M bodies, and subsidy program by the governments

5) Financial arrangement

Financial arrangement for overall project implementation works shall be planned in conformity with above project implementation activities, and schedule.

Fig. 8.2.1 presents proposed managerial organization structure for the project implementation, and Fig. 8.2.2 explains the implementing agencies by each project component.

8.2.3 Beneficiary participation

The beneficiary 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 form principle beneficial participation to the project implementation not only for expedite implementation, but share in the financial burden of 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.

8.2.4 Land acquisition process

The land titles are categorized in four types, viz., public land, private land, patented land including patent application land. 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.

8.3 Operation and Maintenance of Project Facilities

8.3.1 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.

Prospective O&M Agencies

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. 8.3.1 presents proposed functional organization for O&M, and Fig. 8.3.2 explains responsible O&M agencies of the Project.

(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), as a general assembly committee, 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 DA, DENR, and PGL, Municipal governments, chaired by Regional office of NIA. The following are principal roles of OMC:

1) coordination of related O&M bodies and EEU
2) guidance and assistance of beneficiaries' organizations on its management
3) preparation of operation and maintenance program of all project facilities
4) maintenance and repair of project facilities
5) training of staff for project management
6) 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, mainly by the Municipal governments and PENRO (DENR), and Regional offices of NIA, DA. Monitoring and evaluation report shall be prepared 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 including 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:

1) legislation regarding the farm activities in the Public Forest lands
2) preparation of environmental guideline
3) supervisory works of the Public Forest lands/National Park areas
4) monitoring and evaluation of development activities in the Public Forest lands
5) project planning for Public Forest protection, including application to ISFP
6) 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.

(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. In addition, 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 trainings in collaboration of other agencies of UPLB, BAR and NGOs.

8.3.2 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:

1) establishment and strengthening of beneficiaries' organizations
2) routine operation and maintenance

3) periodical maintenance

4) emergency maintenance

Regarding establishment and strengthening of beneficiaries' organizations, national or local governments shall assist mandate procedures, such as dissemination of information, preparation of required paper for registration, workshop implementation and assistance of organization set-up, etc.

Periodical maintenance of overall project facilities will be carried out by respective O&M agencies at the proper intervals to be determined for each structure.

Prospective O&M activities and responsible O&M bodies are tabulated in Table 8.3.1 by each project components.

(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 in Table 8.3.1.

Routine and periodical O&M funds will be shouldered by respective O&M agencies. 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 among 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.

1) 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. 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.

2) O&M fund for irrigation facilities

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 in line with "CIS Management Manual", 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.

3) O&M fund for rural roads

Present O&M agencies of roads, i.e., PGL 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.

4) O&M fund for trading posts

Operation costs of each trading post shall be borne by marketing 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.

5) 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 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.

6) O&M fund for Soil Conservation Extension Center and demonstration fields

Minimum maintenance cost of the Center building, and routine O&M requirement consisting of staff salary, vehicle operation, instrument for nursery operation, and other office expenses shall be borne by PENRO through DENR Regional office in principle. Necessary expenses for the extension activities of soil conservation, such as procurement of forest seed/nursery and farm tools, training requirements, and other activities, as well as irrigation cost for nursery

shall be provided by the beneficiaries. Meanwhile, the beneficiaries applied Certificate of Stewardship Contract (CSC) are able to utilize the financial support of ISFP system.

7) O&M fund for rural water supply system

Municipal governments and BWSAs are responsible for financial O&M support of the rural water supply system.

8.3.3 Institutional framework of O&M agencies

Constitutional process to establish and strengthen proposed O&M agencies for each project component are described as follows.

(1) Irrigation facilities

IAs are responsible for O&M of the irrigation facilities. IAs in the Project area are proposed to establish two associations, viz., Nagcarlan IA and Liliw IA. IAs shall assess its organization set-up with corresponding function of the personnel with managerial assistance by Irrigation Development Officer (IDO), NIA Regional office. NIA Regional office and Municipal governments will assist preparation of seminar implementation, IAs' inventories, etc. Annual post evaluation report shall be prepared by IAs. Re-planning of farming practices and re-organization of system management in relation to the revised duties and responsibilities are simultaneously necessary to maintain IAs' activities. NIA is responsible for coordinate overall IAs' activities in collaboration with Municipal governments. To proceed initial system management by IAs, the following personnel and committees are proposed. Structural organization chart of IAs is shown in Fig. 8.3.3.

Proposed Composition of IAs

I. Personnel	II. Committees
i) President	i) Irrigation Management Committee
ii) Vice President	ii) Training Committee
iii) Secretary	iii) Monitoring and evaluation/planning Committee
iv) Treasurer	
v) Operations manager	

(2) Farm to market roads

Proposed roads are composed of the Provincial roads and the Barangay roads. O&M cost for these roads are borne by the governments of Province and Municipalities. Provincial Engineering Office is responsible for supervision and control of the maintenance, improvement and repair works of the Provincial roads, and also exercises technical supervision over all engineering offices of related Municipalities. Municipal Engineering Offices are responsible for the maintenance works of the proposed Barangay roads. Prior to the completion of the road construction works, Provincial and Municipal governments shall estimate and demarcate the necessary O&M funds.

(3) Trading posts

Marketing cooperatives shall be registered in line with the Cooperative Law with technical assistance of the Cooperative Development Authority (CDA). In each Municipality, Cooperative Board comprising of representatives of several cooperatives shall be established under the supervision of the present Municipal Agricultural Officer (MAO). MAO is in charge of the coordination of cooperatives' activities and other managerial support for each cooperative. Furthermore, establishment of Cooperative Federation comprising of Cooperative Boards of three relevant Municipalities is recommended.

Structural organization of marketing cooperatives, Cooperative Boards and Cooperative Federation is charted in Fig. 8.3.4.

(4) Upland Horticulture and Irrigation Technology Center

The proposed Upland Horticulture and Irrigation Technology Center will be operated and maintained by DA Region IV office with close cooperation of the related Municipal governments, UPLB, Laguna Polytechnique College, NIA and NGOs. DA Region IV office will organize following unit for proper operation and maintenance:

1) Agricultural training/extension unit

The unit is responsible for training of agricultural extension works, extension and transferring of appropriate farming practice, and introduction of suitable vegetable varieties, etc., to the farmers. Multiplication of vegetable seeds and soil tests are also conducted by the unit.

2) Irrigation training unit

The unit is responsible for introduction of modern on-farm irrigation methods through a training of agricultural extension works, operation and maintenance of proposed irrigation system in the demonstration farm and green houses, etc.

3) Monitoring unit

The unit is responsible for monitoring and evaluation of farmers' activities. In addition, the unit determines the operational direction of the Center in conformity with beneficiaries' needs. Meteorological data collection and analysis are also conducted by the unit.

The unit member is composed of permanent and temporary engineers/specialists from DA Regional office, its staff Bureau of Agricultural Research (BAR), UPLB (Department of Horticulture), Laguna Polytechnique College, Provincial Agricultural Office (PAO), Municipal Agricultural Offices (MAOs) and NIA.

The activities in the proposed Center are expected to accelerate roles of state colleges and universities (SCUs), e.g., UPLB and Laguna State Polytechnique College in technology generation, and also to strengthen DA research and extension organizational structure, to maintain linkages with Non-Governmental Organizations (NGOs), such as Philippines Uplands Resources Center (PURC). As illustrated in Fig. 8.3.5, managerial organization is composed of Director and engineers/specialists belonging to the said three units. Provincial and Municipal agricultural offices, NIA, UPLB, and NGOs connected to the Project shall occasionally send engineers, specialists and research workers in response to the request of the Center.

(5) Soil Conservation Extension Center/demonstration fields

PENRO Laguna is responsible for O&M of the Soil Conservation Extension Center including demonstration field of soil conservation measures. On the other hand, DENR Regional office is responsible for evaluation of environmental impact documents and an application for the critical environmental area.

It is recommended that DENR Regional office promotes soil conservation project, aiming at an acceleration and extension of soil conservation measures in the Project area. At present, PENRO Laguna has already commenced the ISF program in the Public Forest lands in the Municipality of Liliw. Accordingly, the proposed facilities and O&M equipment of the Project are planned in conformity with the requirements of soil conservation and reforestation program of DENR (PENRO). Managerial coordination chart between the responsible agencies

of on-going ISF programs and proposed Soil Conservation Extension Center including demonstration fields is shown in Fig. 8.3.6.

(6) Rural water supply facilities

The proposed rehabilitation works for the rural water supply systems (RWSSs) are to be carried out concentrating on the intake portions of existing facilities of Abo RWSS in Nagcarlan and Gawanan RWSS in Liliw. Water supply facilities are presently maintained by the Municipal governments and BWSAs. Accordingly, Municipal governments and BWSAs will successively undertake the O&M activities of the water supply systems.

Existing rural water supply systems have common problems such as water leakage and malfunction of flow control devices, that further improvement, such as pipe replacement of the whole water systems should be undertaken by BWSAs and the Municipal governments. Because of the poor financial backbone of BWSAs, hence, Municipal governments should provide technical and financial supports to conduct the said improvement works for BWSAs.

CHAPTER IX PROJECT JUSTIFICATION

9.1 Economic Evaluation

9.1.1 Basic assumptions

The Economic Internal Rate of Return (EIRR) of the proposed Project was estimated based on the estimated project costs and incremental project benefits. The estimation was carried out for the proposed Project as a whole. Major assumptions for the estimation of EIRR are summarized below:

1) The economic life of the Project is 30 years.

2) All commodity prices are given as of mid-1994 Philippine Peso value throughout the analysis. The exchange rate of US$ 1.00 = ₱ 27.00 = ¥ 100.00 is used.

3) A standard conversion factor (SCF) of 0.80 and a commodity specific conversion factor (CSCF) of 0.82 were applied in adjusting all benefits and costs in local currency and the construction costs, respectively.

4) Economic prices of all non-tradable goods are estimated by domestic prices multiplied by the SCF. Tradable goods are valued by the border prices (FOB) after adjusting domestic costs for transportation and handling.

9.1.2 Economic benefits

The benefits are expected from the implementation of all the project components. However, only direct benefits accrued from the upland irrigation development and the improvement of the existing farm-to-market road were counted in the calculation of EIRR for the conservative estimate of EIRR:

1) Upland irrigation development (Irrigation area: 320 ha)

- Increase in unit yield of crops,
- Increase in cropping intensity, and
- Diversification of cropping from low value crops to high value crops.

2) Improvement of Existing Farm-to Market Road (Influence area: 930 ha)

- Savings of vehicle operation costs (VOC),
- Savings of costs for routine road maintenance and periodic repairs,
- Enhancement of conversion in land use from less profitable coconuts to profitable vegetable plantation (development effects), and
- Reduction in post-harvest losses during the transportation of farm products.

(1) Irrigation benefits

Net crop production values under future condition without the Project are estimated at ₱ 24,965 per ha as shown in Table 9.1.1, while these values will greatly increase up to ₱ 210,498 per ha under with project condition as shown in Table 9.1.2. Incremental benefits by irrigation development will be ₱ 185,533 per ha, or ₱ 59,370 thousand in total for an irrigation area of 320 ha, as given below:

Net Incremental Irrigation Benefits

Items	Without Project	With Project	Increment
Project area: 320 ha			
1) Irrigation area (ha)	320	320	0
2) Average NPV per ha (₱)	24,965	210,498	185,533
3) Total NPV (₱ thousand)	7,989	67,359	59,370

(2) Benefits from the improvement of farm-to-market roads

Unit savings of VOC are assumed to be ₱ 0.75 per km for tricycle and ₱ 2.13 per km for jeepney. Road maintenance cost savings are based on the difference in the routine maintenance and repair costs between with and without the Project. The unit maintenance cost savings are estimated at ₱ 82.29 per m per annum. It is assumed that the existing coconuts plantation of 600 ha within the road influence area (RIA) will shift to commercial vegetable production. Future crop production in RIA is estimated on the basis of the cropping intensity of 200 %. It is also assumed that the road improvement will contribute only 50 % of such incremental benefits.

Incremental benefits accrued from the improvement of farm-to-market roads are estimated at ₱ 28,888 thousand in total, comprising ₱ 3,809 thousand from VOC savings, ₱ 1,525 thousand from maintenance cost savings, ₱ 3,458 thousand from crop production increase in the existing non-irrigated vegetable farms (330 ha), and ₱ 20,097 thousand from the shift from the existing coconut plantation to vegetable production (600 ha).

Net Incremental Road-Related Benefits

Items	Without Project	With Project	Increment
1) Road Influence Area (ha)			
- Existing rainfed vegetable farm	330	330	0
- Shift from coconuts to vegetable	600	600	600
Coconuts	600	-	-600
Vegetables	-	600	600
2) Average NPV per ha (₱)			
- Existing rainfed vegetable farm	24,965	35,443	10,478
- Shift from coconuts to vegetable	1,949	35,443	33,494
Coconuts	1,949	-	-1,949
Vegetables	-	35,443	35,443
3) Total NPV (₱ '000)			
- Existing rainfed vegetable farm	8,238	11,696	3,458
- Shift from coconuts to vegetable	1,169	21,266	20,097
Coconuts	1,169	0	-1,169
Vegetables	0	21,266	21,266
- Total NPV (₱ '000)	9,408	32,962	23,554
4) VOC Saving (₱ '000)			
- Agricultural traffic	471	234	237
- Non-agricultural traffic	203	101	102
- Passengers traffic	6,848	3,378	3,470
- Total VOC Saving (₱ '000)	7,522	3,713	3,809
5) Maintenance Costs Saving (₱ '000)	1,571	46	1,525
Total Incremental benefits (₱ '000)			28,888

9.1.3 Economic costs

The financial project costs excluding the transfer payment and price contingencies consist of 1) construction cost for project works, 2) O&M equipment, 3) administration costs, 4) engineering services, 5) land acquisition and 6) physical contingencies. The financial costs were converted to the economic costs by applying a commodity specific conversion factor (CSCF) of 0.82 for local currency portion. The economic cost is estimated at ₱ 274.7 million in total as summarized below. The annual economic O&M costs are estimated at ₱ 5.4 million.

Economic Project Cost

(Unit: ₱ '000)

Item	Financial Costs			Economic Costs
	F/C	L/C	Total	
1. Detailed Design	10,034	4,819	14,853	13,986
2. Construction Works	106,406	108,192	214,598	195,123
- Irrigation Works	43,626	31,664	75,290	69,590
- Farm-to-Market roads	53,537	59,594	113,131	102,404
- Trading Posts	4,761	7,192	11,953	10,658
- Training and Extension Center	2,597	5,898	8,495	7,433
- Soil Conservation works	657	3,179	3,836	3,264
- Rural Water Supply system	1,228	665	1,893	1,773
3. O&M Equipment	10,021	2,210	12,231	11,833
4. Administration Cost	72	2,870	2,942	2,425
5. Engineering Services	20,790	4,740	25,530	24,677
6. Land Acquisition	0	2,065	2,065	1,693
7. Physical Contingencies	14,732	12,489	27,221	24,973
8. Price Contingencies	16,885	30,517	47,402	-
Total	178,940	167,902	346,842	274,710

Notes: Funds for preparatory works for project implementation in 1995 are excluded from economical project cost because the funds are disbursed from annual fiscal budget of the governments.

9.1.4 Economic evaluation

Based on the above assumptions, economic costs and benefits are computed for the period 1996 - 2025 (30 years) as shown in Table 9.1.3. The Economic Internal Rate of Return (EIRR) of the overall project is estimated at 18.5 %.

In order to evaluate soundness of the project against possible adverse changes, sensitivity analysis is made as follows:

Result of Sensitivity Analysis

Case	EIRR (%)
Original Case	18.5
Case 1: Project cost overrun by 20%	17.2
Case 2: Benefit decrease by 20%	15.3
Case 3: Delay in construction for 2 years	14.9
Case 4: Combination of Case 1 and 2	14.2
Case 5: Combination of Case 1 and 3	14.0
Case 6: Combination of Case 2 and 3	12.6
Case 7: Combination of Case 1, 2 and 3	11.7

9.2 Risk Analysis

Various recommendations or proposals are made on operation and maintenance of the project as well as environmental preservation of the area. They are prerequisites for the attainment of the anticipated project benefits and will adversely influence the project feasibility, if not implemented properly, as shown in the previous section. These recommendations and proposals are reemphasized here:

1) Employment of environmental mitigation measures and restoration of environment damaged by construction activities.

2) Provision or reinforcement of extension services to encourage farmers adopting soil erosion control measures and improved farming practices.

3) Establishment and strengthening of marketing cooperatives to enable farmers to gain bargaining power and governmental support for it.

4) Establishment of Irrigators' Associations for sustainable operation and maintenance of the facilities and governmental support for them.

5) Allocation of necessary budgets for the activities of concerned governmental agencies and cooperation and coordination between them.

6) Implementation arrangement within and between concerned agencies for smooth project implementation and early attainment of expected project benefits.

9.3 Project Impact on Future Farm Income

The impact of the project on beneficiary farmers was examined by analyzing an increase in farm income for typical farms. Two types of farmers are recognized in this project: those who have vegetable farms to be irrigated under the Project and those who have farms to be continuously under rainfed condition but be benefited by road improvement. Farm budget analyses were made for the typical farmers both under with and without project conditions. The results of the analyses are given below.

Farm Budget Analysis for Typical Farmers

(Unit: ₱)

Items	Without Project	With Project	
		Irrigated area	Rainfed area
Average vegetable farm size	-	0.46 ha	0.62 ha
1. Household Income (A)	50,000	146,200	88,600
- Vegetables	21,400	140,100	70,500
- Other agricultural crops	7,600	6,100	7,600
- Non-farm incomes	21,000	0	10,500
2. Expenses (B)	43,100	85,700	62,900
3. Payment Capacity (C = A - B)	6,900	60,500	25,700
4. Payment to be required (D)	200	5,100	1,900
- O&M costs for irrigation facilities	0	1,400	0
- Cooperative fee	200	3,700	1,900
5. Surplus (C - D)	6,700	55,400	23,800

The result of the analysis indicates that the financial condition of the farmers could be improved considerably after the project implementation. Necessary expenses in the future, operation and maintenance costs of the project facilities as well as the cooperative fee being proposed in the project is slight comparing with the payment capacity in both farm categories. It is concluded, therefore, that the improvement in farmers' income will enable farmers to bear the necessary expenses and create a large surplus.

9.4 Socio-economic Impacts

In addition to direct benefit counted in the economic and financial evaluations, various secondary and intangible benefits are expected from the Project. Major socio-economic impacts are as follows:

1) Environmental preservation

The project can not only prevent further deterioration of land resources in the Study area but also improve agricultural land productivity by encouraging farmers to adopt soil erosion control measures. This will result in the preservation of remaining natural forests in Mt. Banahaw- San Cristobal National Park and Public Forest Lands.

2) Environmental protection in downstream area

Promotion of soil conservation and environmentally friendly farming practices by the project will result in improving water quality in the downstream area, including Laguna Lake.

3) Increase in employment opportunity

The project implementation will increase employment opportunity in the Study area in terms of farm labors and construction workers. In addition,

enhancement of marketing activities will also generate the employment in the related sectors.

4) Improvement of local transportation

The local transportation within the Study area will be improved considerably by the improvement of the existing barangay roads. This will not only enhance the marketing activities of vegetables but also contribute to the improvement of accessibility and communication between villages at high altitudes and nearby towns.

5) Constant supply of vegetable to Metro Manila

The project area is located near the large market in Metro Manila as well as blessed with favorable natural condition for vegetable production. The project will enable the area constantly supply high-demand vegetables to Manila, particularly during off season.

9.5 Technical Feasibility

The proposed facility plan is technically appropriate because all facilities can be constructed by the common methods in the Philippines. The irrigation facilities simply consists of the concrete intakes, pipeline, concrete farm ponds, common hydrants and so on. The roads and buildings are also simple structures. All facilities require only easy O&M works.

In the Project plan, some improved technologies such as water saving irrigation, scheduled farming and marketing, and on-farm soil conservation in the area. Such farming and marketing technologies are practiced in Baguio, and soil conservation is promoted nationwidely by DENR. Therefore, these technologies shall be introduced into the beneficial farmers through effective use of the Upland Horticulture and Irrigation Technology Center and Soil Conservation Extension Center.

9.6 Insttitutional Feasibility

For all Project componets, Project Steering Committee shall undertake overall implementation works, and then O&M Committee shall undertake overall O&M works. The establishment of the two Committees shall contribute financial and technical arrangement among the responsible agencies and then smooth Project execution.

Besides, the beneficiaries' organizations of IAs and Marketing Cooperatives shall be newly established within the Project area. That was generally accepted by the beneficiaries at the public consulting meetings. Further, since those organizations commonly exist in the

Philippines and some chief farmers have studied such organizational avtivities at Baguio, the institutional framework for the Project is considered as feasible.

9.7 Environment Impact

Soil erosion and destruction of natural vegetation are typical environmental impacts from irrigation and road development in the uplands. However, the Project is formulated paying much attention to avoiding minimizing such adverse impacts by employing mitigation measures that could impose significant environmental impacts. It is predicted, therefore, that the Project would not cause significant adverse impacts on the environment. Reversibly, the Project would encourage farmers to perform sustainable agriculture through extension services of soil conservation practices.

Very few land acquisition and no removal of houses are designed with the Project implementation, and the daily livelihoods of residents in the Project area will not be suffered by any negative impacts directly from the Project implementation. As the indirect impacts to the rural societies, it is predicted that some unavoidable development gaps may occur in future between the irrigated areas and the other area due to the limited irrigable area in the Project, although other components are planned to equally benefit the farmers in the area. However, the gap will be not so severe because other project components will generate other benefits over the Project area, so that the livelihood conditions will be considerably improved even in the rainfed area. It will be expected that the livelihoods over the rural area including outside of the Project area will be uplifted by the diffusion of the new technologies for marketing, soil conservation, horticulture and irrigation from the Project. In addition, improvement of the roads will contribute greatly for better mutual understanding in the society of the Project area.

Probable environmental impacts from irrigation development and road improvement, and their mitigation measures proposed by the Project are shown in the Table 9.5.1 and 9.5.2.

CHAPTER X RECOMMENDATIONS

10.1 Early Implementation of the Project

The Project is formulated primarily to check the everlasting devastation of the forests of Mts. Banahaw and San Cristobal attributing to poor living conditions and low farm incomes in the Project area. To improve these constraints of the area, accordingly, irrigation, marketing system and agricultural/soil conservation extension development are proposed in the Project. It is anticipated that the situation in the critical environmental areas would be gradually deteriorated unless urgent corrective measures are undertaken. Farmers are also very anxious for the implementation of the Project, especially for environmental preservation scheme, according to the results of the public consultation survey. The Project is verified to be technically sound and economically feasible with EIRR of 18.5 %. It is recommended, therefore, to implement the Project as early as possible.

10.2 Environmental Preservation

In order to ensure sustainable agricultural development and environmental preservation in the area, the following plans and recommendations are properly and timely carried out:

1) Encouragement for farmers who own farms within the Public Forest lands to apply for ISF program in order to provide them secure land tenure,

2) Strict control of any development activities in National Park area for the perpetual preservation of the remaining natural ecosystem,

3) Restoration of environment damaged by the project implementation,

4) Allocation of adequate budget and staff for the proper operation and maintenance of Soil Conservation Extension Center,

5) Monitoring and evaluation of forest resources in the Public Forest lands and the National Park area, and

6) Employment of proper construction methods to avoid severe soil erosion during the construction works.

10.3 Beneficiaries Participation and Land Acquisition

Farmers' participation is an important and effective approach for the successful implementation of the Project. It shall be promoted at detailed design, construction and project

O&M stages. Land acquisition is one of the most time-consuming factors for project implementation. Although special attention was paid to minimize the land area required for construction, approximate 1.9 ha of land is still required for construction of the proposed facilities. The land acquisition should commence as early as possible through a series of public consultation and focus group discussions.

10.4 Project Implementation Arrangement

NIA will be the lead executing agency for project implementation. Other agencies such as DA, DENR, DAR, PGL, Municipal governments of Nagcarlan, Liliw and Majayjay will also participate in the implementation of the proposed project. It is recommended that a Project Steering Committee (PSC), comprising all the related agencies and chaired by the Director of NIA Region IV, be established in order to ensure close coordination among them. PSC should demarcate responsibilities and allotment of funds of each agency before the commencement of the construction works.

10.5 Responsibility for O&M

After completion of the construction works, respective governmental agencies and beneficiaries' organizations shall undertake necessary O&M works for the facilities and provide supporting services for beneficiaries. It is recommended that the O&M Committee (OMC) be organized in order to provide overall activities necessary for the maximization of the entire project benefit derived from the Project. OMC shall make decisions on demarcation of responsibilities and allotment of funds of each agency and/or organization. OMC shall be established before the completion of the construction works.

10.6 Operation Rule of Terminal Irrigation Practices

IAs established under the supervision of NIA are responsible for overall irrigation activities, such as maintenance of irrigation facilities, irrigation planning, collection of irrigation fee, etc. To accomplish sustainable O&M activities by IAs, guidelines and operation manuals regarding IAs' managerial organizations and irrigation practices shall be prepared with technical assistance of NIA. In addition, minimum responsibilities of beneficiaries for soil conservation scheme shall be prescribed in those guidelines for the prospective extension of land use after the completion of the Project.

10.7 Establishment of Marketing Cooperatives

It is inevitable to establish marketing cooperatives in the area not only to strengthen bargaining power of farmers but to facilitate collective production programming, procurement of farm inputs and transfer of production and marketing technologies. Municipal governments should support farmers in establishing cooperatives and coordinate their activities.

10.8 Strengthening of Credit Facilities

Ease of the access to the credit facilities is very important for their farming and marketing activities under the Project. A half of the farmers in the Project area applies to a special loan program provided by the provincial government of Laguna. The ISF program provides credit to organizations of farmers, and the promotion of participation to the ISF program is keenly recommended. There is a real need to establish a credit facility which is easily accessible by individual farmers. For the long term, it is recommended that cooperatives have a function as credit facility using reserved fund saved by members.