

4.4. Methodology of Irrigators' Associations Establishment

4.4.1. General

(1) Necessity for Establishment of Irrigators' Association (IAs)

As referred to previously, the NIA's operation and maintenance work in the national irrigation systems covers all facilities except for those in the stream lower than the turnouts. The national investments for irrigated agriculture development projects are commonly borne fully or partly by governments so as to meet requirements of national agricultural policies and demand-and-supply of foods through encouraging agricultural activities.

The Philippine government has taken a policy of total investment by the government in agricultural development until those beneficiary farmers are well developed and are capable of paying the investment. On the other hand, the post-project O & M services for major facilities are commonly carried out by either method in the Philippines, NIA has rendered O & M services for major irrigation facilities, and the farmers have responsibility for O & M works on on-farm level facilities the necessary costs for which have been collected from beneficiary farmers concerned as "irrigation fees" at a fixed rate in every cropping season.

Originally, however, it was deemed appropriate that beneficiary farmers should be responsible for making O & M services of the facilities and bear the necessary costs. As described in the Chapter on the Project Area, the critical issue in this respect in the AMRIS area is similar in nature to the other projects in that the accumulated national expenditures have much pressed the national budget. As a countermeasure to alleviate heavy budgetary burden, it is recommended that the beneficiary farmers shall be formed into groups for carrying out part of the O & M works of the facilities.

Such works by beneficiary farmers themselves will enable NIA to render much more quality services in irrigation water supply.

In other respect, NIA has long been taking the initiative in the major part of planning and construction of the national irrigation projects, and such project management and O & M services undertaken by NIA have had the beneficiaries away from these works. Under the circumstances, resolution of this problem will require the establishment of an organically close relationship between NIA and beneficiary farmers through appropriate organization of proposed Irrigators' Associations.

(2) Specific Tasks of Irrigators' Association

The farmers' groups or association relating to farm production will cover various tasks such as procurement of farming materials, crediting, sales of materials, agri-extension services, agrarian reform, and so forth.

It is no exaggeration that the multiplier effects created by the functions of the above farmers' group for agricultural production, irrigation water supply and O & M services for facilities have had significant effect on farm management. There will be no organization superior in function to a comprehensive organization for successful accomplishment of the said purposes. At present, however, a variety of agriculture policies taken by government will cause difficulties in making up a comprehensive organization in a short period.

From these viewpoints, the major tasks of the Irrigators' Association (IA) should be, in principle, to carry out O & M and rehabilitation of the local irrigation/drainage facilities, roads and water management, and to collect the necessary irrigation fees. It is suggested, however, that the said organization should be raised to a comprehensive agricultural production organization through gradual staged development in future.

(3) IA's organization by Staged Development

The Philippine rules define that the beneficiary farmers should bear part of project construction costs and the necessary operation and maintenance costs. Besides the national irrigation projects, NIA shall control the national pumping irrigation projects and communal irrigation project. The communal irrigation projects, as a rule, shall be implemented by NIA through feasibility study with designing and surveying in details after receiving project application submitted by 15 representatives of beneficiary farmers. Such projects, when completed, will be handed over to beneficiary farmers on conditions that the beneficiary farmers shall bear the necessary project costs and carry out the O & M works. The national irrigation projects managed by NIA in every respect and part of the project costs shall be recovered without interests by the beneficiary farmers. Consequently, the successful management and control made by IAs for larger scale projects in size and facilities will require a gradual and steady development of the IAs according to the results of prudent study on growing process and capability of the IAs.

The irrigation water is commonly supplied to terminal facilities through the main, lateral and sub-lateral canals from the diversion facilities. Conflicts of interests among IAs and individual members have often occurred over close relationship with facilities provided in the Project. Under the circumstances, the turnover of the facilities to the proposed irrigators' associations shall be made step by step from the transfer of the on-farm level facilities as first stage to the sub-lateral canal systems for their successful O & M services. Then the transfer of the second and the third stages shall be proceeded from the lateral canal systems to the main canal systems for covering the O & M works of the larger areas.

(4) Methodology of Establishment of Irrigators' Associations

A successful establishment of an irrigators' association will essentially require beneficiary farmers to voluntarily and positively participate in it.

It is deemed indispensable to render government financial assistance in the transitional period and powerful administrative guidance throughout the period. At present, NIA has been trying a variety of methods for the purpose, each of which has its own merits and demerits. The AMRIS Project, however, will employ a bottom to top method to take farmers as the terminal group so as to have a gradual development of the organization available, through the FIOP (Farmers Irrigator Organizer Program) that the leading farmers should be the core organizer for expansion of the association.

(5) Time Required for Establishment of Association

A gestation period for organizing the association should be studied taking into account such factors of associations as size, number of members, administrative capacity of NIA, staffing plans, financial assistances available, procedures and components of organization, training of organization staffs, etc.

The first stage organization of farmers will be made on the basis of about 120 ha to 200 ha to be commanded by sub-lateral, totaling about 240 associations in number, each of which will consist of about five groups per unit of turnout level covering 28 ha (total number of groups: about 1,230). Improvement and consolidation of the on-farm level facilities are considered vitally important for assurance of the farmers' consensus for the works, and a successful establishment of an association will take about five years in view of the process of various construction works and partial benefit accrual from the Project, etc. Furthermore, the above 240 associations shall be divided into three major groups from

viewpoints of staffing plan for administrative guidance and training, and the services of these three groups start in the first project year, the second and the third, respectively, for effective organization procedures.

4.4.2. Size and Service Components of Irrigators' Association

(1) Appropriate Size of Irrigators' Association

The size of the irrigators' associations will be determined by the areas commanded by on-farm facilities, sub-laterals, laterals and main canal systems, respectively, since the organization is founded on the number of beneficiary farmers from the on-farm facilities and the related beneficiary acreages therefrom.

The average commanded areas by existing facilities are shown as follows.

<u>Kinds of Canals</u>	<u>Average Beneficial Acreage</u>
1. Turnout Level	<u>28 ha</u>
2. Sub-laterals	
North Angat Main Canal	133 ha
South Angat Main Canal	105 ha
<u>Average</u>	<u>120 ha</u>
3. Laterals	
North Angat Main Canal	1,274 ha
South Angat Main Canal	741 ha
Tibagan Pump	643 ha
Upper Maasim Diversion	1,055 ha
Lower Maasim Diversion	530 ha
<u>Average</u>	<u>925 ha</u>

The above figures shown an average of 31,485 ha which is covered by existing facilities.

A review of the canal system which covers 34,965 ha including 3,480 ha of newly-irrigable areas for grouping by sub-laterals and turnout levels has resulted as follows regarding the number of associations to be organized in the first stage and the number of the terminal groups and the irrigable areas.

<u>Organization</u>	<u>No. of Organization</u>	<u>Irrigable Areas</u>
Terminal Groups	1,227	28 ha
Irrigator's Association	240	146 ha

(2) Service Items of Irrigators' Association

As discussed previously, the size of IAs is in principle such that one unit of IA comprises about 150 ha of the irrigable area commanded by sub-laterals. The major service items of the associations are to carry out O & M works on those canal systems covering less than 150 ha and the related appurtenant structures, water distribution, control of the terminal facilities, collection of irrigation fees from the member farmers in the terminal areas, and effective operation of the association. On top of the above, necessary agricultural production activities and those related thereto shall indirectly be the responsibility of the associations. Establishment of the Irrigators' Association requires that they have a legal registrar as juridical person, articles of association, and other various procedures completed.

And at a proper time after establishment, NIA and newly established association should make a written agreement for partial turnover of the facilities and the related mutual confirmation on the management. The major works to be performed are as follows:

- to establish cropping acreages, cropping periods and cropping pattern, and to make reports to NIA divisions concerning the above matters,
- to formulate a water distribution plan for terminal groups in the Project Area, and to perform O & M services for the respective turnouts, and to make regular reports to NIA about the results,
- to give guidance and instructions on the water distribution to the terminal groups,
- to formulate an O & M plan for the national irrigation/drainage system turned over to the terminal groups and to carry out effective O & M services,
- to give guidance and advice to the beneficiary farmers on O & M of the on-farm facilities,
- to prepare and arrange necessary cadasters and cadastral maps of the beneficiary farmers in the Project Area,
- to collect the irrigation fees and association operation charges from beneficiary farmers and to pay necessary fees to NIA, and
- to handle and treat the matters concerned with association activities other than those referred to as above.

4.4.3. Executive Body for Establishment of Irrigators' Association and Mobilization Plan

(1) Organization and System of NIA

As illustrated in Figure 4.1-1, the executive organization for establishing the associations consist of the Administrative Division, Institutional Development Division Construction Division, Operation and Maintenance Division under the control of NIA's AMRIS Office Irrigation Superintendent-V, and various committees.

The Institutional Development Division (IDD) of NIA will be fully and directly responsible for establishing the associations, and other NIA's divisions shall cooperate with IDD for smooth execution of the works.

In commencing the Project works, the proposed North and the South Zone Engineer Offices are to be provided in the respective sites, and the former will control seven working stations existing as No.6 to No.12, while the latter will control five working stations existing as No.1 to No.5. These two offices are responsible for establishment of the irrigators' associations and construction supervision as well as O & M as present routine works. Among them, the establishment of the associations will be carried out concurrently with the O & M works, and the officer (Irrigators' Association Worker = WMT) in charge of association relating works, who shall be assigned by IS-V shall assist the Farmers Irrigators' Organizer (FIO) who are to represent the beneficiaries in promotion of the association establishment. The said WMTs shall cover the Area for six to seven proposed associations in general, and two assistants selected from among the ditch tenders will be assigned for one WMT so as to promote the procedures smoothly.

(2) Provision of Committees

In the process of establishing the associations, a variety of committees should be provided as follows for smooth execution and fair evaluation and guidance of the works.

1) Management and Evaluation Committee

The bimonthly regular committee shall be held for evaluating the work and giving appropriate advice to the staffs concerned with reference to the reports to be submitted by other committees, works progress, critical issues and action plans, etc. and an extra session shall be opened from time to time when the necessity arises. The committee consists of the following members.

- Chairman : Regional Irrigation Director-III
- Members : Representative of Farmers Assistant Department of NIA Central
- : Representative of System Management Department of NIA Central
- : Irrigation Superintendent-V of AMRIS
- : Manager of Operation and Maintenance Division of Regional Irrigation Office-III (RIO-III)
- : Manager of Agricultural Coordination and Development Division of RIO-III
- Secretaries: Manager of Institutional development Division in AMRIS
- : Manager of Operation and Maintenance Division in AMRIS
- : Manager of Construction Division in AMRIS
- Observers : Consultants

2) Coordination Committee

The committee will discuss and study the matters regarding the establishment of the association that the IDD plans, executes and evaluates, and furthermore, will prepare the data/information and reference materials of the construction works, O & M works of existing facilities, design of on-farm facilities and coordinating work on the cropping pattern during the construction period for the Management and Evaluation Committee.

The Committee shall be held on a monthly basis with the following members.

Chairman	:	Irrigation Superintendent-V of MRIS
Members	:	Irrigation Superintendent-III of AMRIS
	:	Manager of IDD of AMRIS
	:	Manager of OMD of AMRIS
	:	Manager of CD of AMRIS
	:	Manager of AD of AMRIS
	:	Chief of North Zone engineers Office
	:	Chief of South Zone Engineer Office
Secretaries:	:	Chief of Farmers Organization Section of AMRIS
	:	Chief of Engineering Supporting Section of AMRIS
Observers	:	Manager of ACDD in RIO-III
	:	Representative of FAD in NIA Central
	:	Consultants

(3) Employment of Farmer Irrigators' Organizer (FIO)

A FIO will be selected by following the procedures below.

For the unit area (acreage: abt. 150 ha) along the sub-lateral where an association is to be established, the NIA staffs of SWMT, WMT and IDD will make a preliminary selection according to the following rules.

- (i) A candidate for FIO should be well-qualified as a beneficiary farmer in the proposed association unit area, and a high school graduate or equivalent.

- (ii) A existing compact farm association leader, if qualified as above will be given prefeential consideration as candidate.
- (iii) A leader or person who is in a position to take leadership in a local society like the Barangay can be selected as a candidate.

According to the above, candidates shall be selected from every group as proposed leaders of terminal groups, and then, the FIO shall be selected from these candidates. The preliminary selection will also be made for every working station by staffs of SWMT, WMT, DT, etc. IDD will check and study the candidates' lists submitted by each working station and then, the Coordination Committee will deliberate the results. The candidates who are finally selected after the deliberation of the Coordination Committee will be assigned as FIOs by the Office Chief of AMRIS (IS-V) with approval of the Management and Evaluation Committee. The groups of the beneficiary farmers, which shall be engaged in establishing the associations will consist of the following members to expedite the work:

- Farmer Irrigator's Organizers (FIO):
One FIO will be selected for an area of about 150 ha to be responsible for general matters of the establishment of the association
- Assistants to FIO: One assistant to FIO will be assigned for an area of about 30 ha, selected from the terminal group, so as to assist the FIO in the execution of the works and to be appointed as leaders of the Terminal Groups in future; consequently, five to six assistants will be assigned for one association

(4) Staffing Plan of NIA

The staffing plan of NIA for establishing the association is shown as follows:

(i) Institutional Development Division (IDD)	(25 persons)
Secretariat Staff to Division Chief	3 "
Engineering Supporting Section	6 "
Farmers Organization Section	16 "
(ii) North Zone Engineers Office	(84 persons)
WMT (Concurrent)	28 "
DT (Concurrent)	56 "
(iii) South Zone Engineers Office	(54 persons)
WMT (Concurrent)	18 "
DT (Concurrent)	36 "
<u>Total</u>	<u>163 persons</u>

The staffs of both the North and the South Zone Engineers Offices consist of WMT and DT, and shall serve in O & M works of the existing facilities together with the promotion of establishment of the associations and assistance of FIOs in giving appropriate advice. It is considered reasonable that the WMT and DT who have much knowledge and experience in O & M of the existing irrigation facilities in the Project Area and are in close contact with the beneficiary farmers, should give advice and guidance to the FIOs.

4.4.4. Methodology and Procedures for Establishment of Irrigators' Association (IA)

(1) Basic Policy for Establishment of Irrigators' Association

Necessity, functions and roles of the IAs have been discussed already, and the basic matters for establishing the IA are described herein.

The purpose of establishing the IA is to carry out the voluntary O & M works of the irrigation/drainage facilities in the Project Area and to organize the functional group to make sure the activities are carried out smoothly. The association should be organized through strengthening of the infrastructure with beneficiaries' consensus and then, the organization should be gradually expanded by evaluating and confirming the functions appropriately. The association in the Project Area should be established according to the scale of the irrigation facilities which the respective association can cover.

In the first stage, terminal groups (TGs) should be organized, and in the AMRIS Area except for the Upper Maasim Area, about 1,000 TGs have been established in approximately 29,400 ha, but at present they do not seem to function successfully. The existing Compact Farm should be decomposed so as to uplevel its function so that the TGs with about a 30 ha unit area can be provided firmly as strong core groups. And the relevant group leaders shall control foremen to be assigned for every supplemental farm ditch who can assist the group leader as well as being responsible for the O & M works for an Area of every 10 ha.

These TGs, joining several of them together, shall form an association on the basis of the sub-lateral canal unit. The FIOs who are to be employed by NIA shall be educated to become future presidents of the respective Irrigators' Associations as well as to be fully responsible for the association.

The TG leaders shall be educated to become assistants to the respective association presidents. Consequently, the scales of the respective associations and their composition will be as follows:

	TG leader (30 ha)	
	TG leader (30 ha)	foreman (10 ha)
IA (150 ha)	TG leader (30 ha)	foreman (10 ha)
	TG leader (30 ha)	foreman (10 ha)
	TG leader (30 ha)	

In the second stage, prudent evaluation shall be made on the functions of each IA, so that these IAs can be developed into the Federation of Irrigators' Association (FIA).

(2) Procedures of Establishing IAs

Major procedures for establishing IAs are illustrated in Figure 4.4-1. The major items shall cover five fields such as management and evaluation of the works, planning and coordination, guidance and education in the works, promotion of establishing the IAs and study of evaluation results and training. The summary below shows the targets and expected achievements in the respective fields.

1) Management and Evaluation

The major works are to control the progress of the general works for establishing IAs, to formulate plans, to try and solve problems concerned, to give evaluation and advice for the work, and furthermore, to give training and education to the staffs to be engaged in the works, to make coordination with NIA in personnel affairs (FIA, SFIO), budget issues etc.

2) Planning Coordination and Administrative Guidance

According to the comments and instruction/advices given by the Planning and Coordinating Committee, plans shall be made for work progress, and guidelines for administrative guidance shall be prepared and actual guidance given. Also, basic data collection and arrangement shall be made as well as exchange of opinions with beneficiary farmers and other general works summarizing the beneficiaries comments/requests, and preparation of improvement programs.

3) Organization Development and FIO's Activities

In this field, related activities will indicate the direction to promote the establishment of the IAs through following the establishment procedures which can be divided into three steps as under.

The first step will be the collection, arrangement and review of the data and information on the beneficiary farmers, agricultural environment, irrigation and drainage facilities, road systems, local administration and many other socio-economic condition prevailing in the Project Area.

On the other hand, based on the NIA's guidelines and various data and information, a campaign to establish the IA shall be taken up and promoted. In this case, a prudent study shall be made of reactions or responses of the beneficiary farmers and stress should be placed on the selection of strong core groups to be formed from the terminal groups and their development.

The second step will provide terminal groups involving 20 to 25 beneficiary farmers, respectively, through gradual development of the farmers groups other than the core groups; that is to say, this step can be referred to as the promotion step centering around the establishment of the terminal groups. In the process of grouping, a variety of problems shall be treated through evaluating the works at every stage. Furthermore, planning of the O & M works and rendering the said O & M services as well as auxiliary services for collection of irrigation fees and giving training. In other works, this step will cover complete organization of the terminal groups, O & M works for the on-farm facilities downstream from the turnouts and preparation of various reports to be submitted to NIA.

The third step will develop the associations into those covered by the sub-lateral canal unit from the terminal groups composed in the second step. In parallel with the expansion of organizations, the O & M works as well will be expanded from the terminal facilities to those in the terminals for 150 ha of beneficiary areas and turnouts which have been covered by NIA's O & M works, and also the irrigation fees shall be collected in trial. Besides, in the latter half of this step, the preparatory works shall be made with FIOs and TG leaders as cores, for establishing the association, giving training and education to beneficiary farmers on water management and operation/rehabilitation of terminal facilities, preparing cropping patterns and collecting irrigation fees.

The IAs shall provide the necessary four sections as above for pre-arrangement of the works. The last step will be to register the legal persons of the association under administrative guidance of NIA.

4) Action Research

The data/information collected by NIA's Coordination Section and FIOs' activities shall be analyzed and assessed, and according to the data collected by association-to-be, the respective works shall be diagnosed for each stage and the results shall be reported to the related committees.

With the results, some recommendations shall be made for reviewing the works from time to time, so that the appropriate reactions and correction/deviation can be made.

Together with these action researches, monitoring and evaluation of the works shall be continuously carried out at previously determined time and by adequate method.

5) Training Program

The training program will include the training and education of NIA staffs concerned as well as FIO members and beneficiary farmers. The respective training shall be carried out as timely as possible in parallel with the aforesaid works or before or after the said works so as to have better results.

The training of NIA staffs concerned shall be given regularly to upgrade the quality of services and technology for the association members in charge of the financial affairs, establishment of association and SFIO (Supervisor of the Farmers Irrigators' Organizers).

The training and education of FIOs and TG leaders shall be carried out in respect to clarification of the purpose and meaning of establishing association, the operator of the associations, water management techniques, O & M techniques of facilities and collection of irrigation fees. For FIOs, various technical training shall be given from time to time.

3) Plan for Association Establishment

The proposed year for establishment of association shall be commenced in the manner that the associations belonging to the same canal system shall be proceeded in procedures for establishment in the same year, and the association of those including the newly proposed development areas shall be given first priority, and in considering the relationship with construction plans, the details are shown below.

<u>Years</u>	<u>North Area</u>	<u>South Area</u>	<u>Total</u>	<u>No. of T.G.</u>
First Year	31	32	63	332
Second Year	48	32	80	421
Third Year	68	29	97	474
<u>Total</u>	<u>147</u>	<u>93</u>	<u>240</u>	<u>1,227</u>

The working station related and FIA related plans for establishment years of association are presented in 4.4-2.

4.4.5. Organization and Responsibility of the Association

(1) Organization of the Irrigators' Association

The Irrigators' Associations should be organized as illustrated in the organization chart in Fig.4.4-3 so as to carry out independently the O & M works of the facilities provided in the responsible area. The IA shall be headed by a president and vice-president, and have two units of administration and O & M for smooth management. The president shall directly give guidance and supervision on the O & M of the Terminal Groups.

The board of directors of the association as its policy-making organization shall consist of Terminal Groups' leaders to be assigned as directors.

(2) Staffing Plan of IAs

The staffing plan of the IAs is shown as follows:

President

Vice-president

Directors (TG leaders)

Staffs of administration unit

Staffs of O & M unit

The works that the respective staffs are responsible for are referred to as follows:

1) President

President shall conduct a general supervision of the managerial works of the association and give a guidance to T.G. leaders in their practices of O & M works.

2) Vice-president

The Vice-president shall assist the President in the general supervision of the IA and serve as acting-president during absence or leave of the President.

3) Directors (TG leaders)

The TG leaders, who represent the turnout commanding areas, shall be appointed to the directors of the IAs and keep close contact with about 20 farmers belonging to the turnout commanding 30 ha of farm lands so as to gather the requests of farmers for IA's O & M works and collection of irrigation fees and try to arbitrate between IA and farmers whenever various troubles and disputes arise. Furthermore, the TG leaders, shall be assigned to members of both the standing and ad-hoc committees of IA to participate in the discussion and determination of the IA's policy making. The members of the committees will be a chairman of the following committees.

Chairman of Irrigation Management Committee

Chairman of Maintenance Committee

Chairman of Irrigation Fees Collection

Chairman of Complaint Committee

4) Auditors

The auditors shall have right to execute the regular and special auditing of the financial standing of the IA, and have obligation to make reports on the auditing results to the related standing committee and the general assembly of the IA.

5) Staff of Administration Unit

The Administration Unit shall deal with the administration works including accounting and general office works. In particular, accounting works for the irrigation fees collected through each TG leader shall be executed by this unit; in other words, the unit shall treat the invoices of irrigation fees and the relevant receipts issued by NIA and handle the collected money to be paid to NIA.

6) Staffs of O & M Unit

The staffs belonging to this unit shall be engaged in the works of issuing, keeping and dispatching of the O & M related reports and documents such as weekly reports, monthly reports and other documents defined in the O & M regulations.

(3) Appointment of Staffs Required for IA

The necessary staffs for IA should be selected for appointment by the following order and method.

1) Terminal Group Leader

A TG leader shall be selected from among farmers by election or any other suitable method.

2) President, Vice-president and Director and Auditors

The TG leaders will be member of the Board of Directors, and the board meeting will select a president a Vice-president and auditors from the directors by election.

3) Chairman of Committees

The chairman of committees, which will be provided as standing committees or ad-hoc committees under the Board of Directors, shall be generally elected from the members of the committee.

4) Staffs of the Units

The President shall have the right to appoint staffs of the Units of Administration and O & M to handle the necessary works.

(4) O & M of On-farm Facilities

The irrigation systems included in the areas under jurisdiction of the IAs can be classified into two types; one is the area specified as IA's commanding area by sub-lateral (system Type-A) and the other is the area commanded by lateral system or main canal system with direct connection of turnouts (system Type-B). The relevant figure is presented as Fig.4.4-4. The O & M works to be executed by respective IAs are shown as follows:

a) System Type-A

As maintenance works for sub-lateral canals, the IAs' Foremen will render routine checking services, while the seasonal regular maintenance works and those made before canal operation will be carried out by many farmers to be mobilized by request of the Foremen through TG leaders. The necessary costs for these works shall be expended out of the account of the relevant IAs.

The O & M works for lateral canal systems shall be limited to the Area bounded by the neighbouring areas under other IA's administration.

On the other hand, the maintenance works for the terminal group areas of 30 ha, will be made by the group farmers themselves for the main ditches, supplemental ditches as collective activities together with cropping control at the on-farm level.

The gate keepers shall be responsible for the operation of all the turnout gates. The NIA will directly carry out O & M works on main canal and lateral canal systems.

b) System Type-B

In this case, the scope of O & M works shall cover the main farm ditches, supplemental farm ditches, and the turnouts connecting therewith.

In the case, however, that the water source of the canal system is out of the boundary of the jurisdiction of NIA, the IA concerned shall make maintenance works for the Areas under the control of the IA. The IA shall operate the turnout gates and farm ditches which exist within the Areas under the control of the IA.

4.4.6. Financial Assistance

The cost breakdown for establishing the association and the annual budget required are shown in Table 4.4-1 and 4.4-2 respectively. The major items of the cost include those of the committee and other meetings, transportations, employment for FIO and other miscellaneous items, and the cost per 1,000 ha of the beneficiary area was estimated at 349,000 pesos.

The cost required for the institutional development proposed in the Phase-1 stage is approximately 11.9 million pesos.

4.4.7. Providing Articles of Irrigators' Association

The proposed articles for the IA should contain the following fundamental items. The details are referred to in Appendix B.

- Name domicile and purpose
- Membership
- Rights and duties of membership
- Termination and suspension of membership
- Membership fees and dues
- Fixed deposit and savings deposit
- Membership meeting
- Board of directors and committees
- Officers
- Education and training committee
- Finance and development committee
- Irrigation management committee
- Audit and inventory committee
- Agricultural supervisory committee
- The dissolution and liquidation
- Operation and maintenance of irrigation facilities
- Other rules and regulations
- Use and disposition of association funds
- Miscellaneous provisions

4.4.8. Establishment of Federation of Irrigators' Associations

The IAs covering the Areas at the sub-lateral canal systems, while being operated, should be carefully analyzed and evaluated in terms of their status of management, capability and efficiency, so that they can result in establishing a federation of associations. Such a federation, consisting of six to seven IAs is called the Federation of Irrigators' Association (FIA). The study on the existing canal system has found that the average acreage of the benefitted farm lands commanded by lateral canals is about 1,000 ha.

Therefore, the average acreage of the benefitted farm lands under the control of one FIA would be in the range of 900 ha to 1,050 ha.

The scope of FIA-related O & M works will cover the sub-lateral systems and turnouts at the IA level, including a part of special sections of the lateral canal and turnouts to laterals and sub-laterals except for North Angat and South Main canals.

As illustrated in Fig.4.4-1 of the timetable of FIA establishment, the FIAs shall be established two years after the IAs are set up for carrying out the aforesaid O & M services.

Details of specific scope and responsibility borne by NIA, FIAs and IAs for O & M works and the land areas commanded by each IA are referred to in Appendix B as Tables B.5.2-4 to 5.2-5 and B.5.3-1 to 5.3-2.

The aforesaid matters are summarized as follows.

A. Phase-1

<u>Facilities</u>	<u>NIA</u> (km)	<u>IA</u> (km)	<u>Total</u> (km)
Main canal	47.0	-	47.0
Lateral	184.1	59.2	243.3
Sub-lateral	107.4	384.2	491.6
<u>Total</u>	<u>338.5</u>	<u>443.4</u>	<u>781.9</u>
Diversion dam	4.0	-	4.0
Pumping station	3.0	-	3.0
Distribution facility	Head gate check gate	Farm turnout	

B. Phase-2

<u>Facilities</u>	<u>NIA</u> (km)	<u>IA</u> (km)	<u>Total</u> (km)
Main canal	47.0	0	47.0
Lateral	34.4	208.9	243.3
Sub-lateral	0	491.6	491.6
<u>Total</u>	<u>81.4</u>	<u>700.5</u>	<u>781.9</u>
Diversion dam	Bustos, Upper Maasim	Lower and Third Maasim	4.0
Pumping station	0	3.0	3.0
Distribution facility	for lateral	Others	

TABLE 4.4-1 COST REQUIRED OF IAS ESTABLISHMENT FOR PHASE-1
(Per 1,000 hectares)

Work Description	Frequency	Persons	Amount	Remarks
1. Project orientation	Once	20	₹ 125	Refer to Fig. 4.4-1, item A.1.1
2. Management, evaluation committee	Once/two months	20	2,250	" " A.1.2
3. Recruitment of FIOs	Once	140	11,200	" " A.2.3
4. Coordination meeting	Once/a month	9	17,040	" " A.2.6
5. Supervisory, assessment meeting	"	9	17,340	" " A.2.7
6. Technical inputs to FIOs	"	42	138,240	" " A.2.8
7. Seminar of staff development	Once/four months	2	1,612	" " A.2.9
8. Assessment session	12 times	105	2,475	" " B.3.4
9. Terminal group meeting	Continuously	105	12,600	" " B.4
10. Irrigators association meeting	"	105	11,200	" " B.5
11. Travel, allowance for FIO and ITG	Continuously	42	66,150	" " B.4
12. Workshop on diagnostic work	"	L.S	800	" " C.1.1
13. Data gathering, processing	"	"	5,400	" " C.1.2
14. Data feedback and action planning	Once/four months	"	4,500	" " C.1.3
15. Monitoring and evaluation	"	"	4,500	" " C.2.2
16. Orientation and seminar of NIA staff	Three times	25	159	" " D.1.1
17. SFIO staff development	Once/four months	25	2,961	" " D.1.4
18. Pre-deployment training	Eight times	42	18,400	" " D.2
19. Pre-deployment practice	Once/a month	42	18,480	" " D.2
20. FIO development	Once/four months	42	14,107	" " D.2.6
<u>Total</u>			<u>349,539</u>	

TABLE 4.4-2 COST REQUIRED OF FIAs ESTABLISHMENT FOR PHASE-2

Work Description	Frequency	Persons	Amount	Remarks
1. Management, evaluation committee	Once/a month	52	1,500	Refer to Fig. 4.4-1, item 1
2. Supervisory, assessment and planning	Twice/a month	279	10,960	" "
3. Coordination meeting	Once/a month	279	10,960	" "
4. Recruitment of IA officer	Once	L.S	1,530	" "
5. Pre-deployment training	"	12	1,740	" "
6. Formal staff development	"	12	2,310	" "
7. Session with supervisor	3 times/a month	12	47,520	" "
8. Workshop on diagnostic work	Once	L.S	800	" "
9. Data gathering, documentation	Continuously	"	4,500	" "
10. Data feedback and action plan	Once/four months	"	3,000	" "
11. Monitoring and evaluation	"	"	1,500	" "
<u>Total</u>			<u>86,320</u>	

FIGURE 4.4-1 MAJOR ACTIVITIES ON THE ESTABLISHMENT OF IRRIGATORS ASSOCIATIONS 1/4

Major Activities	Phase and Major Activities																			
	1st				2nd				3rd				4th				5th			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
I. Phase-1	Establishment of IA at Sub-lateral Level																			
A. <u>Management and Coordination</u>	Mainly NTA activities																			
1. <u>Management Evaluation</u>	Orientation of the project development																			
1.1. <u>Project Orientation</u>	Management and evaluation of overall project implementation on the institutional development																			
1.2. <u>Management and Evaluation Committee</u>	Once every two months																			
2. <u>Coordination</u>																				
2.1. <u>Data Collection and Assessment</u>	Data collection and assessment of beneficiary farmers in the project area																			
2.2. <u>Activities Planning</u>	Preparation and revision of overall project activities planning																			
2.3. <u>Selection and Recruitment of FIO</u>	Selection and recruitment of 240 farmers irrigators organizers (FIO)																			
2.4. <u>Assignment of SFIO</u>	To assign supervisor of FIO from WMT in respective sections (SFIO)																			
2.5. <u>Consultation with Farmers</u>	Consultation with farmers on the establishment of IA and on-farm development																			
2.6. <u>Coordination Meeting</u>	Work progress and coordination meeting between coordination group and FIOs																			
2.7. <u>Supervisory, Assessment Meeting</u>	Assessment of the activities																			
2.8. <u>Technical Inputs to FIOs</u>	Guidance of the organizational and systems management to FIOs																			
2.9. <u>Staff Development</u>	Formal staff development seminar																			
2.10. <u>Partial Turnover</u>	Partial turnover documentation																			
B. <u>Organizational Development</u>	Mainly FIOs activities																			
1. <u>Survey/Data Collection</u>	Identify some group leaders in each terminal group																			
1.1. <u>Identify Group Leader</u>	Data collection of local condition and general information																			
1.2. <u>Data Gathering and Verify</u>																				

FIGURE 4.4-1 MAJOR ACTIVITIES ON THE ESTABLISHMENT OF THE IRRIGATORS ASSOCIATIONS 2/4

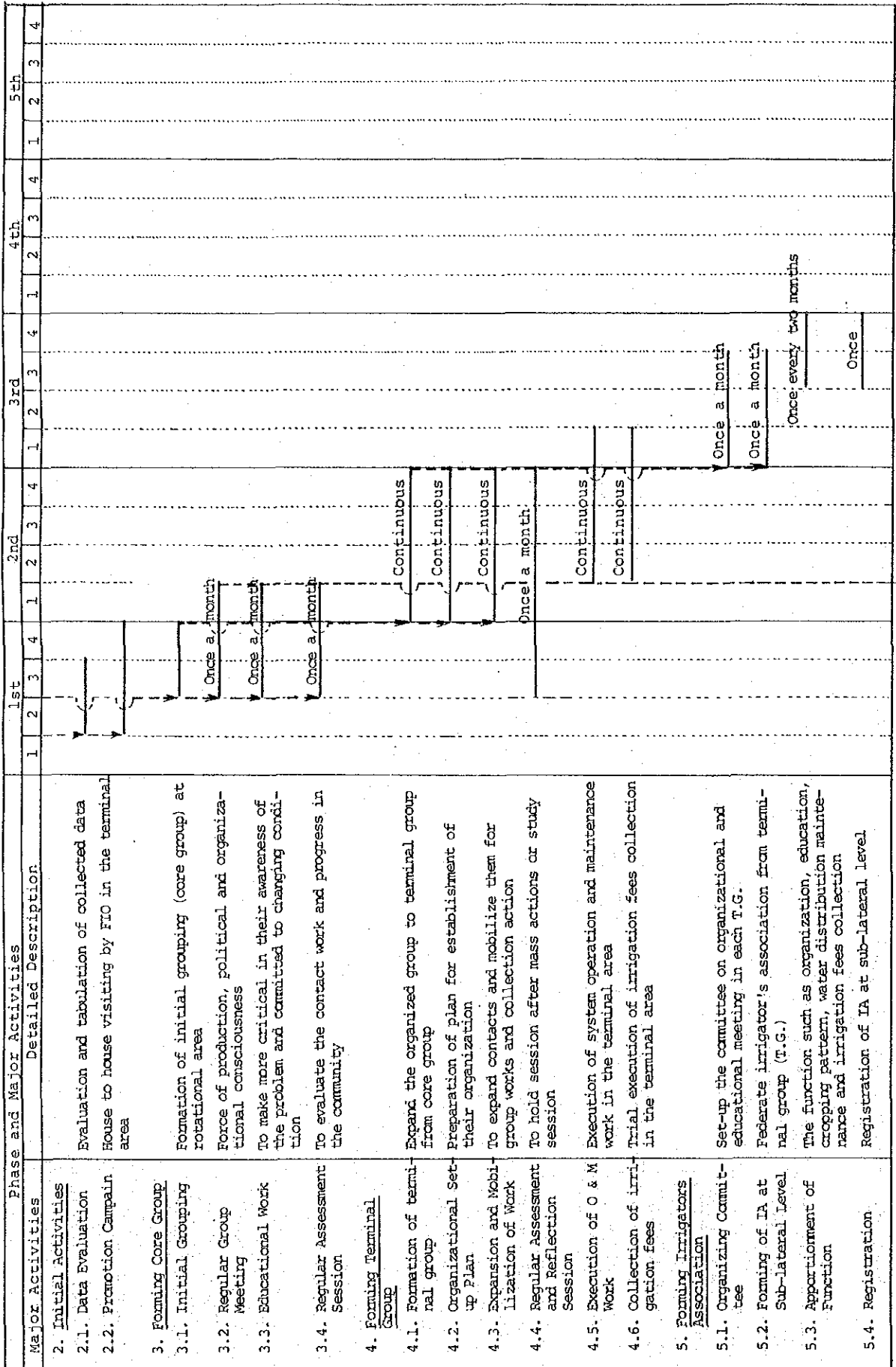
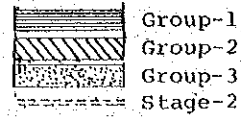


FIGURE 4.4-1 MAJOR ACTIVITIES ON THE ESTABLISHMENT OF THE IRRIGATORS ASSOCIATIONS 4/4

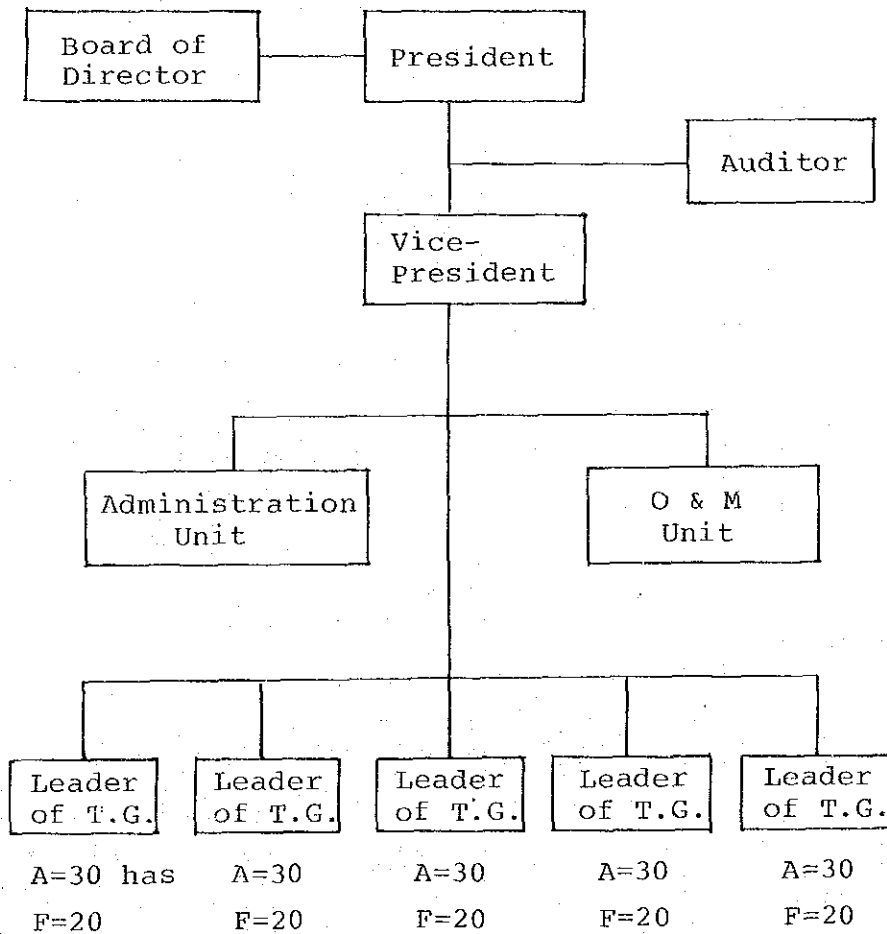
Major Activities	1st				2nd				3rd				4th				5th			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<p>II: Phase-2</p> <p>Establishment of Federation of Irrigators Association (FIA)</p> <p>1. Management and Evaluation Committee</p> <p>2. Coordination of the Activities</p> <p>2.1. Activities Planning and Documentation</p> <p>2.2. Assessment and Coordination Meeting</p> <p>3. Organizational Development</p> <p>3.1. Organizational Set-up Plan</p> <p>3.2. Registration</p> <p>4. Training Program</p> <p>4.1. O & M Practice</p> <p>4.2. Irrigation Fees Collection</p>	<p>Detailed Description</p> <p>Management and evaluation of overall project implementation on FIA</p> <p>Activities planning of forming FIA and preparation of document related Assessment of activities and resolution of problem areas</p> <p>Preparation and creation of the organization of FIA at each lateral level</p> <p>Registration of each FIAs</p> <p>Training of O & M practice of the systems</p> <p>Training of irrigation fees collection procedures and practice</p>																			
	<p>Once every two months</p> <p>Once a month.</p> <p>Continuously</p> <p>3 time every 2 months</p> <p>3 time every 2 months</p>																			

TABLE 4.4-2 ESTABLISHMENT SCHEDULE OF I.A.



W.S.	IA-Stage 1		IA-Stage 2		Schedule																											
	No of IA	No of TG	Name of IA	Area (ha)	1st	2nd	3rd	4th	5th	6th	7th																					
I	5	34	SM-1	746																												
	9	70	TP	1,286																												
				2,032																												
II	4	24	SM-2	532																												
	5	17	SM-3	645																												
	12	43	SM-4	1,687																												
				2,864																												
III	7	34	SM-5	1,078																												
	9	36	SM-6	1,066																												
	8	32	SM-7	1,003																												
				3,147																												
IV	10	53	SM-8	1,538																												
	8	54	SM-9	1,305																												
				2,843																												
V	9	39	SM-10	1,245																												
	2	22	SM-11	552																												
	5	18	SM-12	814																												
				2,611																												
Total	93	476		13,497																												
VI	1	18	NM-1	341																												
	5	51	NM-2	1,023																												
	7	40	NM-3	985																												
	11	47	UM-1	1,409																												
	6	23	UM-2	702																												
7	30	UM-3	900																													
											5,360																					
VII	7	56	NM-4	1,276																												
	7	39	LM-1	1,059																												
	5	23	LM-2	680																												
				3,015																												
VIII	9	56	NM-5	1,610																												
	11	59	NM-6	1,610																												
	3	15	NM-7	550																												
				3,770																												
IX	4	18	NM-8	492																												
	17	73	NM-9	2,463																												
				2,955																												
X	9	28	NM-10	1,091																												
	4	19	NM-11	584																												
				1,675																												
XI	6	25	NM-12	891																												
	3	12	NM-13	439																												
	10	48	NM-14	1,430																												
				2,760																												
XII	6	29	NM-15	738																												
	9	42	NM-16	1,195																												
				1,923																												
Total	147	751		21,468																												
Grand Total	240	1,227	34	34,965																												

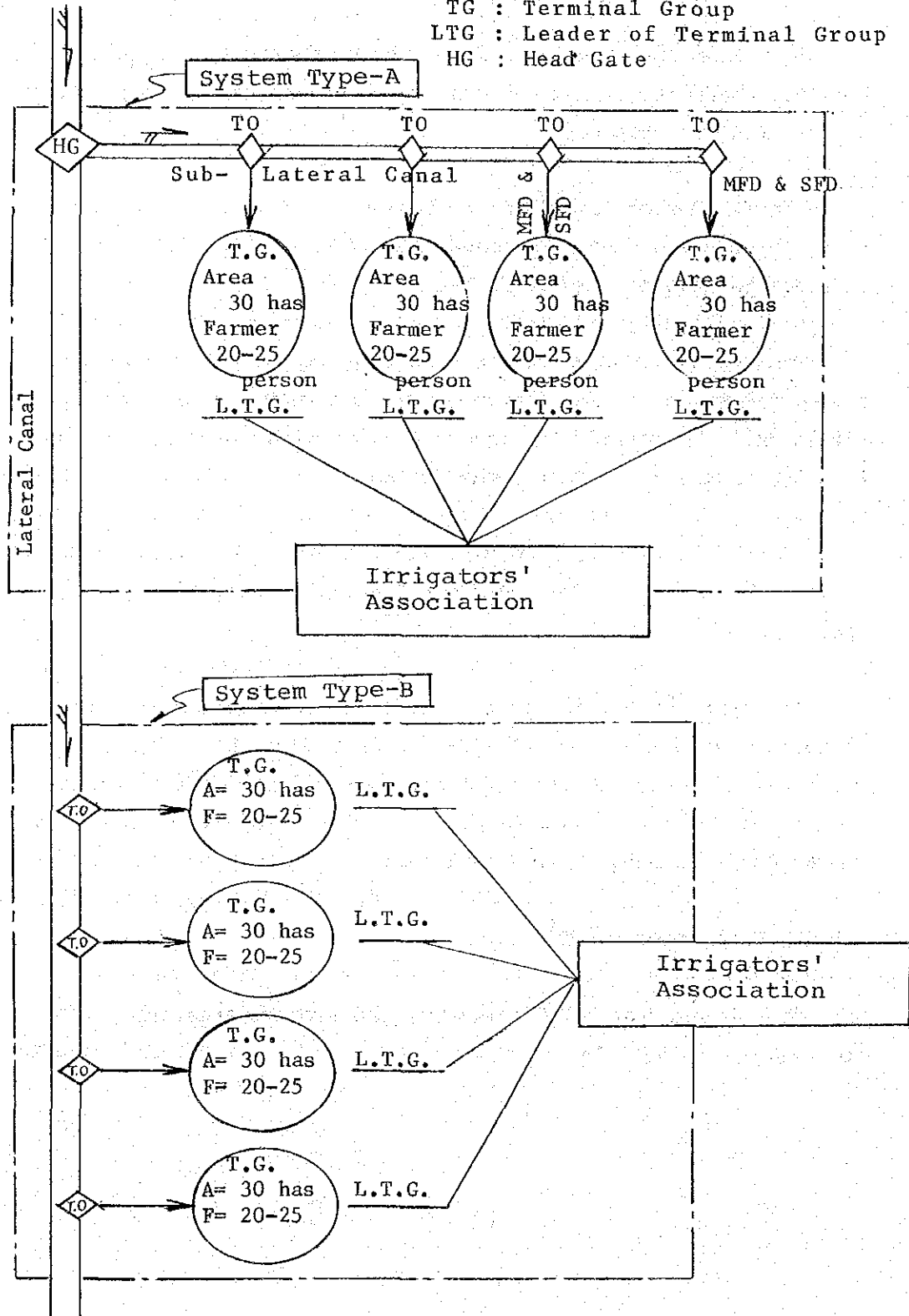
FIGURE 4.4-3 ORGANIZATION CHART OF IRRIGATORS' ASSOCIATION



Note: A: Service Area (has)
F: Number of Farmers

FIGURE 4.4-4 MANAGEMENT SYSTEM IN IRRIGATORS' ASSOCIATION

TO : Turn Out
 MFD : Main Farm Ditch
 SFD : Supplementary Farm Ditch
 TG : Terminal Group
 LTG : Leader of Terminal Group
 HG : Head Gate



4.5. Other Related Agricultural-Institutional Establishment

4.5.1. Agricultural Research and Extension Service

To attain the objectives of higher productivity for the Project, the roles of agricultural research and extension activity are of vital importance.

The NIA Region III Research Station shall undertake applied research to solve on-farm problems pertaining to the improved cultural technique.

These would involve varietal suitability, salinity tolerance and verification of upland cropping system in the rice field. Trials shall be carried out in cooperation with the Demonstration Farm Program anticipated for the Project.

As for the extension services in the Area, the situation will be somewhat serious under the administrative reform expected in the near future.

Therefore, the joint participation of technicians and field workers under NIA and the BAEx Office should be strengthened in technical guidance and other duties. NIA Central Office Training Center and Working Station Office can be successfully used as the meeting and training center for farmers.

4.5.2. Farm Input Distribution

Total farm inputs necessary for the Project Area are as follows:

(Unit: ton)

<u>Item</u>	<u>Present</u>	<u>With Project</u>	<u>Increase</u>	<u>Total</u>
Seeds: Paddy	6,130	4,346	- 1,784	(29)
Upland crops	-	61	61	
Total	6,130	4,407	- 1,723	(28)
Fertilizers	11,679	22,393	10,714	(29)
Agrochemicals:				
Granuler	2,002	2,260	258	(13)
Liquid (Kilo liter)	109	147	38	(35)

Decrease in seed requirement does not mean no more preparation. The seeds with project should be certified instead of the self-harvested seeds of farmers, and shall be supplied through the Seed Growers Associations. A tremendous increase in fertilizer of up to 92 percent over the present requirement requires the utmost coordinated effort from the government and private entities to realize the effective and smooth input allocation and distribution to project beneficiaries prior to the onset of a cropping period. NFAC and EPA branches should meet these requirements for the project farmers.

4.5.3. Farm Credit

In the AMRIS area the maximum credit to be borrowed under Masagana 99 is 1,600 pesos per ha.

The Project Area is covered by such loan programs as Masagana 99, Masagana program, and GSK Project.

GSK has been programmed to encourage the increased production of upland crops like eggplant, tomato, and green corn. The maximum amount of credit is 1,000 to 2,000 pesos/ha depending on the type of crops.

These loan programs have been successful to some extent partly because they require no mortgage, but have not infiltrated into all farm households. BPI and BAEEx are encouraged to make efforts in expanding these programs through Samahang Nasyon, Area Marketing Cooperatives, etc.

The importance of the role played by these institutions has been emphasized in the NIA Region III Status Report which attributed the failure of upland crop programs initiated in 1978 partly to insufficient support of such financial institutions as the PNB, rural Bank, and Land Bank.

4.6. Consulting Services

NIA of the Philippines has rich experience and capable staff for planning, designing and implementing irrigation and drainage development projects.

Recently, however, Projects of this kind have been rapidly increasing in number so NIA cannot assign well-experienced officials to all the Projects.

Under the circumstances, it is considered necessary to employ consultants personnel prominent in the field of irrigation and drainage, detailed design, preparation of tender documents, machinery and equipment, water management, institutional development, farm economy, and construction supervision, so that they can assist the Government officials in execution of the project works.

A total of 320 man-months of consulting services will be required for the project implementation, inclusive of about 175 man-months to be covered by local consultants, for the overall project works such as design, mechanical and equipment services, specification writing, water management, institutional developments,

agronomical services, agro-economic works, construction supervision and so forth, taking into consideration the necessity to upgrade the technological level of the local consultants personnel.

Furthermore, it is planned to dispatch about ten Philippines Government Officials abroad to study for one and a half months in the fields of irrigation and drainage, institutional works, water management, agro-economy, etc. to help them in the project implementation. The tentative manning schedule of consulting services for the Project is shown in Table 4.6-1.

TABLE 4.6-1 MANNING SCHEDULE FOR CONSULTING SERVICES

Description	1st	2nd	3rd	4th	5th	6th	7th	Total
1.1. Foreign Consultant								
Team Leader	12	7	4	4	4	4	4	39
Irrigation Engineer	7	5	-	-	-	-	-	12
Design Engineer (A)	7	-	-	-	-	-	-	7
" (B)	7	-	-	-	-	-	-	7
Construction Supervisor	-	4	4	4	4	4	-	20
Mechanical Engineer	4	-	-	-	-	-	-	4
Specification Writer	5	-	-	-	-	-	-	5
Cost Estimator	4	-	-	-	-	-	-	4
Water Management Exp.	8	6	4	-	-	-	-	18
Institutional Expert	8	6	4	2	-	2	-	22
Agro-Economist	4	-	-	-	-	-	-	4
Equipment Engineer	3	-	-	-	-	-	-	3
<u>Sub-total</u>	<u>69</u>	<u>28</u>	<u>16</u>	<u>10</u>	<u>8</u>	<u>10</u>	<u>4</u>	<u>145</u>
1.2. Local Consultant								
Assist. Team Leader	13	9	4	4	4	4	4	42
Surveyor	8	-	-	-	-	-	-	8
Irrigation, Drainage Eng.	8	-	-	-	-	-	-	8
Design Engineer (A)	8	9	-	-	-	-	-	17
" (B)	8	-	-	-	-	-	-	8
" (C)	8	-	-	-	-	-	-	8
Construction Supervisor	-	-	4	4	4	4	4	20
Construction Planner	3	-	-	-	-	-	-	3
Specification Writer	5	-	-	-	-	-	-	5
Agronomist	4	3	2	-	-	-	-	9
F.I. Organizing Speci.	8	7	-	-	-	5	-	20
Institutional Dev. Exp.	7	6	4	4	2	-	4	27
<u>Sub-total</u>	<u>80</u>	<u>34</u>	<u>14</u>	<u>12</u>	<u>10</u>	<u>13</u>	<u>12</u>	<u>175</u>
<u>Total</u>	<u>149</u>	<u>62</u>	<u>30</u>	<u>22</u>	<u>18</u>	<u>23</u>	<u>16</u>	<u>320</u>

CHAPTER V. COST ESTIMATE

CHAPTER V. COST ESTIMATE

5.1.. Basic Concept of Cost Estimate

5.1.1. General

The construction works will be carried out on the Contract Basis following the Government policies currently instituted in the Republic of the Philippines except for on-farm development works which will be implemented on the Force Account Basis for securing successful coordination between NIA and the beneficiary farmers with their consensus throughout planning stage to completion.

The whole construction works including one-year preparatory work is expected to be completed within seven years taking into account the construction quantity, budget support in Pesos, staffing capability of NIA and especially establishment of viable irrigators' association.

5.1.2. Unit Cost

The cost of construction materials, labor and equipment to be used for the Project are estimated on the basis of the prices employed by NIA of 1983.

5.1.3. Cost Item

The project cost consists of that of survey and design, civil works, procurement of equipment for on-farm development and post-project operation and maintenance of the systems, land acquisition, institutional development activities, project facilities, consulting services, administration as well as physical and price contingencies.

5.2. Project Cost Components

The major cost components of each item are described as follows.

5.2.1. Cost of Civil Works

This item includes the construction cost of the Project which is estimated based on respective unit costs such as construction materials, fuel and oil, labor, depreciation and repair cost of the construction equipment, and overhead charges for contractor. The civil works comprise the following:

- (1) Diversion dam: to include earth and concrete works, and rubber dam and gate systems.
- (2) Irrigation canal: to include the rehabilitation and new construction works of the main, lateral and sub-lateral irrigation canals as well as feeder canals and appurtenant structures such as check gates, head gates, parshall flumes, siphons, culverts and turnouts.
- (3) Drainage canal: to include the rehabilitation and new construction works of the main drainages and creeks as well as appurtenant structures such as culverts, flap gates, siphons and bridges.
- (4) Roads: to include the rehabilitation and new construction of roads along the canals and access roads as well as gravel pavement.
- (5) On-farm facilities: to include rehabilitation and new construction works of main and supplemental farm ditches, drains and appurtenant structures.

5.2.2. Procurement of Equipment

The procurement of equipment covers providing equipment for on-farm facilities and vehicles, heavy equipment and vehicles for post-project operation and maintenance, and an office computer unit. The cost of equipment and spare-parts was estimated on the CIF Manila basis including inland transportation, delivery charges and other expenses.

5.2.3. Land Acquisition

This item includes the cost required in procurement of the land to be occupied by irrigation, drainage and road facilities which will be constructed for the Project excepting the lands for on-farm facilities.

5.2.4. Project Facilities

The cost covers the construction cost of buildings for the North and South Zone Engineers Offices with garages, water and electric supply facilities and their office furnitures.

5.2.5. Institutional Development Programmes

This item includes the cost required for establishment of viable irrigators' association during the period of Project implementation and agricultural extension services of crop diversification programmes.

5.2.6. Survey and Design

This item covers the cost required for field survey and geological investigation for detailed design and design works during the construction period.

5.2.7. Consulting Services

The engineering fee for the consulting services by both foreign and local consultants including reimbursable cost and the cost for overseas training of the Government officials.

5.2.8. Administration

This cost is estimated at ten percent of the above-mentioned investment cost items of 5.2.1. to 5.2.7, taking into account actual costs required for projects similar to the Project.

5.2.9. Physical Contingency

The allocation of contingencies covers minor differences between the actual and estimated quantities, unexpected difficulties in construction work and so forth. The contingency equivalent to 15 percent of the above-mentioned items was allocated.

5.2.10. Price Escalation

Price escalation of 6.0 to 7.5 percent per annum for the foreign currency portion and 12.0 percent for the local currency portion is allowed. Therefore, the adopted percentage of the total price escalation was estimated at 27.6 percent of foreign currency and 59.1 percent of local currency, respectively.

5.3. Total Investment Cost and Disbursement Schedule

The total investment cost, including the price escalation but excluding the interest during the construction period, was estimated at 511 million pesos (equivalent to US\$46.45 million), of which about 250 million pesos will be foreign currency component and about 261 million pesos shares local currency component, respectively.

The summary of the project cost is presented in the following table and a breakdown is attached hereto as Table 5.2-1. The disbursement schedule for the project cost is also given in Table 5.2-2 and the summary is shown below.

SUMMARY OF THE PROJECT COST

(Unit: ₱ '000)

<u>Description</u>	<u>Foreign Currency</u>	<u>Local Currency</u>	<u>Total</u>
1. Survey design	-	4,000	4,000
2. Civil works	111,519	84,989	196,508
3. Procurement	33,430	1,070	34,500
4. Land acquisition	-	2,255	2,255
5. Project facilities	372	1,130	1,502
6. Institutional development	308	15,486	15,794
7. Consulting services	24,882	5,278	30,160
8. Administration	-	28,472	28,472
9. Physical contingency	25,489	21,320	46,809
10. Price escalation	54,000	97,000	151,000
<u>Total</u>	<u>250,000</u>	<u>261,000</u>	<u>511,000</u>

SUMMARY OF THE DISBURSEMENT SCHEDULE

(Unit: ₱ '000)

<u>Project Year</u>	<u>Foreign Currency</u>	<u>Local Currency</u>	<u>Total</u>	<u>Proportion (%)</u>
1st	13,652	9,279	22,931	6.4
2nd	58,746	28,669	87,415	24.3
3rd	23,863	25,756	49,619	13.8
4th	34,897	40,307	75,204	20.9
5th	26,184	25,710	51,895	14.4
6th	23,981	23,975	47,956	13.3
7th	14,676	10,304	24,980	6.9
<u>Total</u>	<u>196,000</u>	<u>164,000</u>	<u>360,000</u>	<u>100.0</u>

Note: The price escalation is excluded from the above figures.

TABLE 5.2-1 BREAKDOWN OF THE PROJECT COST

(Unit: ₱ '000)

Description	Foreign Currency	Local Currency	Total
1. Preparatory Works	-	4,000	4,000
2. Civil Works			
2.1. Irrigation Systems	60,926	43,813	104,739
Diversion Dams	18,553	5,217	23,770
Expansion of Canal	24,735	19,266	44,001
Rehabilitation of Canal Structures	5,781	3,471	9,252
	11,857	15,859	27,716
2.2. Drainage Systems	28,987	13,905	42,892
Expansion of Canal	2,272	1,079	3,351
Rehabilitation of Canal Structures	22,569	10,366	32,935
	4,146	2,460	6,606
2.3. Road Systems	17,935	11,084	29,019
Expansion of Road	11,588	5,889	17,477
Gravel Pavement	6,347	5,195	11,542
2.4. On-farm Development*	3,671	16,187	19,858
Extension	1,545	6,760	8,305
Rehabilitation	2,126	9,427	11,553
<u>Sub-total</u>	<u>111,519</u>	<u>84,989</u>	<u>196,508</u>
3. Procurement of Equipment	33,430	1,070	34,500
4. Land Acquisition	-	2,255	2,255
5. Project Facilities	372	1,130	1,502
6. Institutional Development	308	15,486	15,794
7. Consulting Services	24,882	5,278	30,160
<u>Total (1 - 7)</u>	<u>170,511</u>	<u>114,208</u>	<u>284,719</u>
8. Administration (10%)	-	28,472	28,472
<u>Total (1 - 8)</u>	<u>170,511</u>	<u>142,680</u>	<u>313,191</u>
9. Physical Contingencies	25,489	21,320	46,809
<u>Total (1 - 9)</u>	<u>196,000</u>	<u>164,000</u>	<u>360,000</u>
	(54.4%)	(45.6%)	(100.0%)
10. Price Escalation	54,000	97,000	151,000
<u>Grand Total (1 - 10)</u>	<u>250,000</u>	<u>261,000</u>	<u>511,000</u>
(Proportion)	(48.9%)	(51.1%)	(100.0%)

Note : * The cost of on-farm development is obtained by adding fuel cost, labor wages and depreciation costs other than those for heavy equipment cost. The cost of these procurement comprises 25.3 million pesos of foreign components and 0.7 million pesos of local components.

TABLE 5.2-2 DISBURSEMENT SCHEDULE OF THE PROJECT COST (1)

(Unit: \$ 1,000)

Description	Total		1st		2nd (5, 12)		3rd (3, 7)	
	Foreign Currency	Local Currency	Foreign Currency	Local Currency	Foreign Currency	Local Currency	Foreign Currency	Local Currency
1. Preparatory Work								
Survey, Design Works	-	4,000	-	2,500	-	1,000	-	500
2. Civil Works								
2.1 Irrigation Systems								
Diversion Dams								
Irrigation Canal (Ext.)	18,553	5,217	-	-	3,000	1,250	5,089	2,780
Irrigation Canal (Reh.)	11,919	7,316	-	-	1,983	1,218	3,221	1,978
Feeder Canal	5,781	3,471	-	-	1,415	841	822	494
Appurtenant Structure	12,816	11,950	-	-	-	-	-	-
Sub-total	11,857	15,859	-	-	866	1,420	1,878	2,938
Sub-total	60,926	43,813	-	-	7,264	4,729	11,010	7,190
2.2 Drainage Systems								
Drainage Canal (Ext.)	2,272	11,079	-	-	-	-	-	-
Drainage Canal (Reh.)	22,569	10,366	-	-	7,106	3,261	4,195	1,925
Appurtenant Structure	4,146	2,460	-	-	372	454	1,271	338
Sub-total	28,987	13,905	-	-	7,478	3,715	5,466	2,263
2.3 Road Systems								
Road (extension)	11,588	5,889	-	-	2,097	1,062	544	279
Pavement	6,347	5,195	-	-	1,010	837	564	468
Sub-total	17,935	11,084	-	-	3,107	1,899	1,108	747
2.4 On-farm Development								
Extension	12,192	7,052	-	-	-	467	1,483	858
Rehabilitation	16,770	9,835	-	-	2,625	1,539	3,022	1,771
Sub-total	3,671	16,187	-	-	3,432	2,006	4,505	2,629
Total	111,519	84,989	-	-	17,346	12,248	18,004	12,724
	(136,819)	(85,689)	-	-	(21,281)	(12,349)	(22,089)	(34,918)

*figures in parenthesis indicate construction cost including depreciation cost

TABLE 5.2-2 DISBURSEMENT SCHEDULE OF THE PROJECT COST (2)

(Unit: # '000)

Description	TOTAL		1st		2nd		3rd				
	Foreign	Local	Foreign	Local	Foreign	Local	Foreign	Local			
	Currency	Currency	Currency	Currency	Currency	Currency	Currency	Currency			
3. Procurement of Equipment	33,430	1,070	34,500	-	-	28,400	750	29,150	330	70	400
4. Land Acquisition	-	2,255	2,255	-	20	-	365	365	-	-	367
5. Project Facilities	372	1,130	1,502	372	1,130	1,502	-	-	-	-	-
6. Institutional Development	308	15,486	15,794	308	1,153	1,461	-	2,665	2,665	-	4,056
7. Consulting Services	24,882	5,278	30,160	11,197	1,456	12,653	5,360	1,001	6,361	2,426	767
<u>Grand Total (1 - 7)</u>	<u>170,511</u>	<u>114,208</u>	<u>284,719</u>	<u>11,877</u>	<u>6,259</u>	<u>18,136</u>	<u>51,106</u>	<u>18,029</u>	<u>69,135</u>	<u>20,760</u>	<u>18,484</u>
8. Administration (10%)	-	28,472	28,472	-	1,814	1,814	-	6,914	6,914	-	3,924
<u>Grand Total (1 - 8)</u>	<u>170,511</u>	<u>142,680</u>	<u>313,191</u>	<u>11,877</u>	<u>8,073</u>	<u>19,950</u>	<u>51,106</u>	<u>24,943</u>	<u>76,049</u>	<u>20,760</u>	<u>22,408</u>
9. Physical Contingencies (15%)	25,489	21,320	46,809	1,775	1,206	2,981	7,640	3,726	11,366	3,103	3,348
<u>Grand Total (1 - 9)</u>	<u>196,000</u>	<u>164,000</u>	<u>360,000</u>	<u>13,652</u>	<u>9,279</u>	<u>22,931</u>	<u>58,746</u>	<u>28,669</u>	<u>87,415</u>	<u>23,863</u>	<u>25,756</u>
10. Price Escalation	54,000	97,000	151,000	1,024	1,113	2,137	8,812	7,282	16,094	5,226	10,431
<u>Grand Total (1 - 10)</u>	<u>250,000</u>	<u>261,000</u>	<u>511,000</u>	<u>14,676</u>	<u>10,392</u>	<u>25,068</u>	<u>67,558</u>	<u>35,951</u>	<u>103,509</u>	<u>29,089</u>	<u>36,187</u>
	(48.9)	(51.1)	(100.0)								

TABLE 5.2-2 DISBURSEMENT SCHEDULE OF THE PROJECT COST (3)

(Unit: # '000)

Description	4th (6)		5th (4,8)		5th (2,9,10)		7th (1,11)	
	Foreign Currency	Local Currency	Foreign Currency	Local Currency	Foreign Currency	Local Currency	Foreign Currency	Local Currency
1. Preparatory work, Survey, Design Works	-	-	-	-	-	-	-	-
2. Civil Works								
2.1 Irrigation Systems								
Diversion Dams	2,239	572	2,811	1,185	2,429	430	-	-
Irrigation Canal (Ext.)	2,575	1,577	4,152	1,279	2,057	1,264	-	-
Irrigation Canal (Reh.)	497	293	790	599	1,580	967	452	277
Feeder Canal	12,816	11,950	24,766	-	-	-	-	-
Appurtenant Structure	4,517	3,560	8,077	3,401	1,727	3,290	757	1,250
Sub-total	22,644	17,952	40,596	6,464	7,793	5,951	1,209	1,527
2.2 Drainage Systems								
Drainage Canal (Ext.)	-	-	-	981	198	98	-	-
Drainage Canal (Reh.)	1,491	685	2,176	1,125	4,044	1,865	3,282	1,505
Appurtenant Structure	34	54	88	1,035	429	496	78	83
Sub-total	1,525	739	2,264	3,141	4,671	2,459	3,360	1,588
2.3 Road Systems								
Road (Extension)	1,660	839	2,499	1,318	3,566	1,804	1,148	587
Pavement	785	664	1,449	1,276	1,980	1,563	467	387
Sub-total	2,445	1,503	3,948	2,594	5,546	3,367	1,615	974
2.4 On-farm Development								
Extension	7,395	4,277	11,672	1,295	1,212	701	-	-
Rehabilitation	1,106	649	1,755	3,348	4,182	2,450	2,496	1,463
Sub-total	8,501	4,926	13,427	4,643	5,394	3,151	2,496	1,463
Total	28,622	24,915	53,537	14,789	19,076	14,806	7,075	5,507
Total	(35,115)	(25,120)	(60,235)	(14,911)	(23,404)	(41,928)	(8,680)	(5,552)
Total								(14,232)

TABLE 5.2-2 DISBURSEMENT SCHEDULE OF THE PROJECT COST (4)

(Unit: \$ '000)

Description	4th		5th		6th		7th		
	Foreign Currency	Local Currency	Foreign Currency	Local Currency	Foreign Currency	Local Currency	Foreign Currency	Local Currency	
3. Procurement of Equipment	-	-	-	-	-	-	4,700	250	4,950
4. Land Acquisition	-	284	-	530	-	551	-	138	138
5. Project Facilities	-	-	-	-	-	-	-	-	-
6. Institutional Development	-	3,387	-	2,438	-	1,175	-	612	612
7. Consulting Services	1,736	533	1,384	507	1,787	533	992	481	1,473
<u>Grand Total (1 - 7)</u>	<u>30,358</u>	<u>29,119</u>	<u>22,780</u>	<u>18,264</u>	<u>20,863</u>	<u>17,065</u>	<u>12,767</u>	<u>6,988</u>	<u>19,755</u>
8. Administration (10%)	-	5,948	-	4,104	-	3,793	-	1,976	1,976
<u>Grand Total (1 - 8)</u>	<u>30,358</u>	<u>35,067</u>	<u>22,780</u>	<u>22,368</u>	<u>20,863</u>	<u>20,858</u>	<u>12,767</u>	<u>8,964</u>	<u>21,731</u>
9. Physical Contingencies	4,539	5,240	3,405	3,342	3,118	3,117	1,909	1,340	3,249
<u>Grand Total (1 - 9)</u>	<u>34,897</u>	<u>40,307</u>	<u>26,185</u>	<u>25,710</u>	<u>23,981</u>	<u>23,975</u>	<u>14,676</u>	<u>10,304</u>	<u>24,980</u>
10. Price Escalation	10,190	23,136	9,689	19,591	10,839	23,352	8,221	12,095	20,316
<u>Grand Total (1 - 10)</u>	<u>45,087</u>	<u>63,443</u>	<u>35,873</u>	<u>45,301</u>	<u>34,820</u>	<u>47,327</u>	<u>22,897</u>	<u>22,399</u>	<u>45,296</u>

CHAPTER VI. PROJECT EVALUATION

CHAPTER VI. PROJECT EVALUATION

6.1. Economic Evaluation

6.1.1. Method of Economic Evaluation

The Project is evaluated using Economic Internal Rate of Return (EIRR) and Sensitivity Analysis. EIRR is estimated by discounting streams of economic benefits and costs for the project life period.

Sensitivity analysis attempts to assess the impact on EIRR of changes in such crucial factors as project cost, benefit, target yield, etc.

The Project life is taken to be 50 years taking into account the life of facilities to be installed. The replacement cost has been estimated for O & M equipments and pumping plants which have ten and twenty years project life, respectively.

6.1.2. Evaluation of Commodities and Labor Price

(1) Conversion Factors

Estimation of economic unit price of each input and output from financial prices made use of conversion factors estimated for the Philippines by World Bank as "Social Cost-Benefit Analysis-Estimate of Shadow Prices and Country Parameters". The conversion factors are;

Standard conversion factor	0.820
Conversion factor for Capital Goods	0.865
Consumption	0.840
Electricity, Gas and Water	0.802
Transportation	0.777
Construction	0.827

(2) Economic Farm Gate Price of Input and Output

Prices of traded goods among agricultural inputs and products were converted to border prices using the above conversion factors. Non-traded goods were evaluated based on the domestic prices. A summary of economic farm gate prices is shown in Table 6.1-1. Detailed price structure of agricultural inputs and products is shown in Chapter V in Appendix C.

The official exchange rate is ₱11.00 per 1.0 US dollar. Palay exported from the Philippines ordinarily includes 25 to 30 percent of broken rice and is traded at a price 30 percent below that of palay produced in Thailand which normally includes five percent of broken rice.

Forecasting of prices of inputs and outputs is based on price projection of the World Bank.

(3) Economic Cost of Farm Labor

The monthly wage rate until August 1983 in the AMRIS area is presented below. The eight-month average is 18.80 pesos/day. The wage rate obtained in the sample survey has been determined under the imperfect labor market conditions (lack of information due to insufficient road & communication net work and immobility of labor force) and, therefore, does not reflect the labor surplus condition which is likely to exist in the Area.

In an attempt to correctly estimate the demand-supply conditions of labor market, the concept of opportunity cost of labor is introduced by applying the conversion factor of 0.52 for unskilled labor in rural area.

The wage rate thus obtained reflects the opportunity cost of labor in the domestic market and the derivation of economic wage rate expressed in terms of border price requires further application of a conversion factor of 0.84 for consumption goods. Thus, the economic wage rate turns out to be 8.21 pesos/day.

Monthly Wage Rate in 1983 (Jan. - Aug.)

(Unit: pesos/man-day)

<u>Jan.</u>	<u>Feb.</u>	<u>Mar.</u>	<u>Apr.</u>	<u>May</u>	<u>Jun.</u>	<u>Jul.</u>	<u>Aug.</u>	<u>Sep.</u>	<u>Oct.</u>	<u>Nov.</u>	<u>Dec.</u>	<u>Average</u>
18.0	18.0	18.0	18.0	18.0	20.0	20.0	20.0	-	-	-	-	18.8

(4) Production Cost

Economic cost of production of each crop by cropping pattern was estimated using the aforesaid economic farm gate prices. Results of estimation are given in Table 6.1-2.

6.1.3. Construction Cost

(1) Initial Investment

The initial economic cost of the project has been estimated by first excluding the price contingency and land acquisition from the initial financial cost and then by applying the relevant conversion factors discussed in 6.1.2. to such cost items in the local currency portion as survey and design, civil works, consulting service, project facilities, procurement of equipment, and institutional development.

The economic cost of the project thus estimated is 332,652,000 pesos. Table 6.1-3 gives the summary of initial financial and economic cost of the project.

The detailed economic cost of the project by year during the implementation period appears in Chapter V of Appendix C.

(2) Operation and Maintenance Cost

The incremental O & M cost as compared with the current cost covers that of project facilities and administration cost necessary at NIA and IA. Economic cost of O & M was likewise estimated using the conversion factors. The incremental economic O & M cost after the completion of the Project is estimated to be 2,771,000 pesos per year (see Tables 6.1-4 and 6.1-5).

(3) Replacement Cost

Replacement cost has also been estimated for pumps and other O & M equipment that require replacement during the project life.

<u>Facility</u>	<u>Life</u> (years)	<u>Replacement Cost</u> (₱1,000)	<u>Remarks</u>
O & M Equipment	10	804	
Pump	20	5,692	The existing pumps were installed in 1975

6.1.4. Agricultural Benefit

(1) Net Production Value

Net production value has been derived by deducting the cost of production from the gross production value of various products which is estimated by the economic unit prices of agricultural products and input materials.

Net production value thus estimated is multiplied by the areas where plantation of various crops is proposed to arrive at the total net production value. Incremental agricultural benefit is the difference between the with and the without project production value.

TABLE 6.1-1 FARM-GATE PRICES OF AGRICULTURAL INPUTS (ECONOMIC)

Item		1995	
		Unit	Economic
Seed	Paddy	₱/ton	2,000
	Yellow Corn	"	1,855
	Green Corn	"	1,650
	Water Melon	₱/kg	25
	Pole Sitao	"	25
Crops	Paddy	₱/ton	2,045
	Yellow Corn	"	1,910
	Green Corn	"	1,670
	Water Melon	₱/ton	1,460
	Pole Sitao	"	3,400
Fertilizers			
	N	₱/kg	9.4
	P ₂ O ₅	"	8.6
	K ₂ O	"	3.6
Agro-Chemicals			
	Furadan	₱/kg	8
	Azodrin	₱/ℓ	52
	Brodan	"	52
	Machete	₱/kg	5
	Sevin	₱/ℓ	49
	Thiodan	"	49
	Methyl Paration	"	41
	Ratoxin	₱/kg	45
Animal	Plowing	₱/day	25
	Harrowing	"	25
Agri. Machineries			
	Four Wheel Tractor		
	Plowing	₱/ha	399
	Hand Tractor		
	Plowing	₱/ha	276
	Harrowing	"	213
	Power Thresher	"	213
	Shelling	"	265
	Sprayer	"	15
	Land Preparation	₱/ha	W/O 381 W 458

TABLE 6.1-2 SUMMARY OF CROP PRODUCTION COST

(Unit: Pesos)

Cropping Pattern Season Method	Without Project				With Project							
	A.B.		A.B.E.		A.B.C.D.		A.B.D.E.					
	Wet Season T.P.	D.S.	Dry Season T.P.	D.S.	Wet Season T.P.	D.S.	Dry Season T.P.	D.S.				
Seed	200.0	260.0	200.0	260.0	120.0	160.0	120.0	160.0	24.8	37.1	50.0	150.0
Fertilizers												
N	672.1	672.1	780.2	780.2	780.2	780.2	921.2	921.2	629.8	1,043.4	1,043.4	780.2
P ₂ O ₅	120.4	120.4	120.4	120.4	352.6	352.6	266.6	266.6	180.6	361.2	361.2	352.6
K ₂ O	50.4	50.4	50.4	50.4	75.6	75.6	75.6	75.6	75.6	151.2	151.2	75.6
<u>Sub-total</u>	<u>842.9</u>	<u>842.9</u>	<u>951.0</u>	<u>951.0</u>	<u>1,208.4</u>	<u>1,208.4</u>	<u>1,263.4</u>	<u>1,263.4</u>	<u>886.0</u>	<u>1,555.8</u>	<u>1,555.8</u>	<u>1,208.4</u>
Agro-chemicals												
Furadan	133.6	133.6	133.6	133.6	133.6	133.6	133.6	133.6	133.6	133.6	-	-
Azodrin	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	104.0	104.0	-	416.0
Brodan	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	-	-	-	-
Machete	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	-	100.0	-	-
Ratoxin	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	-	-	-	-
Sevin	-	-	-	-	-	-	-	-	-	49.0	98.0	294.0
Thiodan	-	-	-	-	-	-	-	-	-	49.0	-	294.0
Methyl Paration	-	-	-	-	-	-	-	-	-	-	-	Barboo pole 2,066.0
<u>Sub-total</u>	<u>360.1</u>	<u>360.1</u>	<u>360.1</u>	<u>360.1</u>	<u>360.1</u>	<u>360.1</u>	<u>360.1</u>	<u>360.1</u>	<u>237.6</u>	<u>435.6</u>	<u>180.0</u>	<u>3,070.0</u>
Machineries												
Land preparation	1,143.0	1,143.0	1,143.0	1,143.0	1,694.6	1,694.6	1,694.6	1,694.6	458.0	458.0	458.0	458.0
Spraying	45.0	45.0	45.0	45.0	67.5	67.5	67.5	67.5	24.0	24.0	48.0	240.0
Threshing/Shelling	213.0	213.0	255.6	255.6	255.6	255.6	319.5	319.5	-	265.0	-	-
<u>Sub-total</u>	<u>1,401.0</u>	<u>1,401.0</u>	<u>1,443.6</u>	<u>1,443.6</u>	<u>2,017.7</u>	<u>2,017.7</u>	<u>2,081.6</u>	<u>2,081.6</u>	<u>482.0</u>	<u>747.0</u>	<u>506.0</u>	<u>698.0</u>
Draft Animal	52.5	52.5	52.5	52.5	25.0	25.0	25.0	25.0	175.0	175.0	75.0	175.0
Hired Labor	337.4	214.3	362.9	243.8	359.6	240.5	400.6	287.4	90.3	156.0	197.0	541.9
Miscellaneous	168.1	165.2	176.9	174.0	215.2	211.3	223.3	219.5	403.3	403.5	357.2	373.7
<u>Total</u>	<u>3,362.0</u>	<u>3,296.0</u>	<u>3,547.0</u>	<u>3,485.0</u>	<u>4,306.0</u>	<u>4,223.0</u>	<u>4,474.0</u>	<u>4,397.0</u>	<u>2,299.0</u>	<u>3,510.0</u>	<u>2,921.0</u>	<u>6,217.0</u>

Note: T.P.: Transplanting; D.S.: Direct Seeding.

TABLE 6.1-3 INITIAL PROJECT COST

(Unit: 1,000 Pesos)

Description	Financial		Economic	
	F.C.	L.C.	F.C.	L.C.
1. Preparation	-	4,000	-	3,280
2. Civil Works	111,519	84,989	111,519	70,286
3. Procurement Equipment	33,430	1,070	33,430	926
4. Land Aquisition	-	2,255	-	-
5. Project Facilities	372	1,130	372	935
6. Institutional Development	308	15,486	308	12,699
7. Consulting Services	24,882	5,278	24,882	4,328
Sub-total (1-7)	<u>170,511</u>	<u>114,208</u>	<u>170,511</u>	<u>92,454</u>
8. Administration	-	28,472	-	26,297
Total (1-8)	<u>170,511</u>	<u>142,680</u>	<u>170,511</u>	<u>118,751</u>
9. Physical Contingency	25,489	21,320	25,489	17,901
10. Price Contingency	54,000	97,000	-	-
11. Grand Total	<u>250,000</u>	<u>261,000</u>	<u>196,000</u>	<u>136,652</u>
		<u>511,000</u>		<u>332,652</u>

TABLE 6.1-4 INCREMENTAL O&M COST PER HECTARE

Item	Future Without Project	O&M Cost Required with Project				Incremental O&M Cost			
		Phase-1		Phase-2		Phase-1	Phase-2		
		NIA	IA	NIA	IA			Total	
A. Financial Cost									
Total cost (£1,000)	9,015	9,580	-	9,580	8,230	4,862	13,092	565	4,077
Service area (ha)	31,485	34,965	-	34,965	34,065	34,965	34,965	-	-
O&M cost per ha.	286	274	-	274	235	139	374	(-)12	88
B. Economic Cost									
O&M cost per ha. (£/ha)	235	225	-	225	193	114	307	(-)10	72

Note : 1. Phase-1 and Phase-2 of the O&M cost required mean before and after partial turnover of operation and maintenance works to IAS.

2. Standard conversion factor of 0.82 was applied when economic cost is estimated from financial cost.

TABLE 6.1-5 INCREMENTAL O&M COST BY YEAR

Year	With Project						Without Project				Economic Incremental O&M Cost 1-2 (£1,000)
	Impl'd Area (ha)		Remain' Area		Economic O&M Cost (£/ha)		Area (ha)	Economic O&M Cost (£/ha)		Economic O&M Cost 2 (£1,000)	
	Impl'd Area	Remain' Area	Impl'd Area	Remain' Area	Impl'd Area	Remain' Area		Total 1			
1984	0	34,965	0	225	0	7,867	33,886	235	7,963	(-) 96	
1985	4,966	29,999	225	225	1,117	6,750	"	"	"	(-) 96	
1986	10,934	24,031	225	225	2,460	5,407	"	"	"	(-) 96	
1987	16,262	18,703	225	225	3,659	4,208	"	"	"	(-) 96	
1988	22,718	12,247	225	225	5,112	2,756	"	"	"	(-) 96	
1989	30,595	4,370	307	225	9,393	983	"	"	"	2,413	
1990	34,965	0	307	225	10,734	0	"	"	"	2,771	
1991	34,965	0	307	225	10,734	0	"	"	"	2,771	
1992	34,965	0	307	225	10,734	0	"	"	"	2,771	

Note : Impl'd : Implemented
Remain' : Remaining

TABLE 6.1-6 INCREMENTAL AGRICULTURAL BENEFIT 1/2

	A			B			C		
	Wet		Dry	Wet		Dry	Wet		Dry
	T.P.	Direct	T.P.	Direct	T.P.	Direct	T.P.	Direct	G. Com
Without Project									
Yield (ton/ha)	3.94	4.24	4.49	4.98	3.79	4.07	3.16	3.50	-
Unit Price (£/ton)	2,045	2,045	2,045	2,045	2,045	2,045	2,045	2,045	-
GPV (£/ha)	8,057.3	8,670.8	9,182.1	10,184.1	7,750.6	8,323.2	6,462.2	7,157.5	-
PC (£/ha)	3,362	3,296	3,547	3,485	3,362	3,296	3,547	3,485	-
NPV (£/ha)	4,695.3	5,374.8	5,635.1	6,699.1	4,388.6	5,027.2	2,915.2	3,672.5	-
Cropped Area (ha)	15,144	6,491	10,441	10,441	1,478	633	301	302	-
Total NPV (£1,000)	71,105	34,887	58,836	69,945	6,486	3,182	877	1,109	-
With Project									
Yield (ton/ha)	4.61	4.71	5.22	5.54	4.35	4.43	4.92	5.22	4.71
Unit Price (£/ton)	2,045	2,045	2,045	2,045	2,045	2,045	2,045	2,045	2,045
GPV (£/ha)	9,427.5	9,632.0	10,674.9	11,329.3	8,895.8	9,059.4	10,061.4	10,674.9	9,632.0
PC (£/ha)	4,306	4,223	4,474	4,397	4,306	4,223	4,474	4,397	4,223
NPV (£/ha)	5,121.5	5,409.0	6,250.9	6,932.3	4,589.8	4,836.4	5,587.4	6,277.9	5,409.0
Cropped Area (ha)	10,106	10,106	4,042	16,170	1,055	1,056	422	1,689	1,125
Total NPV (£1,000)	51,757	54,663	25,064	112,095	4,842	5,107	2,357	10,603	6,085
Incremental NPV	-19,348	19,776	-33,772	42,150	-1,644	1,925	1,480	9,494	5,762
									3,481

TABLE 6.1-6 INCREMENTAL AGRICULTURAL BENEFIT 2/2

	C			D			E			
	W. Melon	Y. Com	P. Sitao	Wet	Dry	Wet	Dry	T.P.	Direct	Total
				T.P.	Direct	T.P.	Direct			
Without Project										
Yield (ton/ha)	-	-	-	-	-	-	-	4.40	4.87	
Unit Price (£/ton)	-	-	-	-	-	-	-	2,045	2,045	
GPV (£/ha)	-	-	-	-	-	-	-	8,998.0	9,959.2	
PC (£/ha)	-	-	-	-	-	-	-	3,547	3,485	
NPV (£/ha)	-	-	-	-	-	-	-	5,451.0	6,474.2	
Cropped Area (ha)	-	-	-	-	-	-	-	4,656	4,657	
<u>Total NPV (£1,000)</u>	-	-	-	-	-	-	-	<u>25,379</u>	<u>30,150</u>	<u>301,956</u>
With Project										
Yield (ton/ha)	8.00	4.00	7.50	4.35	4.43	4.92	5.22	5.12	5.44	
Unit Price (£/ton)	1,350	1,910	2,310	2,045	2,045	2,045	2,045	2,045	2,045	
GPV (£/ha)	10,800.0	7,640.0	17,325.0	8,895.8	9,059.4	10,061.4	10,674.9	10,470.4	11,124.8	
PC (£/ha)	2,921	3,510	6,217	4,306	4,223	4,474	4,397	4,474	4,397	
NPV (£/ha)	7,879.0	4,130	11,108	4,589.8	4,836.4	5,587.4	6,277.9	5,996.4	6,727.8	
Cropped Area (ha)	675	1,575	675	1,000	1,000	400	1,600	1,678	6,714	
<u>Total NPV (£1,000)</u>	<u>5,318</u>	<u>6,504</u>	<u>7,498</u>	<u>4,590</u>	<u>4,386</u>	<u>2,235</u>	<u>10,044</u>	<u>10,062</u>	<u>45,170</u>	<u>377,623</u>
<u>Incremental NPV</u>	<u>5,318</u>	<u>6,504</u>	<u>7,498</u>	<u>4,590</u>	<u>4,386</u>	<u>2,235</u>	<u>10,044</u>	<u>-15,317</u>	<u>15,020</u>	<u>75,667</u>

The incremental benefit after the target yield is achieved is 75,667,000 pesos per year (Refer to Table 6.1-6).

(2) Benefit Stream

According to the implementation schedule, part of proposed area starts to generate agricultural benefit land beginning the wet season of 1985 with the gradual expansion of these areas in subsequent years. It is expected to take 10 years for the whole area to generate the stream benefit stream.

6.2. Internal Rate of Return

The streams of economic cost and benefit over the project life of 50 years have been converted into the present worth values using various discount rates. Table 6.2-1 presents the streams of economic cost, benefit, and present worth. The economic internal rate of return thus calculated is 17.53 percent.

6.3. Sensitivity Analysis

The sensitivity analysis has been attempted for the following cases with respective IRR's. Details are given in Chapter V of Appendix C.

- (1) Ten percent increase in project cost 16.15%
- (2) Twenty percent increase in project cost 14.98%
- (3) Ten percent reduction in target yield 13.84%
- (4) Two years delay in attaining full benefit .. 15.72%
- (5) Combination of cases (1) and (3) 12.73%
- (6) Combination of cases (2) and (3) 11.77%
- (7) Combination of cases (1) and (4) 14.57%
- (8) Combination of cases (2) and (4) 13.58%

TABLE 6.2-1 PROJECT ECONOMIC COST AND RETURN

(UNIT : THOUSAND PESO)

YEAR	PROJECT COST		TOTAL (1)	INCREMENTAL BENEFITS (2)	PROJECT RETURN (3) =(2)-(1)	PRESENT WORTH VALUE	
	CAPITAL	O & M				(3)*DISCOUNT RATE (17 %)	(18 %)
1 1984	21507.00	-96.00	21411.00	0.0	-21411.00	-18300.01	-18144.93
2 1985	83123.00	-96.00	83027.00	2270.00	-80757.00	-58994.19	-57998.51
3 1986	45172.00	-96.00	45076.00	6810.00	-38266.00	-23892.23	-23289.92
4 1987	68535.00	-96.00	68439.00	15890.00	-52549.00	-28042.89	-27104.28
5 1988	47344.00	-96.00	47248.00	27240.00	-20008.00	-9125.92	-8745.72
6 1989	43654.00	2413.00	46067.00	41617.00	-4450.00	-1734.79	-1648.43
7 1990	23317.00	2771.00	26088.00	54480.00	28392.00	9460.15	8913.01
8 1991	0.0	2771.00	2771.00	65073.00	62302.00	17742.66	16574.82
9 1992	0.0	2771.00	2771.00	71126.00	68355.00	16638.02	15411.16
10 1993	0.0	2771.00	2771.00	74910.00	72139.00	15007.76	13783.31
11 1994	0.0	3575.00	3575.00	75667.00	72092.00	12818.80	11673.17
12 1995	0.0	8463.00	8463.00	75667.00	67204.00	10213.40	9221.79
13 1996	0.0	2771.00	2771.00	75667.00	72896.00	9468.76	8477.00
14 1997	0.0	2771.00	2771.00	75667.00	72896.00	8092.97	7183.91
15 1998	0.0	2771.00	2771.00	75667.00	72896.00	6917.08	6088.06
16 1999	0.0	2771.00	2771.00	75667.00	72896.00	5912.04	5159.38
17 2000	0.0	2771.00	2771.00	75667.00	72896.00	5053.03	4372.36
18 2001	0.0	2771.00	2771.00	75667.00	72896.00	4318.83	3705.39
19 2002	0.0	2771.00	2771.00	75667.00	72896.00	3691.31	3140.17
20 2003	0.0	2771.00	2771.00	75667.00	72896.00	3154.97	2661.16
21 2004	0.0	3575.00	3575.00	75667.00	72092.00	2666.82	2230.35
22 2005	0.0	2771.00	2771.00	75667.00	72896.00	2304.75	1911.21
23 2006	0.0	2771.00	2771.00	75667.00	72896.00	1969.88	1619.67
24 2007	0.0	2771.00	2771.00	75667.00	72896.00	1683.66	1372.60
25 2008	0.0	2771.00	2771.00	75667.00	72896.00	1439.03	1163.22
26 2009	0.0	2771.00	2771.00	75667.00	72896.00	1229.94	985.78
27 2010	0.0	2771.00	2771.00	75667.00	72896.00	1051.23	835.41
28 2011	0.0	2771.00	2771.00	75667.00	72896.00	898.49	707.97
29 2012	0.0	2771.00	2771.00	75667.00	72896.00	767.94	599.98
30 2013	0.0	2771.00	2771.00	75667.00	72896.00	656.36	508.46
31 2014	0.0	3575.00	3575.00	75667.00	72092.00	554.80	426.14
32 2015	0.0	8463.00	8463.00	75667.00	67204.00	442.04	336.65
33 2016	0.0	2771.00	2771.00	75667.00	72896.00	409.81	309.46
34 2017	0.0	2771.00	2771.00	75667.00	72896.00	350.27	262.26
35 2018	0.0	2771.00	2771.00	75667.00	72896.00	299.37	222.25
36 2019	0.0	2771.00	2771.00	75667.00	72896.00	255.88	188.35
37 2020	0.0	2771.00	2771.00	75667.00	72896.00	218.70	159.62
38 2021	0.0	2771.00	2771.00	75667.00	72896.00	186.92	135.27
39 2022	0.0	2771.00	2771.00	75667.00	72896.00	159.76	114.64
40 2023	0.0	2771.00	2771.00	75667.00	72896.00	136.55	97.15
41 2024	0.0	3575.00	3575.00	75667.00	72092.00	115.42	81.42
42 2025	0.0	2771.00	2771.00	75667.00	72896.00	99.75	69.77
43 2026	0.0	2771.00	2771.00	75667.00	72896.00	85.26	59.13
44 2027	0.0	2771.00	2771.00	75667.00	72896.00	72.87	50.11
45 2028	0.0	2771.00	2771.00	75667.00	72896.00	62.28	42.46
46 2029	0.0	2771.00	2771.00	75667.00	72896.00	53.23	35.99
47 2030	0.0	2771.00	2771.00	75667.00	72896.00	45.50	30.50
48 2031	0.0	2771.00	2771.00	75667.00	72896.00	38.89	25.85
49 2032	0.0	2771.00	2771.00	75667.00	72896.00	33.24	21.90
50 2033	0.0	2771.00	2771.00	75667.00	72896.00	28.41	18.56
TOTAL	332652.00	138457.00	471109.00	3386096.00	2914987.00	6716.78	-5944.94

IERR = 18 17 + 6716.78 / (6716.78 + 5944.94) = 17.53

6.4. Farm Budget Analysis

(1) Farm Budget

Farm budget analysis has been also conducted to measure the project benefit accruing to the representative beneficiary farmers.

Without project, both typical owner operator and lessee, operating on the farm of 1.4 ha, plant 0.98 ha with wet season palay and 1.27 ha with dry season palay, resulting in a total palay planted area of 2.25 ha or a cropping intensity of 161 percent. Whereas with project both typical owner operator and lessee, also operating on a farm of 1.4 ha, plant 1.15 ha and 1.4 ha with wet and dry season palay, respectively, resulting in a total palay planted area of 2.55 ha or an improved cropping intensity of 182.4 percent.

Estimation of farm household income and expenditure with and without project made use of the farm gate prices of input materials and products surveyed in the Area.

Items of income and expenditure considered are gross production value, production cost, irrigation service fee, farm wage, lease rent, and off-farm income. Table 6.4-1 shows that with project farm family surplus increases by about ₱1,900 and ₱1,600, respectively, for owner operator and lessee.

(2) Cost Recovery

The measure of cost recovery most often attempted is the cost recovery index which gives a proportion of public investment on a project recovered by water charges and benefit taxes collected from the beneficiaries. This measure, however, is descriptive only and the values necessary to estimate this index are difficult to obtain with precision, thus instead a level of irrigation fee is established

TABLE 6.4-1 PRELIMINARY ESTIMATE OF FARM BUDGET

	Without Project		With Project	
	Owner Operator	Lessee	Owner Operator	Lessee
1. Farm Size (ha)	1.4	1.4	1.4	1.4
2. Cropping Intensity (%)	161	161	182.4	182.4
3. Farm Family Income (₱)				
- On-farm Income	13,757	13,757	18,055	18,055
- Off-farm Income ^{1/}	15,850	14,150	15,850	14,150
<u>Total</u>	<u>29,607</u>	<u>27,907</u>	<u>33,905</u>	<u>32,205</u>
4. Expenditure (₱)				
- On-farm Expenditure	8,637	10,619	11,051	13,288
- Household Expenditures ^{2/}	13,740	13,740	13,740	13,740
<u>Total</u>	<u>22,377</u>	<u>24,359</u>	<u>24,791</u>	<u>27,028</u>
5. Farm Family Surplus (₱)	7,230	3,548	9,114	5,177

Note: ^{1/}; ^{2/} : Based on the result of 150 farms survey.

that provides for total reimbursement without interest of public investment on this project within the project life of 50 years as well as for total operation and maintenance cost.

This level is estimated by investment cost per hectare per year of 206 pesos which is to be paid interest free (see NEDA Resolution No.20 on Billing and Collection Policies and Procedures) for 50 years plus O & M per hectare of 374 pesos per year. The sum of these is multiplied by farm size of representative farm household of 1.4 ha to arrive at the level of 812 pesos of irrigation fee per household.

Since this level is less than 50 percent of the difference in farm family surplus with and without project both for owner operator and lessee (see Table 6.4-1), it is safely assumed to be within the farmer's ability to pay.

6.5. Socio Economic Impact

Aside from the direct project benefit derived from the incremental production of agricultural products, the Project is anticipated to give rise to the following socio economic impact.

- Expansion of employment opportunities
- Expansion of agricultural production
- Increase in disposable income among farm households
- Improvement in transportation network

6.5.1. Expansion of Employment Opportunities

Increased intensity in labor requirement for crop production is expected to contribute to the expansion of labor to 4,650,000 man-days per year with project from 3,842,100 man-days without project.

The surplus labor existing in the Area is capable of meeting the additional labor requirement of 808,500 man-days. Farm households will thus benefit greatly from this expansion of employment opportunities. In addition, the Project will absorb a large number of the labor force during the implementation period.

6.5.2. Expansion of Agricultural Production

Along with the increased application of agricultural inputs such as fertilizer and chemicals necessary for increased paddy and upland crops production with project, is the anticipated expansion of marketing activities in these inputs as well as products, and concomitantly the expansion of related job opportunities.

6.5.3. Increase in Disposable Income among Farm Households

The farm budget analysis shows that the farm household surplus or net income rises from 7,230 pesos for owner operator and 3,548 pesos for lessee without project to 9,114 pesos and 5,177 pesos with project, respectively.

6.5.4. Improvement in Transportation Network

Improvement in the transportation network with project such as those O & M roads along irrigation and drainage canals will help facilitate the transportation of various inputs and products as well as enhance the mobility of people in the Area.

6.6. Benefit and Justification

Expansion of planted area and unit yield through implementation of the Project with the resultant increase in paddy production upland crops will contribute greatly to the improvement in self-sufficiency in rice of the nation as well as to the expansion of vegetable production in the Area.

Consideration of everything discussed in previous chapters along with an IRR of 17.53 percent leads to the conclusion that the Project implementation is technically sound and economically justifiable.