5. THE PROJECT

5.1 Participatory Rural Appraisal (PRA) and Public Consultation Seminars and Objectives of the Project

5.1.1 Participatory Rural Appraisal (PRA) and Public Consultation Seminars

As stated in Section 3.2.1, the following prospective plans are formulated to fulfill the objectives of the Project:

(i) Irrigated agriculture development plan,
(ii) Rehabilitation and improvement plan of existing irrigation facilities,
(iii) Improvement and strengthening plan of present water management and O&M practices,
(iv) Institutional development plan of IA and NIA,
(v) Strengthening and improvement plan of agricultural support services, and
(vi) Watershed management plan.

The said plans were consulted by the participants through the PRA and public consultation seminars.

The objectives of PRA were to facilitate irrigators' association (IA)-level planning based on the needs of IA member and non-IA member and to formulate IA-level operation and management plan for irrigation and drainage facilities. To achieve these objectives, the PRA was conducted through the following five (5) steps:

(i) Identification of the present social condition, land use condition, physical infrastructures, agricultural activities and environment,
(ii) Identification of constraints and problems on the present agricultural activities,
(iii) Identification of the causes of the above constraints and problems,
(iv) Identification and ranking of potential solutions for the above constraints and problems, and
(v) Preliminary preparation of appropriate improvement plans and projects for agricultural development and operation and management of irrigation and drainage facilities.

The PRA was executed for 19 IA areas covering the entire project area. The participants of the PRA was limited to farmers with farming area of less than 1.0 ha and farm workers. The total participants were 753 and out of them, 671 were interviewed for the PRA participants' profile. The salient data of the PRA participants are as follows:

(i) IA member: 306 (46%) and non-IA member: 365 (54%),
(ii) male: 388 (58%) and female: 283 (42%),
(iii) owners' cultivator: 194 (29%)); leaseholder: 323 (48%); tenant farmer: 37 (5%); farm worker: 117 (18%),

(iv) age group 15-30: 65 (10%); 31-50: 308 (46%); 51-65: 220 (33%); more than 65: 78 (11%),
(v) Most of the participants (466 persons) have been living in their barangays for more than 30 years (69%) and only 0.8% (5 persons) have been in their place of residences for 3 years or less,
(vi) married: 542 (81%) and Catholics: 621 (93%),
(vii) number of children 3-4:174 (30%); 5-6: 153 (27%); 7-9: 137 (24%), and
(viii) education level primary: 298 (44%); secondary: 244 (36%); college: 53 (8%); college graduate: 68 (10%); no school education: 8 (2%).

The following problems were identified through the PRA:

(a) low agricultural production caused by (i) high cost of farm inputs; (ii) low prices of paddy (controlled by trader); (iii) lack of post-harvest facilities; (iv) pests and diseases; (v) absence of financial institution; (vi) lack of farm to market roads; (vii) poor loan repayment; (viii) insufficient farmers' cooperatives; and (ix) lack of technical support (DA).
(b) poor irrigation facilities caused by (i) damaged canal gates and turnouts ; (ii) presence of illegal turnouts, checks and pumps; (iii) siltation on canals; (iv) narrow canals; (v) clogged and uncleaned canals; and (vi) insufficient drainage canals and insufficient capacity of drainage outlets.
(c) poor management of system caused by (i) absence of WRF tender who is responsible for water distribution; (ii) no proper scheduling of water supply; (iii) low ISF collection rate; (iv) limited technical competence of NIA staff; and (v) no monitoring from NIA.
(d) inactive IA caused by (i) lack of cooperation among members; (ii) limited role of members for O&M activities; (iii) conflict on water distribution among members; and (iv) lack of awareness of members on IA activities.
(e) depletion of natural resources caused by (i) illegal logging; (ii) slash and burn farming; and (iii) accumulation of silt and other wastes in the creeks.

To address the above problems, the following prioritized solutions were identified through the PRA:

(a) increase of agricultural production through (i) organization of cooperatives for market and credit assistance and provision of post-harvest facilities; (ii) government subsidy on especially farm inputs; (iii) eradication of pests; (iv) use of organic fertilizer; (v) strengthening of agricultural extension services including new farming technology; and (vi) conduct of soil analysis.
(b) improvement of irrigation system through (i) repair of damaged canal gates and turnouts; (ii) removal of illegal turnouts and construction of new legal turnouts; (iii) construction of water impounding dams; and (vi) canal lining.
(c) improvement of O&M practices through (i) sufficient water distribution; (ii) training of system management personnel (NIA&IA); (iii) establishment

of monitoring system; (iv) development of IA management capabilities; and (v) entrust ISF collection to IA.

(d) strengthening of the IA through (i) training on value formation; (ii) reorganize the IA; (iii) continuous reminder to farmers of their obligation; (iv) continue education to strengthen and improve IA; (v) capital build-up; (vi) sustain cooperation and (vii) organize farm labors as members and transformation of IA into a cooperative (specific proposal in only one PRA session).

(e) protection of environment through (i) planting of trees in the watershed area; (ii) adoption of organic farming; and (iii) prevention of slash and burn farming.

During the PRA session, the above solutions were compared with the measures proposed in the prospective plans prepared by the JICA study team. It was acknowledged by all participants that the identified solutions were mostly the same with the measures proposed in the prospective plans as shown in Table 5.1.1.

Following the PRA session, the Public Consultation Seminars were held to get a consensus among stakeholders such as national government agencies (DA, NIA, NFA, CDA, DAR, DENR, LBP, etc.) , local government units (LGUs), non-government organization (NGOs), IAs and other farmer groups on the findings in the PRA sessions and the prospective plans prepared by the JICA study team.

The Seminars were held as follows:

a) Jalaur proper RIS scheme-level Seminar: November 11, 1997
b) Suague RIS scheme-level Seminar: November 13, 1997
c) Municipal-level Seminar : November 18, 1997

At the scheme-level Seminars, the prospective plans proposed by the study team were generally accepted by all participants with the following comments.

The proposed crop rotation for the Suague RIS was generally accepted if the following support services could be made available to the farmers:

(i) extension services for proper diversified cropping practices,
(ii) marketing support, and
(iii) availability of certified seeds.

At the Municipal-level Seminar, the proposed prospective plans by the study team were generally accepted by all participants with the following specific comment:

presentation of a very strong justification in its recommendation for a maximum utilization of existing water in terms of increasing the cropping intensity and yields in the project area.

5.1.2 Objectives of the Project

Considering the problems and their solution measures identified through PRA and comments pointed out in the Public Consultation Seminars, the main objectives of the Project are:

(a) to increase agricultural productivity, especially yields of paddy through the development of irrigated agriculture, and thereby improve the poor financial position of farmers,
(b) to enhance irrigation efficiency through the rehabilitation and improvement of existing irrigation facilities, and strengthening of the skills of the NIA staff and IAs on water management and O&M practices,
(c) to sustain the water management and O&M practices through institutional development of the NIA and IAs, and
(d) to stabilize river flow, reduce sediment and sustain the Project operations as a long-term objective through watershed management.

The final goal of the Project is to improve the rural economy. This is expected to be achieved through increase of agricultural productivity, revitalization of existing RISs, sustainability of water management and O&M practices, and improvement of poor financial position of farmers. Thus, the Project is expected to support the key agricultural development policies defined in the MTPDP.

5.1.3 Integrated-phased Development Approach

An integrated-phased development approach will be adopted by the Project, divided into two phases. First phase covers the development of soft aspects of the prospective plans to carry out in advance the strengthening of the IAs, rehabilitation of farmers' cooperatives, development of women service cooperatives, and activation of agricultural extension services. The first phase also covers a part of rehabilitation/improvement of irrigation facilities and improvement of O&M skills of NIA and the IAs including the preparation of the O&M manual, using the rehabilitated/improved irrigation facilities. This phase coincides with the 4 years of the pre-construction period and partial construction period. Second phase will carry out the full implementation of hard aspects of the prospective plans and the further advancement of the soft aspects. By the time the improvement/rehabilitation of irrigation facilities are completed, the strengthened IAs would have adequate institutional and technical capabilities to effectively and sustainably use the irrigation facilities and start partial system management. This phase coincides with the construction and sustainability period of the Project.

5.2 Irrigated Agriculture Development Plan

5.2.1 Proposed Cropping Pattern

(1) Selection of Crops

The following crops were finally selected and recommended for cultivation in the project area. The overriding considerations for the selection of these crops were technical suitability for soils and climate, markets and profitability and social acceptability among the IAs and farmers.

Paddy: Paddy is expected to be a major crop given that irrigation is the major investment in the Project. There are no major technical, marketing and social constraints foreseen in the cultivation of paddy. It is the basic food staple in the Philippines. The cultivation of paddy in the project area is seen as a national food security measure given that the country still imports an annual average of less than one million ton as a buffer stock.

Mungbean: Mungbean is a major diversified crop in the project area. Presently, mungbean is planted during the third crop after harvest of the second paddy, using residual soil moisture without plowing and irrigation. Under this extensive farming, the yield is very low at 0.4 to 0.7 ton/ha. The yield is expected to increase by applying new intensive farming systems such as row-ridge cultivation, irrigation, fertilizing, etc. Since mungbean is moderately tolerant to drought, the water requirement is relatively small. The cultivation of mungbean as a leguminous plant improves soil fertility by nitrogen fixation.

As regards the market potential of mungbean, the Philippine imports about 70% of the national requirement. This condition makes mungbean as an ideal import substitute given the recent devaluation of the peso vis-a-vis US dollar. The incremental production of mungbean in the project area which is expected to be significant will form part of the national requirement.

Watermelon and vegetables: Since these crops are highly perishable the cultivation is proposed to be on a small scale. Presently watermelon is one of the major diversified crops after the second cultivation of paddy. The major producers in Iloilo Province are in Aganan and Sta. Barbara RIS areas. The farm-gate prices sometimes drop during peak harvest season. Vegetables such as eggplant, okra, squash, tomato, sweet pepper, chili, ampalaya, stringbean, cabbage, and cucumber are candidates as alternative crops. These vegetables are planted on small scale mainly for local consumption.

It should be mentioned that diversified crops will be introduced only during the dry season. Their cultivation during the wet season is not recommended because of water-logging and high humidity. Soil condition in the project area has limitation on drainability for most diversified crops.

(2) Cropping Pattern

The formulation of cropping pattern was based on to the following conditions:

i) Water distribution will be stopped for 2 months during the dry season to allow for maintenance works of the irrigation facilities,
ii) Paddy will be planted in the entire service area during the wet season,
iii) Diversified crops will only be introduced during the dry season considering the limited supply of irrigation water, and
iv) The cultivation of third paddy, mungbean and watermelon will assume the same conditions in so far as in present area and yields.

In view of the limited supply of water coming from the Suague RIS during the dry season, rotational cropping system of diversified crop (mungbean) is being recommended. The proposed cropping pattern is shown in Figure 5.2.1 and summarized below:

(Unit: ha)

	Jalaur Proper	Suague	Total
1st Paddy Irrigated	8,820	2,900	11,720
2nd Paddy Irrigated	8,820	1,100	9,920
Mungbean Partially Irrigated	0	1,800	1,800
Subtotal	17,640	5,800	23,440
Cropping Intensity (%)	200	200	200
3rd Crops			
3rd Paddy	1,200	50	1,250
Watermelon	100	20	120
Mungbean Rainfed	600	150	750
Subtotal	1,900	220	2,120
Total	19,540	6,020	25,560
Service area (ha)	8,820	2,900	11,720
Total Cropping Intensity (%)	222	208	218

5.2.2 Proposed Farming Practices

The improved farming practice will be proposed based on the results of analysis of the present farming practices. The standardization of recommend farming practices and the procedure of dissemination of improved farming practices are described in the improvement plan of agricultural extension services (section 5.6.1).

(1) Paddy

The yield of paddy will be increased by proper application of farm inputs and appropriate farming practices as explained below.

i) Unification of cropping period

Cropping period will be unified through impartial and certain water distribution. Under the unified cropping, farmers will be able to do group spraying for pest and disease. Optimum interval between harvest of wet season paddy and planting of dry season paddy will reduce occurrences of pest and disease.

ii) Efficient and proper land preparation

To the extent that there are limited supply of draft animals, land preparation will be complemented by available hand-tractors. Land preparation will be done efficiently and properly by the mechanization.

iii) Improvement of fertilization

Crop fertilization will be applied at 100:35:35 kg/ha of N:P:K. All of the P and K, and about 1/3 to 1/4 of N should be applied as basal. Half of the remaining N will be applied six weeks after seeding (2 week after transplanting), and during the panicle initiation stage, side dressing will be recommended. Furthermore, the fertilization will be improved by the analyses of fertilizer cost and yield increase, and recommend system of fertilization rate by quick soil test by extension workers.

iv) Use of certified seed and optimization of seeding rate

The present seeding rates are very high at 120 to 200 kg/ha in direct seeding, and 80 to 120 kg/ha in transplanting, taking into consideration the optimum rate by researches at 60 - 80 kg/ha and 30 - 40 kg/ha to respective methods. The farmers are using much seed against the damage by snail and rat. Optimization of seeding rate and use of certified seed will be recommended in order to reduce seed cost and to increase yield through stimulation of tillering. Taking into consideration the snail and rat damages, the seeding rate will be recommended to be 100 kg/ha on direct seeding and 50 kg/ha on transplanting. Furthermore, the rate should be optimized through the snail and rat control as well as supplemental replanting to the damage.

v) Expansion of transplanting practice

Adoption of transplanting method will be recommended in order a) to attain yield increase easily and quickly, b) to increase employment opportunities for farm labor in the project area, c) to save irrigation water by shortening growth period in the paddy field, and d) to carry out proper control of pest, insect, snail and rat, and reduction of seeding rate and herbicide.

The direct seeding method was promoted in the 1980's for double cropping of paddy in the area with water shortage in the early wet season and dry season

through seeding in advance of rain or water distribution, since the method can seed simultaneously with rain/water distribution. Some farmers still adopt the dry seeding method in the project area.

The plan envisages that transplanting practice will be expanded from 10 - 15% at present to 50% of the project area. Presently, relevant MAOs are extending the application of transplanting method in the project area, and the proposed demonstration farms with adopt transplanting method. The demonstration farms are expected to yield an average of 4.8 to 5.5 tons/ha, and more than 6.0 tons/ha under favorable climate condition.

Transplanting method requires more labor force than direct seeding. According to the socio-economic survey, the labor requirement increases by 24 man-days compared with direct seeding (80 man-days for direct seeding and 104 days for transplanting). As discussed in Section 5.2.4, there is surplus labor force in the project area for the proposed cropping pattern/farming practices even in the busiest month of October.

The higher cost (P1,020/ha) for transplanting practice will be adequately compensated by the increase in paddy field to 130 kg/ha. The transplanting method is profitable if the yield increases more than 130 kg/ha, which is equal to only 2.6% of the target yield. The relevant MAOs explain that transplanting method generally gives more than 3 - 5% of yield increase compared with direct seeding.

Comparison of Costs between Direct Seeding and Transplanting (Unit: peso/ha)

Cost	Direct seeding (D)	Transplanting (T)	Balance (D-T)	Remarks
Seed	(100 kg/ha)	(50 kg/ha)	(50 kg/ha)	
	1,600	800	800	P16.0/kg
Herbicide	350	250	100	reduction of herbicide by manual weeding
Labor	(80 man-day/ha)	(104 man-day/ha)	(-24 man-day/ha)	
	6,400	8,320	-1,920	P80/day
Total	8,350	9,370	-1,020	

Presently, direct seeding is adopted by farmers for the following reasons: a) weak financial condition of farmers for labor cost expenses, b) uncertainty of water distribution at required timing for transplanting after the nursery period, c) insufficient activities by MAO (there exist only 14 demonstration plots for paddy in the relevant municipalities), and d) absence of cost-benefit analysis approach to paddy cultivation. The transplanting method would be extended among the farmers through the provision of crop loan, strengthening of extension services, proper water distribution, and extension activities by the contact farmers.

In the future, mechanical direct seeding will be expanded by reducing labor input for farming activities and hence reducing production cost. Since there is

presently sufficient labor force in the project area, and MAOs and research institutes recommend the transplanting method for the farmers, the transplanting method will be disseminated by giving priority to the farmers with sufficient labor force. It will be disseminated through training for farmers and demonstration farms.

vi) Proper control of pest/insect, snail and rat

Required agro-chemicals such as pesticide, insecticide, herbicide, rodenticide and molluscicide will be supplied timely to farmers through cooperatives for minimization of the damage. TSAGs will do group spray for pest/insect control and capture of rat and snail. Manual weeding, ecological control of pest, snail and rat, and cultivation of tolerant varieties will be practiced as recommend by extension workers. The cultivation of mungbean in the Suague RIS will be expected the mitigation of damages by pest/incest and snail.

vii) Improvement of harvest and post-harvest practices

Harvesting will be done properly at maturing stage in order to minimize losses and inferior quality of paddy. Harvested paddy grain should be dried below 14% moisture content by sundry or mechanical dryer. Mechanical dryer would be used for drying of paddy harvested during the wet season.

vii) Organic farming

Organic fertilizers, such as crop residues and animal manure will be incorporated into the soil by plowing. Hog manure which are readily available can be used as alternative fertilizer manure.

(2) Mungbean

The farming practices of mungbean will be improved to get better and quality yield for well competition vis-a-vis imported mungbean.

i) Practice of row-ridge cultivation method

The row-ridge method will be recommended for land preparation in mungbean in order to furrow irrigation and remove excess water during the typhoon seasons. Plowing, harrowing, and ridging will be done after harvest of the first paddy. Plowing will be made as deep as possible to improve growing germination. Harrowing will done to break up large soil clods. The distance of furrows will be 50 cm apart.

ii) Use of suitable seed and inoculation of rhizobium strain

Common varieties in the area are MG 50-10A, CES 55 & 87, BPI MG-9, Pagasa 5, and IBB M9-9-82. Seed will be treated with liquid chemicals to protect from soil-borne diseases and insects. Seeds will be inoculated with Rhizobium strain intended for mungbean. Seeding rate will be 25 kg/ha, and dibble 2 to 3 seeds/hill spaced at 25 cm between rows and hills.

iii) Fertilization, crop protection and cultivation/weeding

Fertilizer will be applied as follows: 3 times before planting as basal, and after 3 weeks of germination as side dressing. About two-thirds of the N, P, K ratio of 30 : 30 : 30 kg/ha will be applied as basal and remaining 1/3 for side dressings. Complete fertilizer (14-14-14) will be applied. Weeding/cultivation for weed control will be done after four weeks of germination.

iv) Supplemental irrigation

Irrigation will be done partially, just after sowing, flowering and pod filling.

v) Proper harvest and post-harvest practices

Mungbean plants are ready for harvest when pods turn brown or black. After 2 days of sun drying, thresh the pods. Seeds must have a moisture content of 12% or below for store.

5.2.3 Labor Requirement and Farm Machinery

The proposed labor requirement is shown below.

(Unit: man-days)

Crop	Proposed	Present
Irrigated Paddy (direct seeding)	80	69 - 71
Irrigated Paddy (transplanting)	104	99
3rd Paddy	* (56)	56
Rainfed Paddy		56
Mungbean (irrigated)	49	
Mungbean (Rainfed)	* (17)	17
Watermelon	* (80)	80

* : Assumed at same as present condition of 3rd crops

On the basis of the above labor requirement and proposed cropping pattern, the total labor requirement and labor balance in the future plan are estimated under the following conditions:

- transplanting method of paddy would increase by 50% of total area,
- third cropping would assume the same area and farming practices, and
- available labor force for farm activities is estimated at 25,660 persons based on the number of households and farm workers in the project area,

total households in the project area	16,880 (population census 1995)
households of beneficiaries	7,850 (both RIS)
households of farm workers	4,980 (estimated based on the provincial labor statistics)
available on-farm labor force per household	
full-time	1.22 persons (average by socio-economic survey)
part-time	0.78 persons (0.5 x average by socio-economic survey)
total	2.00
total available on-farm labor force	(7,850 + 4,980) x 2 = 25,660

- workable days per month per available labor force 20 days/month
- available labor force per month 25,660 x 20 = 513,200 man-days
- on-farm labor requirement in busiest month (October) 263,560 man-days (Table 5.2.1)

As shown in Table 5.2.1 the total labor requirement is estimated at 1,804,700 man-days/year, and 263,560 man-days/month in the busiest month of October, which is 51% of the available labor force in month. The figure indicates that labor requirement of the proposed farming practices can be supplied by existing labor force.

Plowing/harrowing and leveling will be done fully by hand-tractor. The available number of hand-tractors can do about 6,000 ha of land preparation per month assuming a 30% working ratio. Given this, the whole service area will be completed during two months.

	Available Number * (unit)	Working Capacity (ha/day/unit)	Working Ratio (%)	Workable Area (ha/month)
Hand-tractor	1,150	0.5	30	5,175
Tractor	45	2.0	30	810
Total				5,985

*: Source : Socio-economic survey and Consultation meeting with IAs

5.2.4 Anticipated Crop Yield and Production

The anticipated yield of paddy is assumed at 5.0 ton/ha as referred to in Section 3.2.3.

The yield of mungbean is projected at 1.0 ton/ha. To achieve the expected yield, optimum application of farm inputs, appropriate farming practices as well as proper water management will be recommended.

The crop production under the "with project" condition is estimated by multiplying the anticipated yield with the cropped area. Total production of crops is estimated as follows: 111,000 tons of paddy; and 1,860 tons of mungbean. The net incremental crop production is expected at 43,220 tons of paddy, and 2,100 tons of mungbean. Table 5.2.2 shows the future total production of crops in each RIS compared with the present condition, as summarized below:

(Unit: ton)

	Paddy	Mungbean	Watermelon
Jalaur Proper			
Present	49,869	240	400
With Project	90,888	240	400
Increment	41,019	0	0
Suague			
Present	17,907	60	80
With Project	20,112	1,860	80
Increment	2,205	1,800	0
Total			
Present	67,776	300	480
With Project	111,000	2,100	480
Increment	43,224	1,800	0

5.2.5 Crop Budget and Irrigation Benefit

The project benefit is defined as the difference of the benefits between the "with project" and "without project" conditions. "Without project" condition was assumed to be same as the present condition. Agricultural production conditions would not change from the present condition if the Project would not be implemented.

The benefits under the "with project" and "without project" conditions are shown in Tables 5.2.3 to 5.2.5, and are summarized as below.

(Unit: peso/ha)

	With Project			Without Project		
	Gross Income	Production Cost	Net Profit	Gross Income	Production Cost	Net Profit
1st Paddy irrigated *	42,900	* 19,411	23,489	29,172 ~ 31,231	17,587	11,585~ 13,664
2nd Paddy irrigated *	42,900	* 19,811	23,089	28,314~ 29,258	17,991	10,323~ 11,267
1st paddy rainfed				19,219	12,545	6,674
2nd paddy rainfed				19,219	12,545	6,674
Mungbean partially irrigated	25,000	10,653	14,347			
3rd paddy	19,219	12,739	6,480	19,219	12,739	6,480
Mungbean rainfed, 3rd crop	10,000	4,035	5,965	10,000	4,035	5,965
Watermelon	32,000	15,290	16,710	32,000	15,290	16,710

Note *: Average of direct seed and transplanting

The incremental benefit at full development is estimated at P288 million for both RISs. About P234.6 million is the benefit from the Jalaur proper RIS, and P53.3 million for Suague RIS as shown in Table 5.2.6.

5.2.6 Projected Farm Budget

The projected farm budget at full development is estimated assuming an average farm size of 1.5 ha per household. The net income of Jalaur proper and Suague RISs will increase from the present levels of P28,050 and 32,630 to P72,080 and 62,530 respectively.

(Unit: Peso)

	Farm Size: 1.5 ha			
	Cropped Area (ha)	Gross Income	Production Cost	Net Income
Jalaur Proper				
1st Paddy irrigated	1.50	64,350	29,117	35,233
2nd Paddy irrigated	1.50	64,350	29,717	34,633
3rd Paddy	0.20	3,922	2,600	1,322
Watermelon	0.02	544	260	284
Mungbean rainfed	0.10	1,020	412	608
Total	3.32	134,186	62,106	72,080
Suague				
1st Paddy irrigated	1.50	64,350	29,117	35,233
2nd Paddy irrigated	0.57	24,409	11,272	13,137
Mungbean partially irrigated	0.93	23,276	9,918	13,358
3rd Paddy	0.03	497	329	168
Watermelon	0.01	331	158	173
Mungbean rainfed	0.08	776	313	463
Total	3.12	113,639	51,107	62,532

The net income per household at 1.5 ha farm-size will also increase.

(Unit: pesos/h.h.)

	Jalaur proper	Suague	Note
Present			
Owner-cultivator	28,047	32,631	
Leaseholder:	11,831	16,415	Land fee: 30 sacks/ha/year
Tenant farmer	6,504	6,964	Given 10% of net production
Prospective			
Owner-cultivator	72,080	62,532	
Leaseholder:	54,060	46,899	Land fee: 25% of net income
Tenant farmer	36,040	31,266	Land fee: 50% of net income

5.3 Improvement Plan of Irrigation and Drainage Facilities and Road Network

5.3.1 Basic Improvement Approach

The basic approaches to improvement of irrigation and drainage facilities are:

(a) The first is to increase the overall irrigation efficiency. This would be achieved by improving existing irrigation facilities and strengthening the current water management skills of the NIA and IAs in both the RISs. To attain this purpose, the following elements will be conducted.

(i) Rehabilitation and improvement of existing irrigation facilities, especially the gates at the head gates. including the measuring devices

(ii) Renewal of existing turnout and provision of additional turnouts, including the measuring devices and feeder canals,

(iii) Minor repair of the diversion dams, especially the improvement of the intake gates,
(iv) Construction of settling basin to reduce the siltation in canals,
(v) Improvement of canal sections including canal lining and
(vi) Improvement of the main farm ditch and drain with removal of illegal turnout.

(b) To sustain proper water management and enhance the use of the return flow from the irrigation service area, supplemental irrigation facilities such as farm ponds and small ponds are proposed to be constructed around the head of the canals and in the creeks.

(c) Taking into account the effective use of both the present water resources, the conjunctive use method of water is proposed to increase the cropping intensity of the Suague RIS area during the dry season.

(d) To address the inundation problem in both the RIS areas, additional secondary drains and related structures such as cross drains and bridges will be constructed

(e) The existing service roads would be improved to strengthen the function of the farm to market road in the RIS areas. This will be pursued by establishing the link road system connected with the rural road.

5.3.2 Development Potential and Conjunctive Use of Water Resources

Land resource in the Project area is assesed to be suitable for paddy cultivation. In general, the agriculture land comprising the boundaries of the gravity irrigation system is almost developed in both the RIS areas. However, the portions consisting the elevated agricultural lands located along the main canals of both the RISs and the low agriculture lands in the downstream from the syphon of the lateral E crossing the Jalaur river are still untapped. The total area of the elevated and the low lands is estimated at 183 ha in both the RIS areas. These areas have informally been using the irrigation water coming from the concerned irrigation canals. As the result of the integration of the areas, the irrigation service area of the Jalaur proper and Suague RISs is estimated to reach 8,820 ha and 2,900 ha, especially, in view of the land potential as stated in Section 4.3.1.

The surface water resource for irrigation purpose for both the RISs has reached its maximum utilization, based on the results of the Study for new water resource development in the upper basins of both rivers. The potential of other alternative sources of water resource development notably shallow and deep ground water is reportedly not promising. Therefore, it can be inferred that the available water for irrigation use is almost the same as the current water resources for both the RISs.

The Jalaur river has relatively plenty of water. On the other hand, the Suague RIS encounters reduced supply of water during the dry season. The available water in Jalaur river can be allocated to the Suague RIS area for irrigation purpose under the with and without improvement plan conditions on the Jalaur extension RIS based on the water balance calculation between the Jalaur river and irrigation service areas of the RISs. The maximum water discharge to be allocated is estimated to cover the requirement of paddy cultivation area of about 200 ha in the dry season. As a whole, the development potential area for irrigation will be finally increased to 9,020 ha for the Jalaur proper RIS. This includes the area of 200 ha proposed above. The Suague RIS is estimated to have a development potential of 2,700 ha.

5.3.3 Irrigation Water

(1) Irrigation water requirement

The irrigation water requirement was estimated using the guidelines of the FAO on irrigation and drainage paper No. 24. The requirement was based on the proposed cropping patterns for both the RISs. The unit irrigation requirement is estimated through the same formula as mentioned in Section 3.2.4.

The irrigation water requirement of mung bean is estimated that water is supplied only for germination of the bean. This is in consonance with the present farming practice on the mung bean cultivation and water availability during the dry season.

The peak irrigation water requirement is estimated at 1.69 lit./sec./ha under the condition of double paddy cultivation for the Jalaur proper RIS and 0.55 lit./sec./ha under the conditions of double paddy cultivation in an area of 900 ha and first paddy - mung bean cultivation in an area of 1,800 ha for the Suague RISs. The details are shown in Tables 5.3.1 to 5.3.2.

(2) Water Balance for the Jalaur proper and extension RIS ares

Water balance for irrigation use at the Jalaur diversion dam is computed as shown below. After development of the Jalaur extension RIS, the water deficit for irrigation use will not occur during dry season based on available water with probability of 80 % .

(Unit m3/sec.)

Description	Jan.	Feb.	Mar.	Apr.	May
1 Available Water at Jalaur diversion dam (T= 5 years)	18.30	15.87	10.19	10.00	12.42
Irrigation demand after develpment of Jalaur proper RIS					
Jalaur proper (9,020 ha)	15.24	8.69	1.24	0.00	1.35
Jalaur extension (2,260 ha)	0.00	0.00	0.00	3.30	3.30
2 Total	15.24	8.69	1.24	3.30	4.65
Balance (1 - 2)	3.06	7.18	8.95	6.70	7.77
After development of both RISs					
Jalaur proper (9,020 ha)	15.24	8.69	1.24	0.00	1.35
Jalaur extension (2,620 ha)	0.79	0.00	0.00	1.02	2.39
3 Total	16.03	8.69	1.24	1.02	3.74
Balance (1 - 3)	2.27	7.18	8.95	8.98	8.68

(3) Crop rotation in the Suague RIS area

The irrigation service area for the dry season paddy is extended only to about 900 ha in the Suague RIS area. This is equivalent to only one third of the total area. In this regard, crop rotation of paddy is strongly recommended to permit and sustain active agriculture and proper water management in the RIS area. The crop rotation during the dry season paddy is proposed to be conducted on an irrigation division basis with interval of 2 years.

5.3.4 Improvement Plan

(1) Irrigation improvement plan

The Plan is shown in Figure 5.3.1. Each component of the Plan is described below.

(a) Diversion dam

The gates and incidental facilities will be replaced to sustain proper water management for irrigation as summarized below.

RIS	Main Gate	Scouring Sluice Gate		Intake Gate
	Minor Improvement of Driven Lifting	Improvement of Driven Lifting	Monir Repairing	Improvement of Driven Lifting
Suague RIS	-	1 no.	1 no.	2 nos.
Jalaur Proper RIS	8 nos.	-	-	12 nos.

The trashracks of intake gate and communication facilities will also be provided to sustain the proper water management and maintenance.

In the Suague diversion dam, the river improvement work is proposed to straighten the existing river course through dredging in the upstream front of the weir. The length and width of the dredged river course are respectively planned at about 280 m and 40 m. The gabion mattress revetments of about 280 m and

the gabion groins cum gabion revetment of 70 m will also be installed at meandering river sections of the right bank in the upstream from the weir. The top surface elevation of the gabion mattress and the groin is EL. 42.5 m. The current river course will be closed by gabion & concrete stopper and filled up by the dredged materials, and the back side of the gabion mattress will also be filled up by the same dredged materials until EL 42.5 m.

(b) Main and lateral irrigation canals

The existing canal sections will be re-shaped to sustain sufficient flow capacity, and the required water level will be verified at each head gate and turnout to include the head loss of the newly installed measuring devices.

The existing head gate of the lateral canal C of the Jalaur proper RIS will be moved to the upstream of about 40 m. The head sections of the lateral canal C will be straightened to serve as the canal course from the new head gate.

The canal lining will be provided in the long canal which has the significant role of a water conveyance for both the RISs. This is to accelerate the water run, to reduce seepage loss and to sustain the proper canal section. The canal lining will be made in the main canals of both the RISs, the lateral canal B of the Suague RIS and lateral canals E and E5 of the Jalaur proper RIS. Total length of canal lining will be about 36 km as shown below.

RIS/Canal	Length (m)	RIS/Canal	Length (m)
Suague RIS		Jalaur Proper RIS	
- Main canal	3,250	- Main canal	20,900
- Lateral B	3,050	- Lateral E	7,850
		- Lateral E4	550
Subtotal	6,300	Subtotal	29,300
		Total	35,600

In addition to the canal lining, a special canal, namely a feeder canal will be provided to improve the water supply to the TSAs to cope with the problems on the slow water run from the lateral canals and/or the insufficient water discharge distribution due to illegal turnouts and improper canal layout. The feeder canal will be provided at about 7.4 km (7 canals) in the Suague RIS area and about 24.3 km (24 canals) in the Jalaur proper RIS area.

(c) Irrigation structures

Main improvement works of related structures are as follows.

(i) Construction of the settling basin
(ii) Replacement and new installation of gates at the head gates
(iii) Repairing of riprap in the outlet portion of the head gate
(iv) Renewal of existing turnout and additional turnout

(v) Construction of measuring devices at head gates and turnout
(vi) Repairing and rehabilitation of the damaged structures

The settling basin will be respectively constructed at about 183 m downstream from intake gate of Jalaur diversion dam and at about 106 m downstream from intake gate of Suague diversion dam. Both the settling basins will be constructed at sections of the existing main canals. The type of the settling basin will be natural flushing for the Jalaur proper RIS and mechanical for the Suague. In case of the settling basin of the Suague, it can not sustain the sufficient difference of the elevation to flush out the sediments automatically. The settling basins of both the RISs have the following dimension.

RIS	Type	Dimension (m) W x L x MaxD	No. of Lane
Jalaur Proper RIS	Natural flushing	22.7 x 62.0 x 4.5	8
Suague	Mechanical	6. 8 x 47.0 x 2.6	2

The measuring device of the broad crest weir type will be provided at the outlet portion of the settling basin to confirm the water discharge of irrigation.

The deteriorated gates of the head gate are estimated at about 71 nos. in both the RIS areas. The gate to be replaced due to sever deterioration will be 37 nos., and the new gates to be installed will be 34 nos. in both the RISs as shown below.

RIS	Head Gate	Check Structure		Intake Structure		Total
		Replacement	New Installation	Replacement	New Installation	
Jalaur Proper RIS	24	19	12	6	15	52
Suague	9	5	5	7	2	19
Total	33	24	17	13	17	71

The measuring devices will be provided at all head gates. As explained above, the head gate of lateral canal C, furthermore, will be moved to about 40 m to the upstream of the main canal.

The existing turnouts of about 329 nos. will be renewed, and additional turnouts will also be constructed in both the RIS areas. The additional turnouts are 117 nos. consisting of 41 nos. in the Suague RIS area and 76 nos. in the Jalaur proper RIS area to accelerate the irrigation water run from the main canal or the lateral canals to each TSA and sustain proper water distribution in the each TSA.

The measuring devices of the broad crest weir type will be adopted, taking into consideration simple operation method. They will be installed at the outlet portion of the settling basin as well as at the outlet portion of each head gate and turnout.

The damaged structures such as culverts, drop structure and aqueduct the RIS areas will be improved. Screen for syphons of the main canal and the lateral canal E and spillway will be also provided.

(d) Supplemental irrigation facilities

Main purposes of supplemental irrigation facilities are as follows.

(i) to assist in the acceleration of water run in the irrigation area in the initial stage of the first crop in order to sustain crop calendar when the delay of water run is caused due to some reasons,
(ii) to assist in the recovery of mis-water delivery during the transition period of the improvement of water management skills (the 3rd year to the 6th year) and
(iii) to deal with emergency water use for irrigation for both the RISs in dry season.

The supplemental irrigation facilities are useful to sustain crop calendar, to assist in the up-grading of water management skills and to deal with emergency water use for irrigation for both the RISs in the dry season. Water of the farm ponds is planned to flow out to lateral canals by gravity method.

On the other hand, intake method in the ponds which are provided at deep sections of drainage canals and / or creeks is pumping method, because irrigation area expands in topographical flat plain, and provision of long canals needs to convey the water from the ponds. The gravity irrigation method is not be economic. Moreover, since portable pumps are widely extended in the RIS areas, it will be easy for farmers to apply pump irrigation method

Supplemental irrigation facilities such as farm pond and pond are respectively constructed along irrigation canals and pond in main drains and creeks. The farm pond is proposed at 13 sites in the Jalaur proper RIS area and 7 sites in the Suague RIS areas. The total area is about 18 ha for both the RISs. The ponds are constructed at 4 sites in the Jalaur proper RIS and 2 sites in the Suague RIS.

(e) On-farm improvement

The command area of the turnout will be improved. It will be reduced by constructing additional turnout and feeder canals to prevent the illegal tapping and/or stealing of water and at the same time to accelerate the water run. The average area is estimated at about 28 ha in the Jalaur proper RIS and 27 ha in the Suague RIS area as shown below.

Description	Unit	Jalaur Proper	Suague
Service area	ha	9,020	2,700
No. of turnout	nos.	323	102
Average command area	ha	27.9	26.5

In line with the arrangement of the command area of the turnout, the layout on the main farm ditch and main farm drain will be improved to separate the functions of irrigation water supply and conveyance of the drainage water. The maximum length of the main farm ditch will be 700 m.

(2) Drainage improvement plan

The Plan is shown in Figure 5.3.2. Each components of the Plan are described below.

(a) Drainage requirement

The drainage requirement for the secondary and farm drains is determined in accordance with the Design Guides and Criteria for Irrigation Canal (1979 NIA). The following assumptions are given taking into consideration the prevention of damage on flooding and inundation to paddy.

i) Probable daily rainfall with a return period of 10-year, and drainage period of 1.5 days
ii) Allowable retaining water depth in the paddy field is 100 mm.

The probable daily rainfall with a return period of 10-year is estimated at 205 mm, and the drainage requirement is estimated at 8.1 lit./sec./ha. The drainage requirement of the creeks and main drains is estimated by the unit hydrograph method. The drainage requirement of the significant crossing structures at the high way is estimated based on the probable daily rainfall with a return period of 25-year.

(b) Main and secondary drains

To cope with minor floods and inundation caused by the lack of secondary drains and drainage facilities, secondary drains of about 54 km (58 nos.) will be constructed in both the RIS areas as shown below.

Main Drain	No. of Additional Sec. Drain	Length (m)	Proposed Structures	
			Bridge	Cross Drain
Drain No.1 (Janipa-an River)	7	6,950	0	1
Drain No.2 (Sigangao Creek)	17	10,700	0	0
Drain No.3 (Old Lateral Canal G)	1	1,100	1	0
Drain No.4	0	0	0	1
Jalaur River	18	12,100	1	5
Drain No.5	10	12,650	0	1
Drain No.6 (Binaobao Creek)	2	2,900	0	0
Dumangas River	3	7,500	0	4
Total	58	53,900	2	12

The creek sections of the Abangay will be improved to either enlarge the sections and/or construct river bank to sustain more stable paddy cultivation.

(c) Drainage structures

The improvement work of the related structures will be the construction of new bridge and cross drain. The bridges of 2 nos. and cross drains of 12 nos. will be constructed at the highway crossing with the lateral canals in both the RIS areas.

(3) Road improvement plan

The Plan is shown in Figure 5.3.5. Each components of the Plan are described below.

(a) Improvement of service road

The improvement work of the service roads are divided into categories: (i) improvement of gravel pavement; (ii) improvement of road section and gravel pavement; and (iii) new construction of the service road. Three types of service road are proposed depending on the road width, e.g., the 3 m, 5m and 6 m. The total length of the work will be about 45 km for the Suague RIS and about 127 km for the Jalaur proper RIS.

RIS	Canal Concerned (nos.)	Gravel Pavement Only (m)	Road Section & Pavement (m)	New Construction (m)	Total (m)
Suague RIS	11	7,980	26,540	10,210	44,730
Jalaur Proper RIS	23	36,100	73,300	17,500	126,900
Total	34	44,080	99,840	27,710	171,630

(b) Improvement Works of the Rural Road

The barangay roads to be improved are selected in accordance with following criteria:

i) The barangay road is located adjacent to the service roads of both the RISs and
ii) The barangay road has the potential role of the farm to market road

The proposed barangay roads for improvement are: (i) about 1.2 km (one road) between lateral canals B and B5 for the Suague RIS; and (ii) about 2.1 km (one road) between the tail portion of the lateral canal E and high way Zarraga - Barotac Nuevo for the Jalaur proper RIS.

The access road to the existing service road will be provided at about 0.7 km (one road) to the lateral canal B2 of the Suague RIS and about 2.8 km (5 roads) to lateral canals C1, D1, E3, E4b and H of the Jalaur proper RIS.

5.4 Improvement Plan of Water Management and O&M Practices

5.4.1 Basic Concept

The main purpose of the improvement plan is essentially to address the physical, technical and financial constraints confronting the NIA-JSRIS office and IAs relative to such works. This will be achieved through the following measures: (i) strengthening of the JSRIS office; (ii) improvement of the monitoring system for proper water delivery and distribution schedule; and (iii) improvement of the financial and technical capacities of the NIA and IAs for sustained O&M practices. A two-phased approach will be adopted to ensure the sustainability of water management and O&M practices in the Jalaur proper and Suague RIS. In Phase I, the implementation of Type I and II contracts by the IAs (first four years during detailed design and construction period) will be considerably improved, while Phase II will initiate the implementation of partial system management by the strengthened IAs (beginning on the fifth year of the detailed design and construction period).

The proposed improvement plan is further formulated to address the main causes of poor water management and O&M practices mentioned in Section 4.5, and as diagrammed in Figure 5.4.1.

5.4.2 Strengthening of the JSRIS Office

(1) Restructuring the O&M sections of the JSRIS office

The present organization of the RIS will be strengthened to effectively meet the water management and O&M requirements in the project area, as shown in Figure 5.4.2. This will envisage the establishment of two (2) separate sections: Water Management Section and O&M Section. These sections will replace the existing two (2) O&M sections of the JSRIS office for Jalaur proper and Suague RIS.

The main functions of these new sections will be as follows:

(a) Water Management Section

The section will be reorganized to compose of Hydrologist, Irrigation Engineer and Agriculturist as shown in Figure 5.4.2. The main responsibility of the section will cover the preparation of water delivery and distribution schedule, and cropping calendar.

(b) O&M Section

The section will be composed of two units, i.e., Jalaur proper RIS Unit and Suague RIS Unit, and staffed with operation and maintenance engineers and field O&M staff as shown in Figure 5.4.2. This section will handle the operation of water control structures, maintenance of system facilities and recording of field data, such as water discharge and farming activities.

(2) Recruitment of additional O&M staff for improved water management and O&M practices

Recognizing the lack of O&M staff, additional staff will be recruited to augment the present manpower, particularly in the early stages of institutional strengthening of the NIA and IAs. The proposed types of system management under Type I and II contracts (Phase I), and partial system management (Phase II) are shown in Figure 5.4.3.

(a) Phase I (Type I and II contracts)

The number of WRF Technicians and WRF Tenders will be increased from the present 8 and 35, respectively, to 15 and 42 to achieve the following standard ratios:

(i) One WRF Technician for every RIS division (700-900 ha), and
(ii) One WRF Tender for every 3.5 km canal length (250-300 ha).

The additional O&M staff will be hired as contractual employees up to the end of Type I & II contract implementation (Phase I). For the ISF collection activities, only one (1) NIA collector will be retained in each IA area to provide continued technical assistance to the IAs during the Phase I. The services of this collector will be terminated in the Phase II as the IAs fully assume the ISF collection. This arrangement will allow the WRF Technicians and WRF Tenders to concentrate on their usual O&M works in a more effective manner.

The proposed increase of NIA O&M staff in Phase I (first 4 years of project implementation) is temporary and will be hired on contractual employment. The number of these staff will be reduced by 20% of the present number in Phase II. This proposal will be in conformity with the NIA policy regarding the employment of staff as mentioned below:

(i) For permanent personnel, filling up of positions vacated by some staff who have recently retired is not allowed in line with the national government policy on fiscal austerity measure (Attrition law).
(ii) For temporary/contractual personnel, the hiring of staff depends on the availability of RIS budget from ISF collection and other income, and subject to the approval of NIA central office.

Type I & II contracts shall be implemented in Phase I in all IA areas as a first step of the plan for the improvement of O&M performance of the RIS in the project area.

(b) Phase II (partial system management)

However, the final target of the system's O&M work will be to turn over this responsibility to the IAs under a partial system management after the Phase I. In Phase II, the WRF Technicians will be retained in all the divisions. Only

one (1) WRF Tender will be retained in each IA area to provide continuous technical assistance to the IAs. Hence, the O&M expenses of the RIS office will be considerably reduced at the start of Phase II.

(c) Water management

For the Water Management Section, one (1) Hydrologist and one (1) Irrigation Engineer will be newly designated or recruited to fill up the gap in the present manpower complement of the JSRIS office.

(3) Proper work load assignment for O&M staff

The present condition on the O&M assignment indicates the lack of O&M personnel in some divisions particularly the WRF Technicians, resulting in work overload for most of the existing personnel as mentioned in Section 4.5.

Furthermore, most of the O&M staff are assigned in the same area for a long period of time. Under this situation, familiarity and relationships with water users have been deeply established. In many instances, accurate, fair and proper evaluation of benefited area and production as bases of ISF billing are hardly done. Some O&M staff have tolerated this flawed evaluation system. To rectify this situation, periodic rotation (exchange and transfer) of the O&M staff assignment in the RIS will be considered to enable them to gain wider experience and exposure.

5.4.3 Improvement of Monitoring System

The proposed monitoring system will be composed of collection of field data such as farming activities, rainfall, river water level, canal water level and gate opening, data processing, and evaluation by means of wireless radio and computer. The collected data will be transmitted by wireless radio to the RIS office on time. The annual, seasonal, monthly and weekly water delivery and distribution schedules will be modified based on the evaluation results at the proposed Water Management Section in the RIS office. The wireless radio system will be established at the RIS office as a base station , at each diversion dam site , and at each IA office during the Phase I and II period.

The Irrigation Scheduling System will be developed to support the proposed monitoring system. The objectives of the System will be to facilitate the scheduling and operation of the irrigation system for preparing annual or seasonal irrigation schedule, delivery schedule and water balance within a short time. The System will be a personal computer software package of integrated database for efficient operation and maintenance of the irrigation system. It will simultaneously maintain the database of hydrological data of rainfall and river discharge. Moreover, the System will give graphical information output on the computer's screen for the irrigation area, cropped area, and delivery discharge at major canals to make operation and monitoring of the irrigation system easier.

5.4.4 Improvement of Financial and Technical Capacities of the NIA and IAs

(1) Improvement of the ISF collection system and necessary O&M budget

(a) Improvement of the ISF collection system to ensure sufficient O&M budget

This component will undertake the following activities to increase the collection of ISF:

(i) Proper turn-over of ISF collection responsibility to the IAs

The implementation of Type II contract for ISF collection will be pursued by the Project with proper training and assistance to the IAs. This arrangement recognizes the following merits of Type II contract.

- Reduction of administration cost of the NIA and proper work load of the NIA field staff,
- Real meaning to the concept of farmers' participation,
- Confidence among IA farmer-members, and
- Strategy to build up working capital for the IA.

(ii) Improvement of ISF evaluation policy for accurate and fair estimation of benefited area

There is presently no standard procedures on the evaluation of benefited area for collection of ISF, making the NIA's O&M staff to develop their own individual methods. Under this situation, the benefited areas reported to the JSRIS office are smaller than actual benefited area, and this contributes to the low billing for ISF.

To achieve a fair and higher ISF collection, a new policy for the evaluation of ISF will be established to replace the present basis for ISF payment in order to give more incentives to the water users for payment of ISF on time. For example, the production of 40 cavans/ha or more will be defined as the benefited area but the ISF will be determined as follows:

40 - 41 cavans/ha	:	50% less of full payment
42 - 43 cavans/ha	:	40% less of full payment
43 - 45 cavans/ha	:	30% less of full payment
46 - 47 cavans/ha	:	20% less of full payment
48 - 49 cavans/ha	:	10% less of full payment
more than 49 cavans/ha	:	full payment

This new scheme for ISF collection will be properly explained and disseminated to the water users through the IAs with the support of NIA's IDOs.

(iii) Establishment of proper database management for ISF billing and collection

With the use of computers, a database management for the preparation of ISF billing and collection forms will be established at the ISF Collection Section of the JSRIS office. This database will have two main file components: (i) database on water users, and (ii) database on ISF billing and collection.

The database on water users will include the list of actual water users (farmers and beneficiaries), lot No., their residential addresses, the sizes of their farms, the status of ISF payment, etc.. The database on ISF billing and collection will include the evaluated benefited area in each IA/division, the back and current accounts, the status of ISF collection, the list of delinquent water users, etc.. Updating of these information will be carried out by the billing clerks in coordination with the IDOs.

(iv) Streamlining of legal procedure for non-payment of ISF

At present, the billing clerks of the JSRIS office are carrying out the legal procedure against delinquent water users as recommended by the ISF collectors, as shown in Figure 5.4.4. However, it takes more than five months under normal condition to complete such procedure from the issuance of NIA's "letter of reminder" and "statement of ISF accounts" up to the preparation of "promissory note" on ISF payment by the delinquent water users through the subpoena issued by the Provincial Prosecutor. In order to accelerate the collection of ISF accounts, a streamlining of legal procedure is proposed to be applied by the JSRIS, as shown in Figure 5.4.5 The proposed legal procedure against the delinquent water users is considered favorable for the government by the Legal Counsel for NIA Region VI office.

As regards the penalty on the non-payment of ISF, the present penalty charge of 1% per month for non-payment of ISF seems too low to discipline effectively the delinquent water users, because so large amount of back account of ISF are not yet paid by the delinquent water users. The importance of irrigation and ISF in the O&M cost should be understood

among the water users by mutual consent to sustain the irrigation system. And the IAs will be institutionally strengthened to raise their technical and financial capacity to pay ISF and to assume the O&M responsibility for the irrigation facilities as the partial system management.

(v) Increase of incentives to the IAs for ISF collection

The IA incentive given under the operation and ISF collection contract is based on levels of collection which are as follows:

Collection efficiency (%)	Incentives to IA
0 - 50	0%
51 - 60	2%
61 - 70	5%
71 - 90	10%
91 - 100	15%

No incentive is given to the IA in case the collection efficiency does not exceed 50%. In order to encourage the IA to implement Type II contract and to improve the present low level of ISF collection by IA, additional incentives (e.g., 1% incentive for 41-50% efficiency and 0.5% incentive for 31-40% efficiency) will be considered for collection efficiency of less than 51%.

(b) Necessary O&M budget

Present O&M budget (ISF collection) is lower than the actually required O&M costs. The proposed necessary O&M budget of the JSRIS office for the O&M of Jalaur proper RIS and Suague RIS is estimated below.

	Phase I	Phase II	
		Implementation Stage	Sustainability Stage
Jalaur proper RIS (ISA : 8,820 ha)			
- Necessary O&M budget (pesos 1,000)	13,009	10,175	7,708
Necessary ISF collection efficiency *1	82%	64%	49%
ISF collectible (CA) (pesos 1,000) *2	15,876	15,876	15,876
Benefited area (ha) *3			
Dry cropping	8,820ha	8,820ha	8,820ha
Wet cropping	8,820ha	8,820ha	8,820ha
Suague RIS (ISA : 2,900 ha)			
- Necessary O&M budget (pesos 1,000)	3,917	3,389	2,515
Necessary ISF collection efficiency *1	128%	111%	82%
ISF collectible (CA) (pesos 1,000) *2	3,060	3,060	3,060
Benefited area (ha) *3			
Dry cropping	900ha	900ha	900ha
Wet cropping	2,900ha	2,900ha	2,900ha
Total of necessary O&M budget (pesos 1,000)	16,926	13,564	10,223
Total of ISF collectible (CA) (pesos 1,000)	18,936	18,936	18,936
Necessary ISF collection efficiency	89%	72%	54%

Notes : *1 : ISF collection efficiency = Necessary annual O&M budget/ISF collectible (CA)
*2 : ISF collectible (CA) estimated with benefited area (*3) in current account.
*3 : Benefited area estimated with full irrigable area in the irrigation service area.

In the Jalaur proper RIS, necessary annual O&M budget for the proper and effective O&M works is estimated respectively for Phase I and Phase II at 13.0 million pesos and 10.2 million pesos, and personal services budget represents 71% and 63% of all the O&M budget. If this O&M budget is only secured by ISF collection of current account, 82% and 64% of ISF collection efficiency will be required in Phase I and Phase II, respectively. These are realistic ISF collection efficiency that will be materialized through the proposed improvement plan for ISF collection as mentioned in the above section.

In the sustainability stage during Phase II in the Jalaur proper RIS, the number of O&M field staff of the O&M Section in the RIS office as technical assistance to IAs will be reduced and the necessary O&M budget will also be reduced. The necessary annual O&M budget and the necessary ISF collection efficiency for the O&M budget will be 7.7 million pesos and 49%, respectively, which are more realistically attainable.

In the Suague RIS, necessary annual O&M budget is estimated respectively for Phase I and Phase II at 3.9 million pesos and 3.4 million pesos, and personal services budget represents 69% and 64% of all the O&M budget. If this O&M budget is only secured by ISF collection of current account, 128% and 111% of ISF collection efficiency will be required in Phase I and Phase II, respectively. This means that the necessary O&M budget will exceed the ISF collectibles in current account, and the ISF collection will not be able to fill up the necessary O&M budget. As an alternative to ensure the necessary budget with ISF collection, increase of ISF collection rate (present rate = 150kg/ha and 100kg/ha

in dry and wet season, respectively.) can be considered, but collection efficiency will become lower and this is not effective and realistic.

The reduction of personal services budget is the most effective way to reduce O&M cost, since the personal services budget comprises most of the O&M budget. In the sustainability stage during Phase II in the Suague RIS, the number of O&M field staff of the O&M Section in the RIS office as technical assistance to IAs will be reduced and the necessary O&M budget will also be reduced. The necessary annual O&M budget and the necessary ISF collection efficiency for the O&M budget will be 2.5 million pesos and 82%, respectively.

If the total ISF collection from both the Jalaur proper RIS and the Suague RIS will be considered to achieve the necessary annual O&M budget for both RISs, 89%, 72% and 54% of ISF collection efficiency will be required in Phase I, and the implementation stage and the sustainability stage during Phase II, respectively.

In the future, full turnover of system facilities to IAs will be made and this will eliminate the personal services cost of the RIS office out of O&M cost with the phasing out of the JSRIS office from the two RIS areas.

(2) Adequate O&M competence for NIA staff and IAs

(a) Preparation of practical O&M manual

A practical O&M manual shall be prepared to guide the NIA's O&M staff and the IAs in improved O&M practices and to sustain irrigation system. For the specific consideration of the IAs, simple pamphlets with some illustrations on O&M practices shall be prepared to make the manual more useful to them.

Extensive dissemination of these materials will be carried out through the continuing education program by education cluster on water management and O&M with the proper guidance of the consultant and NIA.

(b) Development of appropriate training program for NIA JSRIS staff and the IAs

A training program for both the NIA-JSRIS staff and the IAs covering the proposed monitoring system, water management, O&M practices and ISF collection will be prepared in accordance with the training plan as shown in Table 5.4.1. Specifically, the practical O&M manual will be fully used for training of the water management and O&M personnel of NIA and the IAs. In addition, the billing clerks will be trained on the use of computers in the preparation of ISF billing and collection records.

This training program will be specific feature in the proposed improvement plan comparing with the existing NIA and World Bank approach as for the improvement on the water management and O&M practices.

Provision of intensive training for O&M staff and IAs will be made by the consultant under the project fund for 5 years with emphasis on the on-the-job training by using the proposed O&M manuals. The on-the-job training will be mainly provided in order to contribute to the improvement of their regular activities directly and effectively. Extensive dissemination on the use of the O&M manuals will be carried out by education cluster on water management and O&M. Regular follow-up and technical advice on the use of the O&M manuals will be carried out by the consultant.

(c) Rehabilitation and improvement of irrigation facilities, installation of proper measuring devices for canal discharge and provision of sufficient O&M equipment

As the prerequisite conditions for effective O&M works, the following physical aspects should be done properly.

(i) Rehabilitation and improvement of the irrigation facilities with installation of measuring devices on the water control structures to perform accurate, proper and effective water delivery and distribution,
(ii) Installation of settling basin to reduce siltation in the canals for effective water flow and reduction of the maintenance work (desilting) in the canals and O&M cost, and
(iii) Provision of sufficient O&M equipment to materialize regular maintenance of RIS facilities, i.e., maintenance of the water control structures, maintenance of the service roads and other facilities.

Particularly, accurate measurement is a fundamental and indispensable factor for the proper operation of irrigation system, and such measuring devices should be practical for easy utilization by the NIA field staff and IA. In addition, accurate measurement with proper recording will be able to justify water distribution discharge to the specific farm area for ISF collection.

5.5 Institutional Development Plan

5.5.1 Basic Development Concept

This plan envisages to resolve the weak institutional and technical problems of the IAs through the institutional strengthening of the IAs and the rehabilitation of existing farmers' cooperatives in the project area. A two-phased approach to the strengthening of the IAs will be adopted to gradually build their technical skills and improve the financial position of the IA members in order to enable the IAs to manage and own sections of the irrigation system through the envisioned partial system management as discussed in Section 5.4. The rehabilitation of existing farmers' cooperatives is meant to re-start the agricultural loan support for crop production, group buying/selling of paddy, and drying, storing and milling of paddy to give the IA

members who belong to these cooperatives the benefit of high value-added from the integrated paddy production, processing and marketing.

The institutional strengthening of the IAs and rehabilitation of farmers' cooperatives will be carried out simultaneously from Phase I to establish strong complementation of functions and resources between the IAs and farmers' cooperatives. The cooperatives will provide loan and post-harvest facility services to the farmers while the farmers will entrust their produced paddy to the cooperatives for drying, storage, milling and selling of paddy, or participate the said activities as members of the cooperatives. This complementary function will be put in place to increase farmers' income that would allow them to promptly and fully pay the ISF to the IAs or NIA for the improvement of the O&M of irrigation system. The simultaneous but separate strategy of strengthening the IAs and rehabilitating the farmers' cooperatives takes into account the present government institutional set-up which mandates NIA to assist the IAs and local government units (LGUs) through their respective Municipal Agricultural Offices (MAOs) to assist the farmers' cooperatives based on the 1991 Local Government Code.

The two-phased approach to the institutional strengthening of the IAs will be as follows. Phase I (first four years of the Project) shall activate the four (4) committees at both the IA and TSAG levels to effectively and sustainably carry out the following activities:

(i) development of continuing education program on water management and O&M practices through the establishment of relevant education clusters for each IA to conduct regular on-site training for the IA members,
(ii) formation of working groups under the IA service committee to undertake the proper and periodic O&M activities under Type I and Type II contracts on a rotational basis,
(iii) establishment and maintenance of the IA records management system, and
(iv) management and maintainance of the IA office which will be constructed under the Project.

Phase I will also involve the rehabilitation of the existing farmers' cooperatives as discussed in Section 5.6.2 to supply the financial requirements of the IA members belonging to these cooperatives for crop production, and group buying/selling and processing of paddy. The latter activity will be carried out through the establishment of business tie-ups of the farmers' cooperatives with private owners and National Food Authority (NFA) for the access of the IA members to existing post-harvest facilities such as the drying, warehousing and milling facilities. The services of these facilities will be extended to all the IAs in the project area through a memorandum of agreement (MOA) to be executed between the farmers' cooperatives and the concerned IAs. Procurement of new facilities will be postponed until the Phase II wherein the cooperatives are expected to have acquired the needed financial resources to replace the obsolete facilities.

In the IA areas with no existing farmers' cooperatives, women service cooperatives (WSC) will be established to also provide agricultural loan to the IA members for crop production, and group buying/selling of paddy. The WSC will be comprised mainly of the women-members of the existing IAs in the project area.

In Phase II (beginning on the fifth year of the Project), the institutionally and technically strengthened IAs will carry out the following activities:

(i) partial system management to enable the IAs to manage and own sections of the irrigation system for sustained O&M works, and
(ii) development of IA federation for each RIS for more effective system-wide water management and O&M practices.

The farmers' cooperatives to be rehabilitated in Phase I are expected to manage and control the integrated rice business through the procurement and operation of the most needed post-harvest facilities such as solar dryers and rice mills. The services of the new facilities of these cooperatives will also be extended to all the IAs in the project area through the same MOA mentioned above.

5.5.2 Institutional Strengthening of the IAs

(1) Activation of the IA/TSAG committees

The following four (4) standing committees of the IAs and TSAGs will be activated through intensive training and technical guidance by the proposed recruitment of four (4) locally-based NGOs and consultant on institutional development for the entire 5-year period of the Project as shown in Table 5.5.1:

(a) Committee on membership, education and training,
(b) Committee on service,
(c) Committee on finance, and
(d) Committee on audit and inventory.

At the IA level, each committee will have two (2) permanent members from every member-TSAG to implement more effectively and regularly its respective functions based on their by-laws. The total members of each committee will be twice the number of the TSAGs comprising one IA. For instance, if the IA is consist of 4 TSAGs, each commitee will be composed of 8 members including the committee chairman. The two permanent members from the TSAG for each commitee will be responsible for the organization of the pertinent commitee at the TSAG level. In order to ensure that all TSAG members will participate in the TSAG group activities, each of the 4 TSAG committees similar to those mentioned above will be comprised of one-fourth of the total members of the TSAG. All the members of the four committees at both the IA and TSAG levels will be given the proper training and regular on-site advice by the NGOs and institutional development consultant.

The monthly meetings of the IA commitees as defined in the IA by-laws will be regularly conducted to monitor and evaluate the progress of the activities of each committee and to act promptly on any problems related to water management and O&M works, etc.. However, the TSAG committee meetings will be done more frequently from the present once a month to twice a month (or bi-monthly) meeting to enable greater interaction and exchange of ideas and experiences among the TSAG committees. Every month, the first TSAG committees' meeting will be carried out at the same time to discuss the progress and problems related to their respective activities in order to identify a joint course of action. The second TSAG committees' meeting will be held separately for the individual assessment of the activities of each committee, the development of concrete action plan, and the preparation of necessary reports. The present general order of business in each meeting will be adopted, but the management of meeting will be further improved by giving on-the-job training to the committee chairmen in order to cover all the pertinent agenda of the meeting in one to two-hour meeting. All the committee meetings at both the IA and TSAG levels will be properly scheduled to enable the NGOs and NIA's IDOs to observe and provide advice whenever necessary, and will be permanently held in the IA office, as discussed below, to ensure proper safekeeping of minutes of meetings and other records.

(2) Development of continuing education program

The perennial problem on limited budget for IA training will be addressed by the development of continuing education program referred to in Tables 5.4.2, 5.5.1 and 5.6.1. The consultants and NGOs to be recruited under the Project will prepare or assist the IAs in preparing the required training manuals and materials including the O&M manual. The training manuals/materials will cover the following: (a) participatory management and organizational development, (b) water management and O&M practices including ISF collection, (c) agricultural extension of improved farming practices, (d) financial accounting and management, (d) general property management, etc.. These manuals will be used for the training of all IA members.

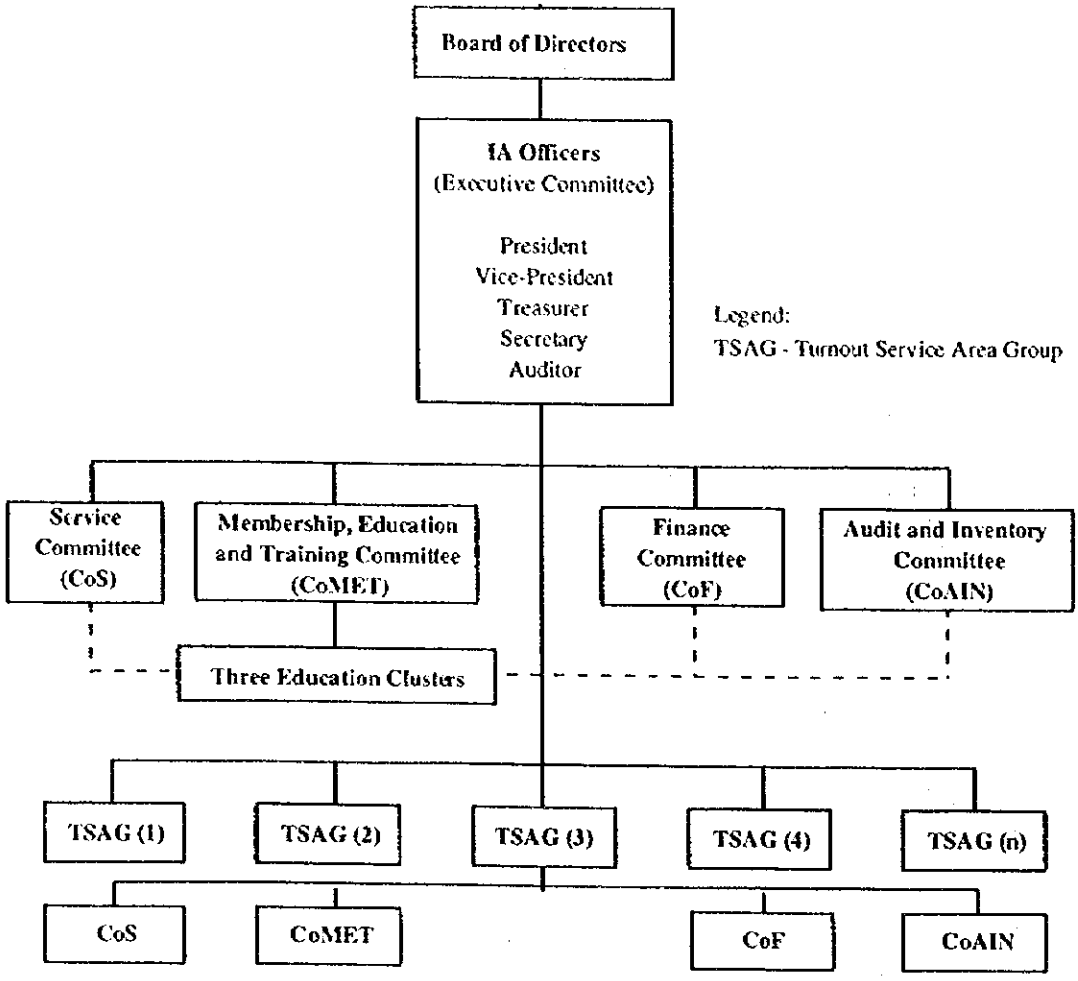
To support the continuing education program, three (3) education clusters will be established for each IA to coordinate the planning and implementation of the training programs for the IA members in Phase I as on-the-job training for the cluster members, and to undertake and sustain regular on-site group education sessions for all IA members beginning in Phase II. Each of the 3 clusters will be assigned a specific area of concerns, as follows:

(a) Organizational development and participatory management,
(b) Water management and O&M practices, and ISF collection, and
(c) Agricultural extension on improved farming practices.

Each cluster will consist of 3-5 progressive IA farmer-members to act as community trainers/resource persons after attending the proper training from the consultants and NGOs to be recruited under the Project. The members of the education cluster for area (a) will be selected from the members of the IA/TSAG committee on

membership, education and training. The members of the education cluster for area (b) will be chosen from the members of the IA/TSAG committees on service and finance. The members of the cluster for area (c) will come from the contact farmers to be involved in the development of techno-demo farms as discussed in Section 5.6.1. At the TSAG level, the establishment of education clusters will be an option for the TSAGs. The three education clusters will be placed under the supervision and guidance of the IA committee on membership, education and training as shown in the proposed improvement of the IA organization structure below.

Proposed Improvement in the IA Organization Structure



Publication of simple newsletters on improved farming practices, water management and O&M practices, etc. will also be prepared in local dialect and then disseminated to all IA members regularly every quarter by the education clusters with the proper assistance of NIA, NGOs and consultants under the Project and in cooperation with MAOs and research institutes.

Regular on-site group education sessions shall be scheduled before and after the cropping season by the IA committee on membership, education and training to allow all members to benefit from the program.

(3) Organization of IA working groups for rotational O&M activities

In order that all IA members could participate in the O&M activities under Type I and Type II contracts during the Phase I, while at the same time attend to their individual proper farming operations, four (4) working groups will be organized for each IA to undertake the regular canal maintainance on a quarterly rotational basis. Every quarter, one working group will be assigned to maintain the canals within the IA area under the Type I contract.

The organization of working groups will be done at the TSAG level. The members of the TSAG will be equally divided into 4 O&M working groups so that all IA members will be involved in the O&M activities. The IA committee on service will be responsible for the actual scheduling and supervision of the O&M activities by the working groups. These working groups will be given intensive on-the-job training for five years by NIA's O&M engineers and O&M consultants under the Project as shown in Table 5.4.2 to prepare them in the implementation of partial system management in Phase II.

(4) Development of records management system of the IAs

A simple records management system for the IAs will be developed in a joint collaborative effort between the IAs, NIA and NGOs in conformity with the proposed monitoring system to be set up at the NIA-JSRIS office. This records management system will compose of collection and recording of field data on farming activities, water management and O&M practices including ISF collection, and recording and updating of membership education and training, proceedings of meetings, and financial statements. The members of the IA committee on membership, education and training will be trained by NIA's IDOs and NGOs with the technical assistance of the institutional development consultant under the Project to operate and maintain the IA records management system.

(5) Construction and management of IA office

20 offices will be constructed for the existing IAs in the project area to provide a permanent venue for the IA meeting and training, the safekeeping of IA data and other information, and small storage room for farm inputs. Each office will measure about 70 m2: 50 m2 for meeting/training venue and data safekeeping and 20 m2 for input storage. Basic office equipment consisting of tables, chairs, steel cabinets and wooden blackboards will also be provided to the IAs.

The IA committee on audit and inventory will be responsible for the proper and regular maintenance and safety of the IA office. This committee will assign a security officer for each week from its members to oversee the general safety of the IA office and its facilities.

(6) Clarification of IA boundary area and administrative responsibility

The following activities will be carried out by NIA's JSRIS office to clarify the boundary areas and administrative responsibilities of the concerned IAs:

(i) boundary mapping of the IA coverage area to define the exact location and size of farm lots of the IA members for accurate evaluation of benefited area to increase the collection of ISF,

(ii) adjustment of the TSA boundaries in conformity with the construction of new turnouts for a more manageable size of 20 to 30 members (or about 30 ha), wherein the number of TSAG is envisaged to increase from the present 271 to more than 300 in the future, and

(iii) clarification of the boundary and administrative responsibility of SMEWBAT IA in the Suague RIS through the following:

- adjusting the boundary of SMEWBAT IA (division1) to cover the 67 ha which are presently within division 2 of the Suague RIS, and
- tranferring the administrative responsibility of ISF collection on 133 ha in SMEWBAT IA from the WRF Technician of division 4 to the WRF Technician of division 1.

5.5.3 Rehabilitation of Farmers' Cooperatives

In Phase I, the rehabilitation of the 15 existing farmers' cooperatives will be carried out by the Project through the NGOs and consultants (institutional development, and credit and small enterprise development) based on the improvement plan of agricultural credit discussed in Section 5.6.2. These cooperatives will give preference of credit lending to their farmer-members who are also IA members to meet their urgent financial need for crop production, and group buying/selling and processing of paddy based on the authorized loanable amount. In addition to the provision of agricultural loan to their members, these cooperatives will undertake the following activities in Phase I:

(i) bulk buying of farm inputs,
(ii) group buying and selling of paddy, and
(iii) group buying, drying, milling and selling of paddy.

Activities (i) and (ii) will be directly done by the cooperatives, while activity (iii) will involve the establishment of business tie-ups between these cooperatives and the private owners (usually big landowners) or NFA. A MOA will be signed between the cooperatives and the private owners/NFA for the utilization of the post-harvest facilities by the cooperative members.

A more intensive management and technical training program will be given to these cooperatives including the MAOs' cooperative development officers by the

concerned consultants and NGOs under the Project as shown in Table 5.5.1, covering the following topics: institutional strengthening, cooperative development and management, and post-harvest processing and marketing. The MAOs' cooperative development officers will also act as trainers and technical advisers to the farmers' cooperatives after they have attended the proper training, especially after the implementation phase of the Project.

In Phase II, the financially rehabilitated farmers' cooperatives will be encouraged to operate and manage their own post-harvest facilities to achieve the full control of an integrated rice business in accordance with the improvement plan of post-harvest processing and agricultural marketing as discussed in Section 5.6.3.

5.5.4 Development of Women Service Cooperatives (WSC)

In Phase I, the WSC will be developed by the NGOs under the Project in the IA areas where no farmers' cooperatives exist to provide credit to other IA members mainly for crop production and paddy trading. Female members of the IAs will comprise these new cooperatives in order to reduce the work load of the male members with the IA activities and their farm operations. Presently, very few of the 288 female members are IA officers, thereby giving them more opportunities to manage the new cooperatives.

This component will comprise of the following activities:

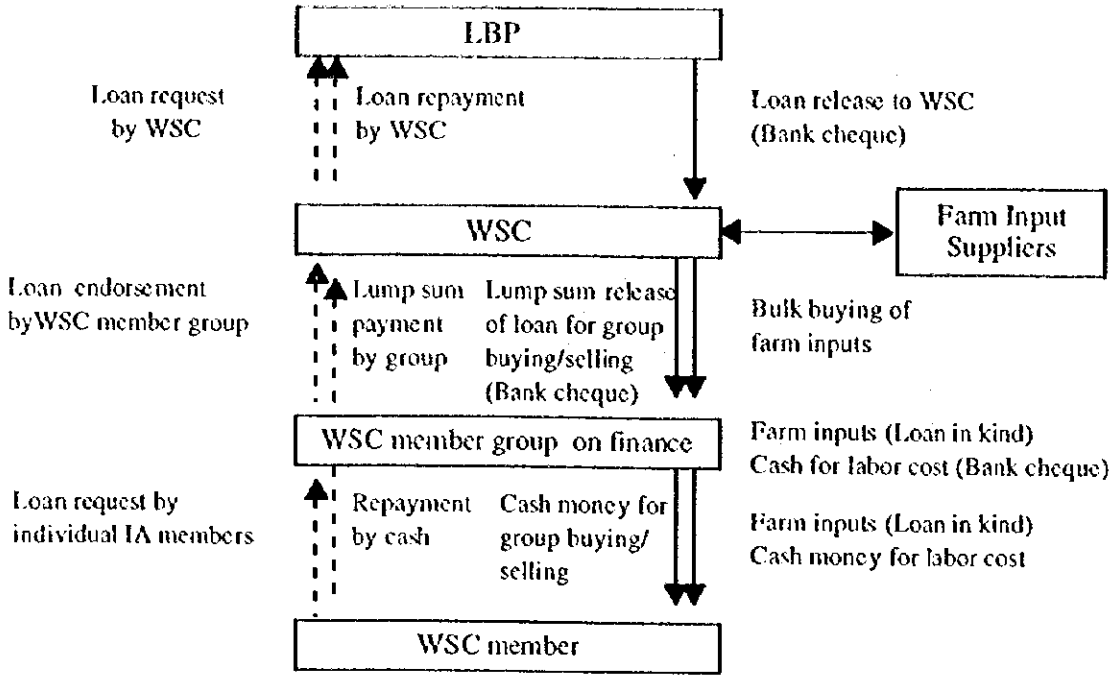
(1) Membership education

Six WSC will be organized in the six divisions of the Jalaur proper RIS with no farmers' cooperatives to provide credit to other IA members within their coverage area. Prospective members of the WSC will be trained by the NGOs and consultant on credit and small enterprise on the various subjects of cooperative development and management as shown in Table 5.5.1 including the requirements and procedures for WSC registration with the CDA and for credit availment from the LBP. Specialists from CDA and LBP will also be invited to educate the WSC members on their respective policies and programs related to agricultural credit.

(2) Credit lending for production and group buying/selling of paddy

At the initial stage of the project, the farmers will need a considerable amount of credit for crop production and group buying/selling of paddy. To address this need, the WSC will avail of agricultural loan from LBP to finance the requirements of farmers for the following two purposes: (i) bulk buying of farm inputs and labor cost, and (ii) group buying and selling of paddy.

The credit system will be based on a group loan requiring the endorsement of the WSC member group on finance, based on the following general process:



The detailed loan procedures are discussed in Annex F.

5.5.5 Partial System Management

The strengthened IAs will implement the partial system management in Phase II through a MOA between NIA and the IAs. In this way, the IAs will have an opportunity to establish ownership over the sections of the system which they will operate and manage. The proper amortization schedule based on the capability of the IAs will be prepared by NIA and the concerned IAs in accordance with the existing policy of NIA. In this new arrangement, the main responsibilities of the IAs and NIA will be as follows:

IA level

- to operate and maintain the system's improved headgate in the coverage area,
- to manage irrigation water delivery from the headgate to the turnouts,
- to monitor the distribution of water to the farm through the turnout by TSAGs,
- to disseminate information on updated cropping calendar and water delivery and distribution schedule to the TSAGs,
- to collect ISF from the TSAGs for prompt payment of amortization to NIA, and
- to support, coordinate and monitor the O&M of irrigation canals and facilities done by the TSAGs in the coverage area.

TSAG level

- to operate and maintain the turnouts and check structures in the coverage area, to manage the distribution of irrigation water from the turnouts to the farms of individual members,
- to inform the members about the cropping calendar and water distribution schedule,

- to collect ISF from TSAG members, and remit the payment to the IA finance committee, and
- to maintain other facilities such as portions of lateral canals and service road in the coverage area.

NIA-JSRIS O&M staff
- to operate and maintain the main canals, drainage, and diversion dams,
- to manage the timely and proper delivery of water at the diversion points to the lateral headgates of the different IAs,
- to conduct regular monitoring of water management and O&M work being done by the IAs,
- to collect amortization payment from the IAs,
- to provide training and technical support to the O&M activities of the IAs, and
- to facilitate the coordinated delivery of agricultural support services for the IAs.

The NIA's IDOs will train and assist the IAs to prepare and implement a simple O&M plan which will be the basis of its O&M works. This plan will contain the cropping calendar, water delivery and distribution schedule, ISF collection and O&M activities to be carried out by the IAs in conformity with the NIA-JSRIS office's general O&M plan for each RIS.

5.5.6 Federation of the IAs

All the IAs in each RIS will be organized into an IA federation. The IA presidents will form as the BOD of the IA federation, and draft the federation by-laws. Once the by-laws are approved, the BOD members will elect the federation officers (president, vice-president for administration, vice-president for operations, treasurer, secretary and auditor) among themselves. This federation will be registered with SEC as per established procedure and requirements. The IA federation will operate at the RIS level for two main functions:

(i) to manage the system-wide coordination and management of water delivery/ distribution and O&M works within the system, and
(ii) to respond to the needs of the IA members for integrated support services for farm inputs, post-harvest facilities and marketing through establishment of coordinative linkages with the LGU's MAOs, DA, etc..

5.5.7 Institutional Development of NIA

(1) NIA-JSRIS staff training

Three types of NIA personnel will be trained by the project to ensure the effective water management and O&M works: (i) the JSRIS O&M staff and IDOs assigned to the two RIS (ii) the JSRIS office support staff (billing clerks, planning engineers, etc.), and (iii) the regular personnel of the Institutional Development Division (IDD) and System Management Division (SMD) of NIA Region VI Office who have supervisory functions over the JSRIS office.

The specific training for these personnel is presented in Tables 5.4.2, 5.5.1 and 5.6.1. The new implementation approach to institutional development and the arrangement for partial system management will be emphasized in the training.

(2) Renovation of NIA Regional Training Center, Pototan

The NIA Regional Training Center located in Pototan municipality will be renovated and furnished with training equipment (Table 5.5.2). The renovation works will cover roofing (trusses, roof and accessories), concreting (beams, columns, floor slabs and forms), replacing broken wooden windows by steel windows, and filling materials.

(3) Computerization of database management

Computers will be provided to the NIA-JSRIS office for systematic recording of basic information on water users (IA members and non-members), preparation of ISF billing and collection documents, processing of gathered data on river water discharge and intake water discharge, etc. for the improvement of the existing water management and O&M performance. Training of NIA-JSRIS personnel on the computer operation and management will also be carried out as shown in Table 5.4.2.

(4) Improvement of communication and transport system

Communication equipment and vehicles will be provided to NIA-JSRIS office for the use of O&M staff and IDOs in their field activities. These are as follows (Table 5.5.2):

Items	Number
1. Portable hand-held radio transceivers (NIA:21, IA:20)	41
2. Pick-up vehicles (O&M staff and IDOs)	3
4. Motorcycles (WRF Technicians)	41
Total	85

(5) Technical assistance

(i) Consultants

This component will recruit consultants to render technical advice and training to the IAs, NIA-JSRIS staff, LGU-MAO and contracted NGOs in the areas of institutional development, credit and enterprise development, irrigated agriculture, water management, and O&M of irrigation systems for a total of 264 man-months.

(ii) NGOs

Four locally-based NGOS will be recruited by the Project to render services for the institutional strengthening of the IAs, the rehabilitation of farmers' cooperatives and the development of WSC for a total period of five years. Each NGO will dispatch 4 community organizers and 2 cooperative development facilitators who willl take temporary residence in the IA areas assigned to them for closer and regular contacts with the IA members. Initial contract with the NGOs will cover only two years, and renewable for another three years depending on their satisfactory performance and the level of IA development.

5.6 Improvement Plan of Agricultural Support Services

5.6.1 Agricultural Extension Services

(1) Basic approach

The basic approaches to the improvement plan of the present extension service are:

(i) Field training and extension of new farming technologies to contact farmers through the development of demonstration plots (techno-demo farms),
(ii) Farmer-to-farmer technology dissemination by contact farmers,
(iii) Training of extension workers of the MAOs,
(iv) Standardization of appropriate farming practices, and its dissemination
(v) Improvement of certified seed production/distribution system

The present extension system will be principally used in the improvement plan. The present extension services should be activated and be substantial in order to realize the irrigated agriculture development plan. MAO is the main agency to implement the plan of agricultural extension services. DA, PAO and research institute will technically support the activities of MAO.

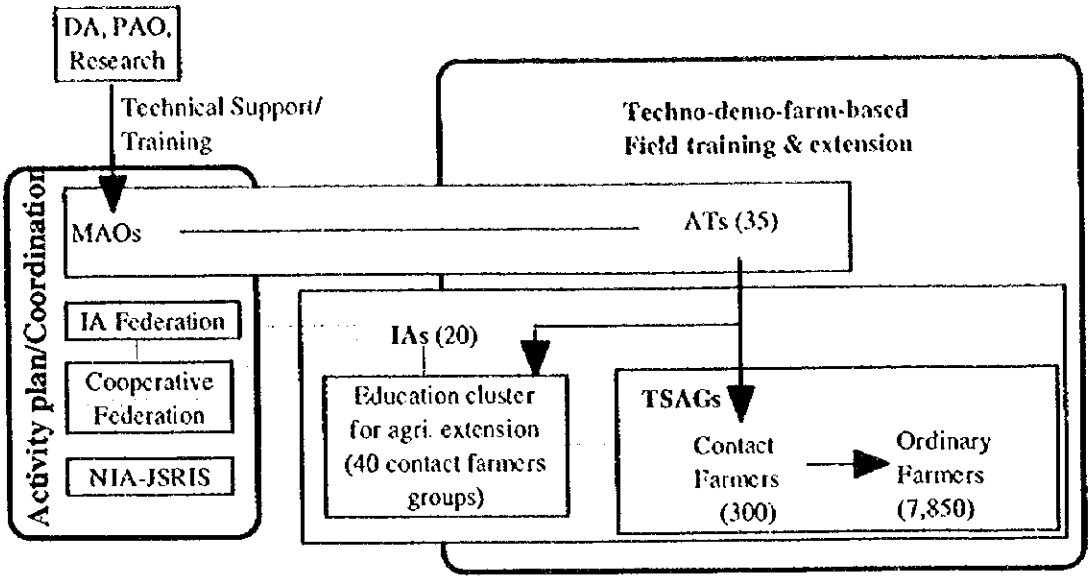
(2) Improvement of extension service system

The improvement plan of extension system will focus the extension services on the turnout service area group (TSAG) under the IA, and not on the farmers' groups or cooperatives in the barangay at present. Presently, there are 271 TSAGs under the 20 IAs, 7,850 farmer-beneficiaries and additional 4,980 farm workers in the project area. Assuming that the TSAGs will increase to about 300 under the Project, the average number of beneficiaries per TSAG will be 25 farmers (40 households including farm-workers). The group size is believed to be the optimum size for faster adoption of new and better technologies. The extension activities will be based on each TSAG as a smallest farmers group in order to disseminate appropriate farming practices to all farmers.

Ninety four (94) agricultural technicians (ATs) are presently employed by concerned MAOs in the project area. Of these, 70 ATs are engaged in extension activities for crop and organization development. It is assumed that about 30 to 35 ATs will be able to be engaged in agricultural extension activities in the project area based on the ratio of total barangays (78) in the project area against total number of barangays (about 170) under concerned MAOs except non-agricultural barangays such as town, proper and fishing areas. One AT will cover 0.5 IA or 10 TSAGs in average, and work for three days per week in the field.

Participatory extension system will be adopted by the contact farmer through farmer-to-farmer technology dissemination, which has been adopted in the UNDP and FAO projects. The extension system is believed to supplement shortage of MAO staff to disseminate improved/proper farming technologies to all farmers. One contact farmer per TSAG, or 300 contact farmers in total in the project area, will be selected from progressive average farmers with high leadership potential. A contact farmers' group with 7 to 8 members/group (2 groups per IA), will perform as an education cluster for farming technology under the membership, education and training committee of IA as mentioned in Section 5.5.2. They will be trained on new/proper farming technology and extension activity by MAO in group, and attend to extension activity in close cooperation with each other under the assistance by ATs. Every contact farmer will be directly in-charge of extension activity in his respective TSAG members. The contact farmer works voluntarily as an agricultural technician for farmer-to-farmers technology dissemination at the field level, and will receive incentive in terms of intensive training and supply of free farm inputs to his techno-demo farm as mentioned below.

The techno-demo farm will be established at the farmers' farm land for demonstration and verification of proper farming practices as well as training for farmers and varietal trials on paddy and mungbean, and valuable crops if farmers require. The farm is a venue for the activities of ATs and contact farmers. The techno-demo farm will be set up two plots (one plot per a contact farmers' group) in each IA with an area of 0.5 to 1.0 ha every cropping season. The location of the techno-demo farms will be rotated every cropping season to be able to expand as quickly as possible their outreach services. This is also essential to cover as many farmers as possible. The techno-demo farms which are principally accredited in the contact farmers farm will be supplied free with the required inputs such as seed, fertilizer and agro-chemicals. The techno-demo farms of 40 plots will be set up in every cropping season, or a total of 360 plots during 4.5 years (9 cropping season). The flow of the proposed extension system is as follows.



(3) Production and distribution of certified paddy seed

Certified seed is in short supply and financially prohibitive for most farmers. In the project area, the projected seed requirement is approximately 810 tons per year at full development stage assuming that transplanting method would be adopted in 50% of the area. Thus, an area of 200 ha will be required for production of registered seed estimated at 10 tons as shown below.

Total paddy cropping area		21,640 ha/year
Seeding rate	Transplanting	50 kg/ha
	Direct seeding	100 kg/ha
Total seed requirement		1,620 ton
Replace period of certified seed		2 cropping
Certified seed requirement		810 ton
Unit yield of certified seed		4 to 5 ton/ha
Requirement of paddy field for seed production		200 ha
Requirement of registered seed		10 ton

The required certified seed will be produced in the project area and distributed through the farmers' cooperatives. Seed growers' group will be formed in the cooperatives in order to establish a business function of the cooperatives. The cooperatives will provide credit to the seed growers' group for the purchase of required inputs such as registered seed, fertilizer and agro-chemicals, and will distribute the produced certified seed to the members through cooperatives at a lower price using credit system.

The seed growers will be selected and trained from the members under the technical guidance by BPI, PAO and MAO. Approximately 80 seed growers will be trained including existing seed growers in the project area. BPI will accredit seed growers, and supply registered seed through Western Visayas Integrated Agricultural

Research Center (WESVIARC). MAOs will provide technical services to seed growers, and inspect the produced seed. PAO and WESVIARC will provide technical training to ATs of MAO on farming practices, drying, seed processing and seed inspection. The seed processing will be done by using facilities attached to the WESVIARC.

(4) Training plan

The training plan is designed to ensure the effective dissemination of proper farming practices through strengthening extension services and certified seed production. Training of ATs, contact farmers, seed growers and ordinary farmers will be provided for effective dissemination of proper farming practices and technologies. The training courses will be provided on farming practices and technologies, extension activities, and seed production for each target trainee. Seven training sessions will be provided for 5 years from the second year of the Project period to one year after completion of the construction stage.

Training Course	trainee (No.)	Trainer	method/location Frequency
Farming practices & technology	ATs (80), Agriculturist of NIA	DA, PAO, Researches Consultant(s)	Seminar, Field, Training center Demo farm, 2 times/cropping season
	Contact farmers (300)	DA, PAO, Researches Consultant(s), ATs	Seminar, Field, Training center Demo farm, 2 times/cropping season
	Ordinary farmers (7,850)	ATs, Contact farmers	Field, Techno-demo farm, Every 2 weeks
Extension activities	ATs (80), Agriculturist of NIA	DA, PAO, Researches Consultant(s)	Seminar, Field, Training center Demo farm, 2 times/year
	Contact farmers (300)	DA, PAO, Researches Consultant(s), ATs	Seminar, Field, Training center Demo farm, 2 times/year
Seed Production	ATs (30)	DA, PAO, Researches Consultant(s), ATs	Seminar, Field, Training center 2 times/year
	Seed growers (80)	ATs	Seminar, Field, Training center 2 times/year

The training courses on the farming practices and technology put emphasis on fertilization, reduction of seeding rate, transplanting method, and control of pest/insect, snail and rat, and cover the whole farming and post-harvest practices for paddy and mungbean cultivation. The training on monitoring and evaluation of farming and seed production will be additionally provided for the ATs and contact farmers. The training for the ordinary farmers will be carried out in the field school, and farmers' group discussions at techno-demo farms.

The course on extension activities will provide training on the activity method, leadership and document preparation in crop farming and activities for the ATs and contact farmers.

The course on seed production will provide training on seed multiplication for the seed growers, and on inspection, distribution and management of seed for the ATs.

Table 5.6.1 identifies the training needs of the various staff of the MAOs, and contact farmers.

(a) Training on farming practices and technologies

ATs training

No. of Trainee: 80, twice per cropping season (before season and after harvest), seminar/workshop, in the training center and techno-demo farms, during 5 years,

Contact farmers

No. of trainees: 300, twice per cropping season (before season and after harvest), seminar/workshop, in the training center and techno-demo farms, during 4.5 years.

Ordinary farmers

No. of trainees: 7,850, once per two weeks, field school and field discussion at the techno-demo farm or barangay facilities by contact farmers and ATs, during four (4) years.

(b) Training on extension activity

ATs training

No. of Trainee: 80, once per cropping season, seminar/workshop and in the training center and techno-demo farms, during 4 years.

Contact farmers

No. of trainees: 300, once per cropping season, seminar/workshop, in the training center and techno-demo farms, during 4 years.

(c) Training on seed production

ATs (technical support and Training)

No. of Trainee: 30, once per cropping season, seminar/workshop, in the training center and field, during 4 years.

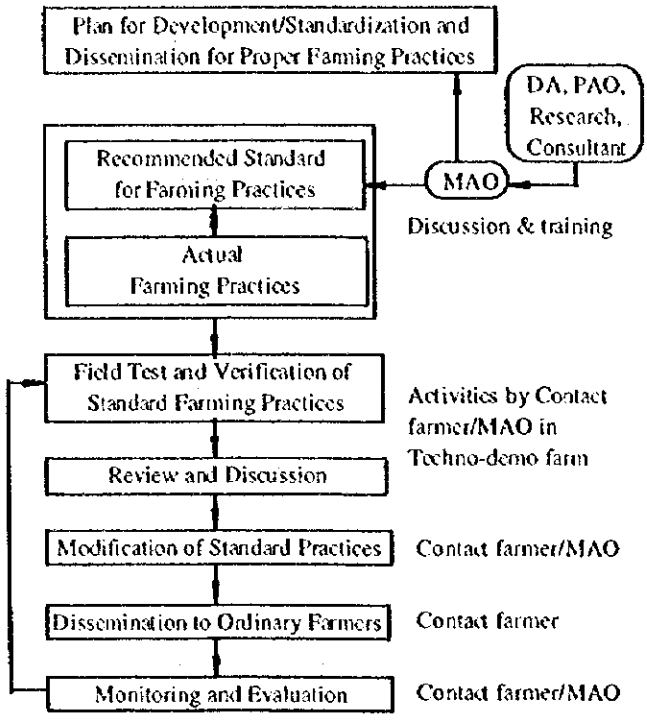
Seed-grower Training

No. of Trainee: 80, once per cropping season, seminar/workshop, in the training center and field, during 4 years.

(5) Procedure of development, standardization and dissemination of new/proper farming technologies

The proposed farming practices mentioned in Section 5.2.2 have been mostly verified as appropriately recommendable in the project area. The proposed farming practices and technology will be disseminated among the farmers in the project area by standardization through demonstration, verification and comparative field tests in the techno-demo farm. ATs and contact farmers will be the leading implementors for village-level extension services. DA, PAO and concerned research institutes will technically support MAO and contact farmer on newly developed technologies and integration of farming technology, and will provide training to ATs and contact farmers.

The procedure of dissemination of improved farming practices at the field level is as follows:



The differences between the recommended farming practices by MAO/DA and actual farming practices by farmers will be discussed and clarified by ATs and contact farmers through the training for initial standardization of farming practices. The initial standard will be practiced at techno-demo farms in order to demonstrate, verify and field trial. Through evaluation of the results of the techno-demo farm by ATs and contact farmers, the recommended standard farming practices will be prepared for dissemination among ordinary farmers. The recommended standard farming practices will be improved through the monitoring and evaluation on the progress of the technology dissemination.

The recommended standard farming practices will be prepared by MAOs and contact farmers with technical assistance of DA, PAO and concerned research institutes. The techno-demo farms will be the venue for the training and dissemination of improved farming practices to ordinary farmers.

MAO will prepare simple pamphlets and guidebooks on new/improved farming practices and technologies for dissemination among the farmers in cooperation with specialists from PAO, DA and research institutes. The documents will be used for training of contact farmers and farmers group discussion in the field, and distributed it to all farmers. It will be gradually revised to substantially reflect the farmers' needs and technical advancement. The documents will be prepared on the following:

- Guideline on paddy and mungbean cultivation,
- Pamphlets on priority extension items to be improved, and
- Evaluation results on field-tested farming technologies.

(6) Provision of goods and equipment for extension activities and employment of consultant

The following goods and equipment will be provided for improvement of extension services:

Portable audio set for field activities	14 units
White-board	14 units
Camera set	7 units
Soil quick test kit	20 units
Cereal moisture meter	15 units
Motor-cycle for field activities	35 units

The required inputs such as seeds, fertilizer and agro-chemicals for the techno-demo farms will be supplied in kind from the project through the IA with the appropriate guidance of MAO. The total area of techno-demo farms will be 360 ha for 4.5 years.

Consultant(s) will be recruited by the project to render technical advice and training to MAOs, contact farmers and seed growers in the area of agricultural development and strengthening of extension services for a total period of 60 man-months.

5.6.2 Agricultural Credit

The agricultural credit plan is envisaged to address the problems in the proceeding section. The counter measures against each problem are as follows.

Problems	Counter Measures
Low repayment rates	
1. Lack of intention to repay	- Selective loaning - Establishment of data base of high risk loanees - Securing of collateral and guarantors - Payoff of bad loans by attachment or sales of bad loans
2. Lack of collateral and guarantors or the shortage of them	- Securing of collateral and guarantors - Group guarantee
3. Lack of monitoring system of loans	- Establishment of monitoring system in the field of organization and data base - Organization of loanees for mutual watching

4. Lack of effort to recover loans	- Payoff of bad loans by attachment or sales of bad loans - Strengthening of a legal section - Introduction of frequent small repayment
5. Shortage of high risk loanees	- Establishment of data base of high risk loanees among cooperatives, and opening of them - Opening of LBP loan information
6. Shortage of supporting services for production and marketing	- Strengthening of technical training and guidance - Commitment of loaners in individual loan projects
7. Calamity	- Encouragement of the contract of agricultural security, particularly for small farms

Low use rates of formal credit

1. Lack of active credit cooperatives near farms,	- Rescheduling of bad loans and reopening of non-active cooperatives - Repayment of bad loans - Introduction of the irrigation services development fund sponsored by NIA - Establishment of women cooperatives - Re-start of credit services
2. Limited capability of loanees to plan and to implement viable projects,	- Strengthening of training and guidance in LBP and cooperatives - Strengthening of technical and marketing services - Encouragement of small business such as vegetable growing, animal husbandry and vendoring
3. Complicated long procedures to get loans	- Simplification of loan application forms by group guarantee - Establishment and strengthening of saving and loan groups
4. Lack of collateral	- Introduction of group guarantee
5 Limitation of cooperative credits to agricultural purposes,	- Diversification of loan usage to education and medical treatments - Introduction of micro-credit

Divergent use of the formal credit	
1. Subsidized interest rates for farmers' cooperatives (12%/year)	- Application of market rates
2. No monitoring of loan usage	- Establishment of monitoring system (section and data base) - Organization of loanees for mutual watching

The agricultural credit program will be implemented mainly through cooperatives and include the rescheduling of bad loans of the cooperative members and the re-start of credit services, the establishment of women service cooperatives and the strengthening of farmers' cooperatives.

(1) Components

(a) Loan rescheduling and re-start of credit services

The farmer-borrowers who have past due loans are proposed to have a loan rescheduling program mutually agreeable between the LBP and farmers' cooperatives. The loan rescheduling would be planned to consider a modified loan amortization of past due loans while at the same time allowing the farmer-borrowers to renew their loans for new production activities. It is estimated that 60% of the IA members belonging to the existing cooperatives have past due accounts. Non-IA members are likewise having past due loans. Before restart of credit services, the possibility of repayment of bad loans will be studied based on assessment of assets, life style of bad loanees. Hopeless loanees will be abandoned . Hopefull loanees will make loan reschedules, repay bad loans and re-start new credit services after the successfull repayment The loan rescheduling is foreseen as the first step to settle the arrears of the members of the farmers' cooperatives.

(b) Strengthening of credit operation

In parallel to the loan rescheduling program, the strengthening of credit operation will be done through the diversification of capital sources, the improvement in the rules of crediting, the improvement of loan monitoring system and the strengthening of loan support services.

The diversification of capital sources will be implemented through the mobilization of capital and the introduction of the irrigators' association development fund (IADF). The capital will be accumulated by saving at least 60 pesos/ member in each wet and dry season (120 pesos/year) or 10 pesos per month. The capital will be used as working funds for members and cooperatives.

(2) Irrigators Association Development Fund (IADF)

The IADF is envisaged as a twin mechanism for facilitating the release of agricultural credit at the same time a continuous source of financial assistance for institutional activities under the Project (Figure 5.6.1). The IADF is essential to allow the IA members through their respective organizations to access credit from the LBP. Under the new accreditation and lending criteria of the LBP, accessing cooperatives must hurdle the stringent eligibility criteria to be entitled for loans. Without the IADF, access to the LBP lending window would be limited. Only those cooperatives whose members are in good credit standing would be eligible for loan availment.

Since loan rescheduling and institutional improvement would be simultaneously undertaken, the IADF would be deposited to the LBP as a guarantee cover (a minimum of one crop production cycle) for the renewed loans of the IA members including those who are restructuring their arrears. While the IADF is deposited to the LBP, the interest earnings would be used to fund institutional activities, especially training for the new responsibilities of the IAs.

The transfer of the IADF account from the NIA to the LBP would be covered by a memorandum of agreement between the two institutions. Such agreement would include terms of loan amortization of the IAs for restructuring account and interest earnings that should be regularly remitted to the NIA to fund the institutional activities of the Project.

The IADF is estimated at around P 8.2 million. This amount is expected to provide earnings enough to cover the annual expenditures for institutional activities and guarantee for arrears of the IA members. The estimation of the financial requirement of the IADF was based on two factors: (a) annual budgetary requirement for institutional activities proposed under the Project estimated at around P2 million per year; and (b) amount of guarantee to cover the arrears of the IA members. The number of IA members who are believed to be in default of their loans is estimated at 60% of the IA active members numbering about 2,400. To be able to estimate such fund, the cost of the LBP's wholesale lending was also considered. This was taken at 7% per year for 5 years. The 5-year period is the timetable of the Project implementation. Capitalizing the P2 million budget for institutional improvement at 7% for 5 years(using the capital recovery factor) will yield a principal sum of P8.2 million.

The improvement in the rules of crediting will include the suspension of subsidized interests which are the hot beds of unscrupulous acts, the utilization of data base on high risk loanees, the selection of viable loanees by effective screening criteria, the securing of collateral and guarantors, the simplification of loan application forms by introduction of group guarantee replacing inefficient individual loan management, the introduction of micro-credits, the diversification of loan objectives such as education and medical treatments, and encouragement of contracts of agricultural security for small farmers in particular.

The improvement of loan monitoring system will consist of the establishment of loan monitoring system, the establishment of data base on high risk loanees, the payoff of bad loans including attachment and sale of bad loans, the strengthening of a legal section, and the introduction of frequent small repayment. The monitoring will be done by the groups and its survey items will be utilization of loans, profitability of loan projects, repayment, etc. The main purpose of the high risk loanee database has been utilized successfully in risky consumer credits in Japan and would be effective in the Philippines.

The strengthening of loan support services will include the strengthening of technical capability of farmers and cooperative staff through training and guidance by lecturers from LBP and IDOs from NIA etc., the strengthening of marketing services such as joint purchase and selling, the commitment of cooperatives in individual loan project aside from credit services , and encouragement of micro business.

5.6.3 Post-Harvest Processing and Marketing

(1) Group buying and selling

The marketing plan envisages group buying/selling and processing of paddy to be performed by the farmers' cooperatives. Group buying will eventually become an integrated rice enterprise of the cooperatives. This plan is envisioned to be implemented gradually consistent with the institutional development plan. The gradual implementation is essential in order to give ample time for the IA members to develop their skills in marketing and acquiring the necessary financial resources.

To be able to achieve the above plan, the following are essential:

(a) Access to adequate post-harvest facilities and trucking fleet

Integrated rice mill complex is essential to be able to control production and selling. However, the issue of ownership and acquisition by the farmers' cooperative organizations should be decided only when they are ready to operate and maintain such facilities. Leasing and renting existing facilities are financially advantageous in view of the excess capacity of rice mills and warehouses in the project area. Over the medium to long-term, however, investments in post-harvest facilities would have to be studied to replace inferior and obsolete facilities.

It should also be noted that financial requirements for post-harvest facilities of the farmers' cooperatives will have to be estimated for the project regardless of the future ownership. The estimation, however, will be based on the requirement of the additional paddy production from the Project less the capacities of existing facilities.

At full project development, the following capacities and investments in post-harvest facilities were estimated:

	Jalaur Proper RIS		Suague RIS	
	Capacity	Investment	Capacity	Investment
Warehouse	20,500	39,981	1,103	2,043
Mech. Dryers	27,282 annum	5,684 annum	6,037	1,258

Unit: Capacity ;Ton, Investment;P1,000, operation of dryer; 3000 hrs, price of dryer; 500,000 peso including house

It should be emphasized that the above investments will be part of the long-term loans to be secured by the cooperatives. They will be strictly private investments.

(b) Provision of working capital

The provision of working capital is necessary to be able to procure paddy. The release of this loan should form part of the loan restructuring program envisaged under the credit plan.

(c) Intensified capability building

The farmers' cooperatives should be equipped with the necessary skills on markets, pricing, inventory and distribution channels. The cooperatives will have to price their paddy at market rates to be able to stay competitively in the business dominated by traders and millers. Such capability building will form part of the institutional strengthening program.

(2) Operationalizing group buying and selling

Under the plan, a two-stage approach is envisaged (Figure 5.6.2). The first stage is to give option for the farmers' cooperatives to buy and sell paddy by initially postponing the acquisition of new facilities, notably rice mills. The deferment of putting up of new facilities is being emphasized to avoid excessive loan exposure in fixed assets. As earlier documented, there are existing private rice millers whose facilities can be leased or rented.

The existing cooperatives in the project area, numbering about 15 can be rehabilitated to initially form the core group to do either paddy trading cum drying or milling and as volume of procured paddy becomes big, they can enter agreement with the NFA for storage and drying. The advantage of using the NFA as market outlet for well dried paddy is the additional incentive of P0.50/kg, i.e. over and above the support price, given to cooperatives as payment for crop insurance premium. While the paddy are in the NFA warehouses, the cooperatives can request for quedan financing so that it can pay immediately the IA members. Quedan financing is important even if the cooperatives decide to mill the paddy, so that the cash flow of individual IA members will not be impaired. Farmers will still prefer to receive payment for their paddy immediately upon selling.

The final stage is where the cooperatives completely control the operations of an integrated production and milling. It is envisaged that at this stage the cooperatives have pooled their financial resources and skills and are ready to compete with the private traders and millers. The time frame to achieve this plan is well espoused in the institutional development plan.

5.7 Watershed Management Plan

As mentioned in Section 3.2.1, settling basins will be installed at the intake dam as a short-term mitigation measures to avoid siltation in irrigation canals. The watershed management plan is, therefore, considered as a long-term plan for improvement of the condition since it is difficult for the watershed management measures to reduce the sediment load in the short term as compared to the hard approach. In addition, the watershed areas are widely extended to about 100,000 ha in Jalaur and 20,000 ha in Suague, respectively. To apply an improvement plan for the entire watershed areas at once is assumed a dreamy story, since the cost, time and manpower for the works will require huge amounts. Reasonably considering, it is recommended to implement a pilot rehabilitation project on the selected micro-watershed area as a model project in order to demonstrate the effects to the surrounding areas, step by step, as explained in Section 3.2.9. Thus, this model project in the priority area will be the first step of the watershed management. Although the watershed management plan will significantly contribute to revitalization of the RISs, the beneficiaries and the implementation agency of the plan will be different with the main development plan as villagers in upstream of the RIS and DENR. Therefore, it is recommended to conduct as an another project. It is recommended that the watershed management plan shall be carried out in a project of the Forestry Sector Project (FSP) presently supported by the OECF, taking into consideration the project similarity.

5.7.1 Selection of Priority Watershed Area

The relevant sub-watershed in Suague (2 sub-watershed) and Jalaur (8 sub-watershed) was evaluated based on the following consideration for selection of the model development site. The detailed results are presented in Annex H.

Item	Consideration Point
i) Land category	The selected area should be categorized as Forest Lands at present.
ii) Emergency :	How is the degree of watershed degradation ?
iii) Demonstration Effect :	How does it expect the effects of demonstration in the watershed ?
iv) Unification :	Is the area of watershed unified as one area.
v) Size of Area (Forest land) :	Is the size of area a optimum level from 2,000 ha to 5,000 ha.
vi) Administrative situation :	Does the area locate in one municipality ? or it covers several ones ?

As a result, the Forest Land of the Suague sub-watershed area is considered as the most optimum site based on the above selection criteria. The salient features of the Suague sub-watershed area are described in the following paragraphs.

(1) Location

The model project site is about 15 km west of Janiuay town or 25 km west of Pototan town (Ref. Figure 5.7.1). The total area of model project site is 4,766 ha. The area extends over 4 barangays of Janiuay, Barasalon, Canawillian, Panuran and Quipot.

(2) Land use condition

The land use condition of the model site is identified by the interpretation of aerial photo at a scale of 1/20,000. The present land use condition is summarized as follows :

Land use type	(ha)	(%)
1. Old forest	1,926	40.4
2. Secondary Forest (dense)	430	9.0
3. Secondary Forest (sparse)	1,066	22.4
4. Grassland/Open land	628	13.2
5. Upland	622	13.1
6. Paddy field	94	2.0
Total	4,766	100.0

Source : JICA Study Team, 1997

(3) Slope condition

The model project site is composed mostly of rolling hill to very steep mountain characterized by undulating topography. Most steep mountain is located in east end of the watershed and occupies about 70% of the watershed area. The area is mainly covered by the old forest and secondary forest, however some traces of slash and burn cultivation are found as a small patches of open land.

Degree of sloping	(ha)	(%)
0-3%	0	0.0
3-8%	117	2.4
8-18%	0	0.0
18-30%	778	16.3
30-50%	447	9.4
over 50%	3,424	71.8
Total	4,766	100.0

Source : Slope Map, Region IV, DENR

(4) Socio-economic condition

Based on the results of Barangay Accessibility Survey conducted in 1996 by Janiuay municipality, the socio-economic condition and the present villagers' intention of the relevant barangay in the model site are summarized as follows :

	Barasalon	Canawillian	Panuran	Quipot
1. No. of H.H.	230	207	145	578
2. Population	1,200	1,242	800	3,096
3. Villagers' Intention				
1st priority	- Road improvement	- Water supply	- Water supply	- Road improvement
2nd priority	- Transport service	- Health service	- Agri. input	- Secondary school
3rd priority	- Secondary school	- Road improvement	- Road improvement	- Water supply

Source : Barangay Accessibility Survey, 1996, Municipality of Janiuay, Iloilo

The present concerns of villagers are converged on the improvement of rural infrastructures such as water supply, rural road, school and health services. Of these, improvements of rural road and water supply system are the two most priority concerns.

5.7.2 Community Development Plan

A comprehensive community development activities including community organizing, rural infrastructure development, and other livelihood activities in the relevant barangays, will precede the start of watershed management activities such as reforestation and erosion control. The activities will be undertaken mainly by LGU and NGO as a community organizer. Other activities in the watershed management plan will be undertaken after a genuine villagers' organization is in place in every barangay covered by the model site. The community development activities will be carried out for the first two years.

(1) Community organizing

Community organizing is composed by the following activities.

- Social investigation by using a participatory approach such as PRA
- Education and dissemination of technologies by workshop, lectures, etc.
- Institutional building and technology development through planning and implementation of development works of i) rural infrastructure development, ii) agro-forestry, iii) reforestation, etc., as an on-the-job training of the community
- Empowerment for the community organization to increase adhoc local governance and self-reliant capacity

(2) Rural infrastructure development

To motivate the villagers' and build up the ability, the rural infrastructure development will be planned through the discussion with the community. The work quantities, material for construction and its supply, design, construction scheduling, etc., shall be formulated by the villagers in consultation with the community organizer. The skill and management capacity of the community will be strengthened through the process. Based on the present concerns of villagers and the result of survey by using topographic map at a scale of 1/50,000, the following options are considered for the infrastructure development in the community.

- Improvement of water supply system for 331 H.H. in Canawillian and Panuran

- Improvement (gravel pavement) of barangay road of 9.5 km from Barasalon to Quipot

In addition, four (4) bunkhouses for housing the workers during the plantation and five (5) lookout towers for forest fire detection shall be constructed. The bankhouses will be set up at each barangay, and the lookout towers will be located in strategic spots in the sub-watershed.

(3) Establishment of income generation program

Bamboo made handicraft can be considered as a possible activities for income generation. By using product of bamboo planted during the implementation, the community can expand the size of business and establish a particular production group under the support of community organizer. It is also expected to empower the women in the community.

5.7.3 Land Use Plan

Based on the present land use condition, slope condition and existing watershed rehabilitation program, the future land use is set up as shown below.

Future land use	Area (ha)	(%)
1. Paddy <1	94	2.0
2. Upland with soil conservation measures	23	0.5
3. Agro-forestry area including SALT system	778	16.3
4. Reforestation area <2	1,515	31.8
5. Forest protection area <1	2,356	49.4
Total	4,766	100.0

Remark : <1 Same as the present classification.
<2 including i) supplementary reforestation and ii) river bank protection area.

Taking into consideration the availability of manpower, technical capability and the climatic condition, the project activities shall be divided into three (3) phases; 30% of the area for the first year, 50% for the second year and 20% for the third year. The areas to be developed in three years will be 703 ha, 1,171 ha and 466 ha, respectively.

(1) Reforestation and agro-forestry program

According to the land use plan, a total of 1,515 ha will be designed as a reforestation area including supplementary reforestation on the sparse secondary forest and river bank protection on the bank of about 50 m width along the Suague river, and the 801 ha of the grassland or upland farming fields will be used for agro-forestry farming. The following components will be included in the program.

Component	Outline
Nursery Development	- The raising of seedling will be done by each member of community. - Each member will establish own backyard nursery, and raise a certain number of seedlings - Each member can receive a reasonable incentive from community organization for their wage. - Total seedlings are about 2,465,700 seedlings and 25,100 cuttings with 30% margin for loss.
Tree Species	- Tree species will be finally decided in discussion with the community members. - 5 species (Narra, Mahogany, Acacia mangium, Teak, Rain tree) for reforestation, 10 species (Jack fruit, Cacao, Lanzones, Coffee, Rambutan, Guayabano, Ipilipil, Chico, Pigeon pea, Banana) for agro-forest and one species (Giant Bamboo) for river bank protection are proposed.
Plantation Establishment	- The community organization will equitably assign the areas for development to the members or sub-group for the efficient plantation establishment and its maintenance.
Maintenance of Plantation	- Inventory of survival rate shall be conducted 2 months after planting by the assigned members. - Weeding and fertilizing, and watering, if required shall be also done by the members.
Protection of Plantation	- Banana will be planted along the edge of the forest plantations to serve as firebreaks.
Harvesting	- Thinning of trees in the reforestation area will economically benefit the assigned households. - Several output (fruits, berries, others) will be provided to the assigned households from agro-forestry fields. - Bamboo lots can also be harvested, and it will benefit the community through promotion of bamboo made handicrafts with increase of production, etc.
Marketing	- Following options will be considered to improve quality and marketing condition. i) introduction of agro-processing of jam making ii) dissemination of proper post harvest process, especially coffee iii) establishment of group-selling system for empowering the negotiation power

(2) Sustainable upland farming

The concepts and technology of the sustainable upland farming will be incorporated in the curriculum on the community organization program. The emphasis in the curriculum will be put on the vegetative measures as mentioned in Section 3.2.9 which can be applied by villagers for the reasonable costs. The planning, design and implementation of land conservation measures on upland fields will be conducted by the community organization itself.

5.7.4 Monitoring Plan

To oversee the actual implementation of the activities and to ensure the success of project implementation, periodic monitoring and evaluation of the implemented activities shall be undertaken. The monitoring works will be focused on the following three (3) aspects, as described in Annex H.

a) from the beneficiaries/participants viewpoint (e.g. living condition, etc.)
b) from the implementation agency viewpoint (e.g. area planted, etc.)
c) from the regional/national governmental viewpoint (e.g. reduction of suspended load, etc.)

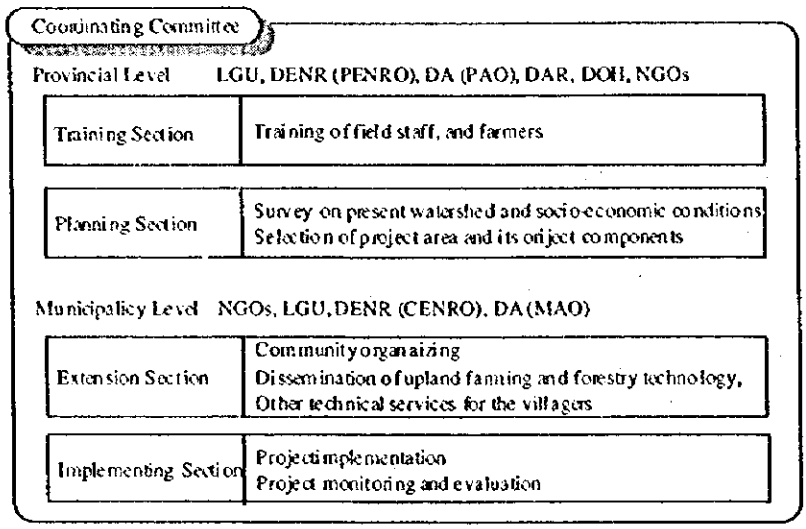
The monitoring works shall be undertaken mainly by CENRO or PENRO, in cooperation with the community organization, NGOs, LGUs and other concerned agencies. The monitoring and evaluation procedures to be employed are shown below.

a) to make a checklist survey for members of the community
b) to have a consultation meeting with community
c) to have periodical assessment meetings with the community organizers and community
d) to make a periodical monitoring of the biophysical environment change

5.7.5 Establishment of Project Management Organization

(1) Establishment of task force

The development plan on institutional aspect will establish a multi-sectoral coordinating committee at national and provincial level. Since an inter-departmental executive steering committee at national level may be established through WRDP, establishment of a task force committee at the local level is proposed in this report for the management, monitoring and evaluation of the watershed management project. The committee will have a comprehensive function for watershed management program as shown below.



(2) Project management by community organization

The actual project components of the watershed management plan will be mainly conducted by the community organization in consultation with the coordinating committee, especially NGOs and LGU who will work as a community organizer. The proposed organizational chart of the community organization is presented in Figure 5.7.2.

5.7.6 Tentative Implementation Program

Prior to community organizing, preparatory activities will include the prequalification of NGOs, bidding and awarding of contracts, and land management unit survey and delineation will be done. Community organizing will be done during first two (2) years. Implementation of the major watershed management activities including

nursery operation, plantation establishment, and management and maintenance are programmed for a period of six (6) years. The construction of rural infrastructure facilities are scheduled for completion within the first two years. The tentative implementation schedule is presented in Figure 5.7.3.

5.7.7 Cost Estimate for the Plan

(1) Total project cost

The total cost for the watershed management project for six year operation is estimated at about 76.1 million pesos as shown below.

Components	Cost (p 1000)
1. Protection works	17,420
2. Reforestation works	19,990
3. River bank protection works	3,620
4. Soil conservation and Fire break works	3,790
5. Infrastructure development	16,860
6. Preparation works (Land use survey, social investigation)	1,220
7. Project management cost (including community organizing cost)	6,290
8. Physical contingency	6,920
Total	76,110

(2) Cost recovery

Most of the cost shall be borne by government subsidy. However, the beneficiaries shall also cover part of this cost. The beneficiaries include the direct and indirect beneficiaries. The direct beneficiaries are members of the community to be organized in the model site. The indirect beneficiaries, on the other hand, are people in the lower reaches of the watershed, composed of i) farmers in the CIS along the Suague river, ii) the farmers in Suague RIS, and iii) the farmers in the Jalaur RIS. In this case, the charge to recover the partial cost is assumed to be collected from indirect beneficiaries as part of the Irrigation Service Fee. While, the charge for the direct beneficiaries is mainly compensated by labor, although most works will be contracted with the community organization.

5.7.8 Expectable Benefits from Watershed Management Project

The following direct and indirect benefits can be expected from the project.

i) Forest resource accumulation
ii) Increasing household income
iii) Employment generation
iv) Reduction of sediment load
v) Stabilization of river flow throughout a year

5.8 Environmental Consideration

5.8.1 Future Environmental Issues with the Project

The environmental screening and scoping were carried out to identify and assess the potential adverse impacts of the priority projects, taking the detail features of priority projects into account. In the process of screening and scoping, the priority project areas were assumed to be one irrigation project, because these systems are adjacent with each other and closely contain the same features and components. As a result, five (5) future environmental issues to be caused by the project works are identified in the project areas. These probable issues and their significance with and without mitigation measures are summarized in Table 5.8.1, and explained in the following sections.

(1) Health hazard from agrochemical use

Although the use of agro-chemicals will slightly increase with the project condition, the effect for farmers' health is expected to be not serious under the proper agricultural extension as described in Section 3.2.10. In addition to the proper extension, it is also recommended to promote the transplanting practice in paddy cropping and the IPM system in the project area.

(2) Deterioration of downstream water quality

The use of farm inputs will increase under the future intensive agriculture to obtain higher yields. This might result in nutrient load in drainage water and affect the downstream water quality. An examination of future impacts is presented in Annex I, and the estimated contamination of the runoff water under proper water management condition is shown below.

(Unit : mg/lit)

Input	Present Condition <1			Increment			Future Contamination		
	Wet season	Dry season	Average	Wet season	Dry season	Average	Wet season	Dry season	Average
N	0.11	0.11	0.11	0.45	0.95	0.59	0.56	1.06	0.70
P	n.d.	n.d.	n.d.	0.03	0.07	0.04	0.03	0.07	0.04

Remark : Figure in wet season of present condition is set at the same as one in dry season.

Based on the above assumption, the nutrient load in the runoff water was estimated to be low . According to the standard of water quality for fishery use (Class C of Water Quality Criteria, DENR, Philippines), the runoff water from the project area is at optimum level. In addition, the downstream has an original discharge, especially Jalaur river, and the downstream water is mostly used for dilution water into sea water in fish ponds. Therefore, it is considered that the water quality will be in safety level for fishery use under proper water management. However, it is recommended to periodically monitor the drain water quality.

(3) Loss of farm land

Total 20 farm ponds which consist of 7 ponds in Suague and 13 in Jalaur are planned to be constructed under the project. The loss on farm land (or total land) is not expected to be large as 10 ha (12.9 ha) in Jalaur and 4 ha (4.8 ha) in Suague. The impact of the issue will be minor since the loss area is too small. Furthermore, the construction of the pond is meant to supplement irrigation water during the dry season, and thus ensures stable crop production. Therefore, it is considered as an optimum trade-off between negative and positive impacts. It is, however, necessary to fully compensate a loss of farm lands for the owners and/or the tenant farmers in the land and to get their consensus before the project implementation.

(4) Beneficial impacts on farm household income and regional economy

The biggest beneficial effect of the Project is the upliftment of farm economy as a result of the increase in crop production. The following results of the farm economic analysis indicate that a substantial increase in income will be attained by every farm type in both RISs at full development of the Project.

(Unit : peso/year)

Item	Suague RIS			Jalaur RIS		
	OC	LH	TF	OC	LH	TF
Net farm income without project	32,630	16,420	6,960	28,050	11,830	6,500
Net farm income with project	62,410	46,810	31,200	71,960	53,970	35,980
Balance (increase)	29,780	30,390	24,240	43,910	42,140	29,480

Remarks : OC means "owner cultivator", LH is "leaseholder", and TF is "tenant farmer".

As for regional economy, the priority projects will generate incremental employment of a casual labor at the construction stage, though not permanently. In addition, the intensive agriculture is expected to generate additional farm labor as the annual farm employment will be about 1.8 million man-day per year at full development stage. The increase in agricultural production will induce economic activities in other sectors through linkage effect. The secondary tertiary benefits will accrue in any sectors related to agriculture such as farm inputs' suppliers, traders, and millers. The initial construction investment would also expand effective demand for construction materials and thereby increase regional and national incomes.

(5) Reduction of excessive use of ground water

As noted in Section 3.2.10, ground water from shallow tube wells are widely used in the project area, and excessive use of ground water is reported in some places, particularly in the dry season. Therefore, the proper supply of irrigation water from both RISs will prevent the excessive pumping of ground water. However, it is recommended that a study on the potentials and present use of ground water will be conducted in order to have a better perspective on ground water utilization.

5.8.2 Monitoring Plan of Downstream Water Quality

Even with extension services for proper water management and farm input use, the contamination might occur due to accidental mishandling of farm inputs. Thus, periodic monitoring is required to be conducted to notice any irreversible effects. The following monitoring survey should be conducted in cooperation with DENR.

(1) Existing monitoring work

Presently, DENR carries out a water quality analysis for the sample taken at the mouth of Jalaur river just near fish ponds. The monitoring period is on monthly basis, and items of analysis are ; i) Color, ii) Temperature, iii) pH, iv) DO, v) BOD, vi) TSS and vii) TDS. The work is presently conducted by the Environment Section, DENR, Region VI.

(2) Additional survey items

In addition to the above items, it is recommended to include the items of total nitrogen and total phosphate in the monthly analysis. Furthermore, the degree of agrochemical contamination should be analyzed twice a year, such as July and December.

(3) Additional sampling points

The fish ponds related with Jalaur proper RIS are generally divided into three groups such as Barotac Nuevo, Dumangas, Zarraga by location. In addition to the sampling at Jalaur river (Dumangas), it is recommended that additional sampling works on the creeks in Barotac Nuevo and Zarraga used for water source of fish ponds shall be carried out.

(4) Implementing agency of monitoring

The monitoring works will be carried out by DENR along with the monthly monitoring works. However, the additional cost for the additional works shall be shared by NIA and DENR.

5.8.3 Recommendation on Restriction of Quarry Activities

To prevent the sinking degradation of the Suague river bed downstream of the diversion dam and also to sustain the project viability of Suague RIS, the quarry activity shall be restricted in the downstream. It is recommended to shift from the present site to the upstream of the dam as an alternative in the future. It is also recommended that a monitoring on the riverbed fluctuation and the quarry activities will be conducted finally to ensure the sustainability of project life.