6. PROJECT COST ESTIMATE

6.1 Implementation Schedule

(1) Project works

Improvement works of the Jalaur proper RIS are scheduled to be executed since 1998 under the WRDP fund, but the improvement works proposed by NIA are minor works for canal and related structures such as canal desilting works, minor rehabilitation works of related structures, etc. Allocated budget for the works is about 23 million pesos for the 3 years from 1998 to 2000. The works to be covered by the WRDP are excluded in the Study. The Project works are summarized as follows.

Description	Unit	Jalaur proper RIS	Suague RIS	Total
Improvement Plan of Irrigation/Drainage and Rural Road				
1 Diversion Dam				
1.1 Replacement of slide gate for main gate, scouring sluice gate, intake gates	nos.	20	4	24
1.2 River Treatment				
Length of river treatment	m		280	280
Gabion mattress & groins	m		350	350
1.3 Trashrack	nos.	2	1	3
2 Main/Lateral Canals and Related Structures				
2.1 Improvement of canals	km	121.3	39.4	160.7
2.2 Feeder canals	km	24.3	7.4	31.7
2.3 Canal lining	km	29.3	6.3	35.6
2.4 Settling basin	nos.	1	1	2
2.5 Replacement and installation of gates at head gate/turnout	nos.	52	19	71
2.6 Additional turnout	nos.	76	41	117
2.7 Additional related structures	nos.	102	33	135
2.8 Farm pond (supplemental facilities)	nos.	13	7	20
2.9 Pond (supplemental facilities)	nos.	4	2	6
3 Main/Secondary Drains and Related Structures				
3.1 Additional secondary drains	km	53.9	common for both the RIS	
3.2 Enlargement of Abangay creek	km		8	8
3.3 Bridge	nos.	1	1	2
3.4 Cross drain	nos.	11	1	12
4 Service road and rural road				
Service road				
4.1 Improvement of gravel pavement	km	36.1	8	44.1
4.2 Improvement of road	km	73.3	26.5	99.8
4.3 New construction	km	17.5	10.2	27.7
Rural road				
4.4 Improvement of road	km	3.6	1.2	4.8
4.5 New construction	km	1.3	0.7	2
5 Procurement of O & M equipment				
5.1 Construction equipment	nos.	16	common for both the RIS	
5.2 Vehicle and motorcycle	nos.	44	common for both the RIS	
5.3 Office equipment and others	nos.	63	common for both the RIS	
Institutional Development Plan				
1 Buildings				
1.1 Renovation of NIA training center	m2	730	common for both the RIS	
1.2 IA office	nos.	20	common for both the RIS	
2 Procurement of equipment and facilities				
2.1 Training and communication	L.S.		common for both the RIS	
2.2 Transport facilities	L.S.		common for both the RIS	
2.3 Office equipment and facilities	L.S.		common for both the RIS	

(2) Implementation schedule

The implementation of the Project is divided into three stages: (i) pre-construction period including detailed design and tender administration, etc., (ii) construction period involving the full implementation of the Project, and (iii) sustainability period involving the O&M of irrigation facilities by the IAs. Main components of the Project implementation are construction of civil works and institutional development.

(a) Construction time schedule

Construction time schedule is made based on the estimated quantity of main works, workable days in the site, construction method and program, anticipated capacities of construction equipment, and physical site condition.

Workable days for the construction are very limited because of the situation of irrigation activities and rehabilitation project. Current idle period of irrigation water supply is about 2 months from March to May for NIA's periodical maintenance works, but the Jalaur -Suague RIS office can enhance the irrigation water supply to stop actual delivery for the 4 months from January to April in view of current farming practices in the study area. Based on the result of hydrological analysis using the rainfall data for the recent twelve years, the days with rainfall of less than 5 mm are estimated at 114 days during the 4 months, and the workable days are estimated at 97 days, assuming a 6-working days per week. As for the other 8 months, the workable days can be estimated at about 130 days deducting the holidays, and the Jalaur -Suague RIS office can also suggest to carry out partly suspension on the irrigation water supply.

Construction works on main canal and big lateral canals such as the lateral canal E of the Jalaur proper RIS, settling basin and canal lining, etc. are scheduled to be carried out only during the full suspension period of water supply, and the construction works on other lateral canals and related structures are scheduled to be executed for the partly suspension period, operating the rotational irrigation water supply.

Main construction works such as earth and concrete works are planned to be carried out by mechanical construction method. Embankment materials is principally excavated materials, but necessary amount of embankment materials are planned to be hauled from the currently approved borrow areas. The materials of road pavement and gabion are also hauled from the approved quarry area.

Based on these assumptions, the necessary work days are estimated, and construction time schedule which covers 3-year construction for the Jalaur proper RIS and 2-year construction for the Suague RIS are prepared.

The most critical path of the schedule is construction of settling basin, and rehabilitation and concrete lining of main canal in both the RISs.

Construction of the settling basin is scheduled to be executed in the 4 months from January to April of the first year of the construction stage. Rehabilitation and concrete lining of main canal is scheduled to be carried out for the 4 months of the 3 years for the Jalaur proper RIS and the 2 years for the Suague RIS. River treatment works for the Suague diversion dam are scheduled to be carried out during the 4 months of the second year after the commencement of construction.

In addition, construction of IA offices and renovation of NIA regional training center is scheduled to be executed during the first to the second years of the pre-construction period, taking into consideration the schedule and program of the training work for IAs and NIA staff.

(b) Implementation schedule of the institutional development plan

The implementation of the institutional development plan is scheduled to be divided into two phases based on the basic development concept discussed in Section 5.5:

(i) preparatory phase which will involve the setting up of the required physical facilities, Project organizations and management systems for the proper start up activities on the IA institutional strengthening and the rehabilitation of farmers' cooperatives, and

(ii) implementation and sustainability phase which will carry out the partial system management implementation by the IAs, the federation of the IAs, etc.

The gradual implementation of the plan is essential to give ample time for the IAs to develop their technical skills and acquire the necessary financial resources from the improvement of farmers' income and hence capacity to pay the ISF.

The first phase is scheduled on the first 4 years of the Project. The renovation of the NIA regional training center which will be the main venue for training of the IAs, NIA staff and MAO personnel will be carried out. The IA offices will also be constructed at this phase for the development of records management system and regular on-site training and meeting of the IAs. The required training equipment will also be procured to make the NIA training center and IA offices fully operational for the scheduled institutional development activities such as the strengthening of the IAs, rehabilitation of farmers' cooperatives, and development of women service cooperatives.

Establishment of the proposed Project organizations such as the Project Steering Committee and Project Technical Committee, activation of IA committees, development of IA education clusters and preparation of monitoring and evaluation system are also essential to be carried out during this phase to provide sufficient guidance and extension services to the IAs, NIA and other agencies involved in the Project. Technical assistance will also be provided by recruitment of consultants and locally-based NGOs to prepare training material and carry out the training of the IAs, NIA staff and MAO personnel for the first 5 years of the Project including the frist year of the second phase.

The second phase is scheduled to start on the fifth year of the Project by which time most of the IAs would have been institutionally and technically strengthened, and will carry out the partial system management and the federation of the IAs for each RIS. The farmers' cooperatives are envisioned to procure and manage their owned post-harvest facilities to control the integrated rice business in the project area.

In the second phase, the IA committees and education clusters are expected to carry out the continuing education development program for the members at the TSAG level through the guidance of the consultants, NGOs, NIA staff, MAO personnel, etc. This approach will prepare the IAs to sustain the training and extension activities after the construction period.

The implementation schedule of the Project is shown in Table 6.1.1.

6.2 Organization and Management

(1) Executing agencies related to project implementation

The executing agencies for the Project implementation for the three (3) stages mentioned in Section 6.1 are as follows:

Development Stage	Major Activities	Lead Agencies	Cooperating Agencies
Pre-construction	D/D, tender administration, preparation of O&M manual and training materials, start up of training program, construction of IA office and NIA training center	NIA	
Construction	Construction works, irrigated agriculture development, water management and O&M practice, institutional development of the IAs and NIA, agricultural support services, watershed management, etc.	NIA, LGUs (7 Municipal Governments) through the MAO, DENR	DA, Provincial Government through PAO, WESVIARC, LBP, DAR, CDA, NGO
Sustainability	O&M of irrigation facilities and continuous management of business activities by the IAs	IAs, NIA	MAO, PAO, DA, LBP

The NIA will be the overall lead implementing agency for the implementation of the Project. The other agencies which will take the lead role and cooperating role for the implementation of specific prospective plans of the Project are shown in Fig. 6.2.1 in conformance with their present mandated functions.

As for the implementation of irrigated agriculture development plan, the LGUs of the concerned 7 municipalities will be the lead agency and the NIA, DA and PAO will be the cooperating agencies.

In the implementation of improvement plans of irrigation and drainage facilities and rural infrastructure, and water management and O&M practices, the NIA will be the lead agency. The provincial and municipal LGUs will be the cooperating agencies.

The NIA and LGUs will be the lead agencies for the implementation of the institutional development plan with the support of NGOs to carry out the institutional strengthening of the IAs and rehabilitation of farmers' cooperatives, etc. The DAR will be the cooperating agency to accelerate the implementation of CARP in the project area. The NIA and LGUs through the NGOs will also be the lead agencies for the implementation of the improvement plan of agricultural support services, and DA, CDA and LBP will be the cooperating agencies.

As for the implementation of the watershed management plan, the DENR will be the lead agency and the LGUs and NIA will be the cooperating agencies.

Proper cooperation and coordination among the implementing agencies will be ensured by the development of the multi-agency Project Steering and Technical Committees as described below.

(2) Project organization and management

The proposed organization of the Project is divided into three groups: (i) Project Management Office to be operated through the NIA Jalaur-Suague RIS (JSRIS) office, (ii) Project Steering Committee, and (iii) Project Technical Committee, as shown in Fig. 6.2.2. This organizational set-up is essential to pool the resources and skills of all the agencies concerned for the effective and systematic implementation of the Project.

(a) JSRIS office

This office will act as the Project Management Office which will be responsible for the supervision, monitoring and evaluation of the implementation of the prospective plans of the Project. The major functions of this office will be as follows:

i) Prepare and implement the annual work and financial plan of the Project,
ii) Coordinate with other concerned agencies for the implementation of the prospective plans,
iii) Follow-up and release budget requests on time with the concerned units of NIA and other agencies such as NGOs and MAO,
iv) Supervise, monitor and evaluate the Project implementation, and
v) Submit regular monthly, quarterly and annual progress reports to the Project Steering and Technical Committees, NIA Regional and Central Office, funding institutions, etc.

The six sections of the JSRIS office will carry out their present mandated functions, and the proposed functions for the new Water Management Section and Operation and Maintenance Section as referred to in Section 5.4. The JSRIS office will also supervise and coordinate the activities of the Technical Assistance (consultants and NGOs). Sufficient administrative support to the proposed Project Steering Committee and Project Technical Committee by the JSRIS office shall be ensured for the effective and proper operations of such committees.

(b) Project Steering Committee (PSC)

A multi-agency PSC will be established to serve as the policy making group of the Project to be consist of the following:

Agency/Representative	Position in the PSC
Provincial Governor of Iloilo	Chairman
NIA Regional Irrigation Manager, Region VI	Co-Chairman
DA Regional Director, Region VI	Member
DAR Regional Director, Region VI	Member
DENR Regional Executive Director, Region VI	Member
NEDA Regional Executive Director, Region VI	Member
Municipal Mayors (7) concerned	Member
LBP Regional Manager, Region VI	Member
NGO Representative	Member
NIA JSRIS Irrigation Superintendent	Member

The PSC will meet every quarter for the entire duration of the Project, or as the need arises as requested by the Chairman or any member of the PSC. The functions of the PSC are as follows:

i) Review and approve the annual work and financial plan submitted by the JSRIS office,
ii) Formulate, improve and approve policies and procedures on the implementation of the Project, and
iii) Acknowledge the progress reports of the Project, etc.

The proposed chairmanship position of the PSC for the Provincial Governor of Iloilo takes full cognizance of the LGUs' important role in the Project implementation such as the development of irrigated agriculture, improvement of agricultural extension services to the IAs, farmers' cooperative development, maintenance of rural infrastructure, etc.. This greater role of the LGUs (provincial and municipal governments) in the Project is essential to support their new mandate under the 1991 Local Government Code. The JSRIS office will provide the secretariat services to the PSC for the proper recording of the quarterly meeting of the PSC.

(c) Project Technical Committee (PTC)

The PTC will also be established to provide technical support to both the PSC and the JSRIS office, particularly on matters related to the implementation of the prospective plans of the Project by the respective field offices of the PTC member-agencies. This group is essential for the smooth and timely execution of the Project in view of the proximity of the field offices of the proposed PTC members to the project area. The proposed members of the PTC are as follows:

Agency/Representative	Position in the PTC
NIA JSRIS Irrigation Superintendent	Chairman
Provincial Agriculturist, LGU-PAO	Member
PARO, DAR	Member
PENRO, DENR	Member
MAO, LGU (7)	Member
NGO (4)	Member
LBP Provincial Manager	Member
IA Representative (4)	Member

The main functions of the PTC will be the following:

(a) Review the major technical plans contained in the Project's annual work and financial plan, and endorse the reviewed plans to the PSC for approval,
(b) Provide technical advice on requests of the JSRIS office, IAs, etc. on a regular basis,
(c) Render monitoring support to the JSRIS office with respect to the performance of the PTC members' respective staff to be designated to the Project, etc.

The JSRIS office will provide secretarial services to the PTC meeting. The meeting of the PTC will be scheduled every month to render more effective technical support to the PSC and the JSRIS office.

(3) Funds flow

Since the JSRIS office will be the Project Management Office, the existing flow of funds of NIA for the JSRIS office will be adopted for the Project. A separate book of financial accounts solely for the Project will be established at the JSRIS office for proper and transparent accounting.

6.3 Cost Estimation

(1) Basic assumptions

Construction costs are estimated at the price level of December 1997 using the unit prices of labor, construction materials and equipment in and around the Project area. The cost estimation is based on the international competitive condition. Procurement costs of the O & M equipment and training facilities, etc. are estimated based on the CIF Iloilo prices. Land acquisition costs are estimated to refer to the provincial tax ordinance of Iloilo.

Engineering service costs for the civil work and administration costs are respectively assumed at 10% and 2% of the sum of the direct construction and procurement costs.

Physical contingency is assumed at 10% of the sum of direct construction, procurement, engineering services, administration and land acquisition costs. Price contingency is assumed to be 1.8% per annum for the foreign currency portion and 5.3% per annum for local currency portion based on the statistic data 1997 of Philippines. The exchange rate used in the cost estimation is US $ 1.0 = Pesos 35.10.(December 1997)

In addition, the construction costs of the WRDP of about 29.4 million pesos are deducted from the total direct construction cost estimated in the Plan.

(2) Project costs

Total project cost of both the RIS is estimated at 1,573.3 million pesos, and each project cost is respectively estimated at 1,186.2 million pesos for the Jalaur proper RIS and 387.1 million pesos for the Suague RIS.

The common costs for both the RIS such as the procurement cost for O & M work and institutional development, construction cost of IA offices and the fund for irrigators' association development (IADF) are shared in accordance with the numbers of irrigators' association of each RIS area. The detailed is shown in Tables 6.3.1 to 6.3.4.

Summary of Project Cost

(Unit: 1,000 pesos)

Description	L/C	F/C	Total
1. Construction Costs	436,954	492,382	929,336
1.1 Improvement of Diversion Dam	27,468	45,894	73,362
1.2 Irrigation Canal and Related Structures	329,196	357,568	686,765
1.3 Drainage Canal and Related Structures	19,451	40,651	60,102
1.4 Service Road	33,233	14,185	47,418
1.5 Rural Raod and Related Structures	23,192	29,672	52,864
1.6 IA Office	3,500	3,500	7,000
1.7 Training Center	913	913	1,825
2. Procurement Cost	0	60,050	60,050
2.1 O & M Equipment	0	50,371	50,371
2.2 Institutional Dev. & Agr. Extension	0	9,680	9,680
3. Cost & Expenditure of Training Materials	6,672	6,672	13,344
4. Engineering Services Costs	78,975	115,543	194,519
4.1 Civil Works	43,695	49,238	92,934
4.2 Training	35,280	66,305	101,585
5. Irrigators' Association Development Fund	0	8,200	8,200
6. Administration Costs	8,873	11,182	20,055
7. Land Acquisition Costs	44,375	0	44,375
8. Physical Contingency	57,585	68,583	126,168
9. Price Contingency	128,139	49,149	177,288
Grand Total	761,572	811,762	1,573,334

Summary of Project Cost (Jalaur proper RIS)

(Unit: 1,000 pesos)

Description	L/C	F/C	Total
1. Construction Costs	325,390	374,169	699,560
1.1 Improvement of Diversion Dam	1,443	5,773	7,216
1.2 Irrigation Canal and Related Structures	262,343	296,227	558,570
1.3 Drainage Canal and Related Structures	18,375	39,616	57,992
1.4 Service Road	25,807	11,015	36,821
1.5 Rural Raod and Related Structures	13,885	18,000	31,885
1.6 IA Office	2,625	2,625	5,250
1.7 Training Center	913	913	1,825
2. Procurement Cost	0	56,053	56,053
2.1 O & M Equipment	0	48,793	48,793
2.2 Institutional Dev. & Agr. Extension	0	7,260	7,260
3. Cost & Expenditure of Training Materials	5,004	5,004	10,008
4. Engineering Services Costs	58,999	73,172	132,171
4.1 Civil Works	32,539	37,417	69,956
4.2 Training	26,460	35,755	62,215
5. Irrigators' Association Development Fund	0	6,150	6,150
6. Administration Costs	6,608	8,705	15,312
7. Land Acquisition Costs	37,174	0	37,174
8. Physical Contingency	43,318	51,710	95,028
9. Price Contingency	97,714	37,054	134,767
	574,207	612,016	1,186,223

Summary of Project Cost (Suague RIS)

(Unit: 1,000 pesos)

	Description	L/C	F/C	Total
1.	Construction Costs	111,563	118,213	229,776
	1.1 Improvement of Diversion Dam	26,025	40,121	66,146
	1.2 Irrigation Canal and Related Structures	66,854	61,341	128,195
	1.3 Drainage Canal and Related Structures	1,076	1,035	2,110
	1.4 Service Road	7,426	3,170	10,596
	1.5 Rural Raod and Related Structures	9,307	11,672	20,979
	1.6 IA Office	875	875	1,750
	1.7 Training Center	0	0	0
2.	Procurement Cost	0	3,998	3,998
	2.1 O & M Equipment	0	1,578	1,578
	2.2 Institutional Dev. & Agr. Extension	0	2,420	2,420
3.	Cost & Expenditure of Training Materials	1,668	1,668	3,336
4.	Engineering Services Costs	19,976	42,371	62,347
	4.1 Civil Works	11,156	11,821	22,978
	4.2 Training	8,820	30,550	39,370
5.	Irrigators' Association Development Fund	0	2,050	2,050
6.	Administration Costs	2,265	2,478	4,742
7.	Land Acquisition Costs	7,201	0	7,201
8.	Physical Contingency	14,267	16,873	31,140
9.	Price Contingency	30,425	12,095	42,520
	Grand Total	187,365	199,746	387,111

(3) O & M cost

Total O & M costs for both the RIS are respectively estimated at 17.0 million pesos/year for the first to fourth year of the Project, 13.6 million pesos/year for the fifth to eighth year, and 10.2 million pesos/year for the ninth year and thereafter, taking into consideration the implementation schedule of the Project.

(4) Total costs for institutional development and O & M works

Total costs for the institutional development, water management and O & M works, and agriculture extension works are estimated at about 211.1 million pesos including construction costs of irrigators' association offices, renovation cost of the NIA training center, procurement costs of O & M equipment and training equipment, the fund for irrigators' association development (IADF), etc. as summarized below.

Total Costs For Institutional Development and O & M Works

(Unit: 1,000 pesos)

		L/C	F/C	Total
1	Construction Works			
1.1	Construction of IA Office	3,500	3,500	7,000
1.2	Renovation of Training Center	913	913	1,825
	Sub-total	4,413	4,413	8,825
2	Procurement of Equipment			
2.1	O & M Works			
	(1) O & M Equipment	0	50,371	50,371
2.2	Institutional Development & Agr. Extension			
	(1) Training & Communication	0	1,190	1,190
	(2) Office equipment	0	510	510
	(3) Transport facilities	0	5,000	5,000
	(4) Techno-demo farms	0	2,980	2,980
	Sub-total	0	9,680	9,680
3	Cost & Expenditure of Training Materials	6,672	6,672	13,344
4	Engineering Services Costs	35,280	66,305	101,585
4.1	for implementation of training program	35,280	60,300	95,580
4.2	for procurement of equipment	0	6,005	6,005
5	Irrigators' Association Development Fund (IADF)	0	8,200	8,200
6	Administration Cost for Institutional Development and Procurement	133	1,334	1,468
7	Physical Contingency	4,209	13,436	17,645
	Total	50,707	160,410	211,117

7. PROJECT EVALUATION

7.1 Economic Evaluation

7.1.1 General

The following basic conditions are applied in the derivation of economic costs and benefits.

a) All costs and benefits are expressed in 1997 constant prices.

b) A standard conversion factor of 0.83 is applied to non-traded goods and skilled labour to convert financial prices to economic prices.

c) Economic prices of traded agricultural products (rice) and inputs (urea, triple super-phosphate, muriate of potash) are defined to be the import parity prices derived from the long-term international market price forecast by the World Bank for the year 2005 based on 1990 constant prices, after converting them to the 1997 price level. Transfer payments such as taxes , irrigation fees, subsidies, interests, etc. are deducted from the costs.

d) A specific conversion factor of 0.6 is used for the estimation of market wage rate of unskilled labor.

e) Imported goods are valued at the foreign exchange rate of 35.1 pesos per US $.

7.1.2 Economic Benefits

Agricultural benefits would be obtained from the increment of crop production and the improvement in agricultural productivity due to the improvement in irrigation and drainage facilities, the operation and maintenance of irrigation systems, crop husbandry, and agricultural support services such as agricultural credit and agricultural extension, and the institutional strengthening of the IAs.

With the Project, cropping intensity will be increased from 197% to 218%, and cropped area will be increased by 2,490 ha. Economic incremental benefit by the Project in crop production is estimated at 258 million pesos. The summary of the calculation is shown in the Table 7.1.1. The basis on calculating the economic prices of paddy and fertilizers is shown in Table 7.1.2. Future economic crop budgets is given in Tables 7.1.3, 4 and 5.

On the 4th year of the Project, the irrigation benefit from incremental agricultural production will increase progressively and reach the full scale on the 8th year.

7.1.3 Economic Costs

The economic costs of the Project are calculated by multiplying the project costs estimated in chapter 6 by the standard conversion factor of 0.83. The replacement costs of metal works, stoplog and O/M equipment are calculated in the same manner. The annual O/M costs such as personnel costs, rehabilitation costs and maintenance costs are also included in project costs. In the calculation, the land acquisition cost and price contingency cost are excluded from the costs. The total initial economic costs are as follows:

(Unit: million pesos)

Description	Amount
Jalaur proper	839
Suague	279
Total	1,118

7.1.4 Economic Evaluation

Economic evaluation is made to determine the economic viability of the Project. Economic opportunity cost of the capital expressed by an internal rate of return is used for the evaluation. The Project is evaluated by integrating the Jalaur proper and Suague RIS areas because of the following:

- the irrigation canal system of the Suague RIS is connected with the irrigation main canal system of the Jalaur proper RIS, and
- 200 ha in Suague RIS will be provided with irrigation water through the main canal of Jalaur Proper RIS.

The internal rate of return of the Project is estimated at 16.4%. Thus, the project is economically viable with the economic internal rate of return of more than 15%, which is the threshold of economic viability stipulated by NEDA. Details of the calculation are shown in Table 7.1.6.

A sensitivity analysis is conducted to examine the viability of the Project under the following adverse conditions.

(1) Increase of the initial cost by 20%
(2) Decrease of benefit by 20%
(3) Combination of (1) and (2).

The analysis results are as follows:

	Project	Case (1)	Case (2)	Case (3)
EIRR	16.4%	14.8%	15.1%	13.6%

As shown above, the Project can be considered economically viable even under the moderate adverse conditions except in the case (3).

7.1.5 Financial Evaluation

The future farm budget is analyzed as a financial evaluation of the Project. The farm income consists of the net crop income and non-crop income which includes the incomes from non-farm activities. The net farm income is estimated based on the future crop budget mentioned in section 5.2.6. While, the non-crop income is estimated by adjusting the present condition on the basis of the results of household interview survey in Phase II, taking consideration into the reduction in family labor. The expenditures are assumed to be the same amount as those of the present condition to be able to evaluate the direct impact on the net crop income. The evaluation is made for three typical farm types with average farm size (1.5 ha) and family size (5.3 persons), and the results are summarized as follows :

(Unit: pesos/h.h.)

	Net Crop Income <1 (1)	Non-crop Income <2 (2)	Household Expenditure <3 (3)	Net Reserve (4) (1)+(2)-(3)	(4)/((1)+(2)) %
Jalaur proper					
Owner-cultivator	72,082	30,567	50,908	51,741	50
Leaseholder:	54,062	19,056	46,156	26,962	37
Tenant farmer	36,041	23,880	37,075	22,846	38
Suague					
Owner-cultivator	62,531	24,457	45,144	41,844	48
Leaseholder:	46,898	23,925	39,845	30,978	44
Tenant farmer	31,267	26,840	33,543	24,564	42

Reference data : Household Interview Survey by JICA Study Team (1997)
Remarks : <1 The ISF, land tax, etc., are already excluded in the figures.
<2 The figures are adjusted by the factor 0.88, calculated from reduction rate of available family labor.
<3 Same as the present condition.

According to the results of the household interview survey, the net reserves of the farmers are presently in a marginal level (0 to several thousand pesos). By implementation of the Project, at the mature stage, it is estimated that those will significantly increase at about 22,800 to 51,700 pesos. The significant net reserve will result in improvement of their living condition. Therefore, the Project is evaluated as a viable one from the farmers' financial aspect.

7.2 Indirect and Intangible Benefits

In addition to the direct benefits mentioned in the above economic evaluation, it is expected that the Project would generate secondary or intangible benefits.

(1) Employment opportunity

The incremental direct farm employment by the Project is estimated at 2.49 million man-days per year at the full development stage as shown in the Table 7.2.1. At the unit labor cost of 80 pesos per man-day, this incremental labor requirement would generate the real and nominal income of 199.2 million pesos for farm laborers and family laborers. As almost a half of the labor requirement is covered by the hired labor, an additional income of about 100 million pesos will accrue to farm laborers, which would significantly mitigate poverty of landless farm laborers in the project area.

Job opportunities during the construction and rehabilitation period in the Project will also generate additional income for construction workers.

(2) Improvement of transport conditions

The rehabilitation of existing roads and construction of new farm roads under the Project will substantially improve the transport conditions in the project area. This in turn will contribute to more economic activities due to the improved transportation of farm products and inputs as well as personnel movement. Better and timely farm operation will be secured through the improvement of rural road networks.

(3) Generation of post-harvest businesses

The increment of paddy production and improvement of social infrastructures such as cooperatives, credit and agricultural extension services will produce favorable business environment for rice post-harvest businesses such as rice milling and trading by farmers. As the rice market mechanism in the region is not working efficiently due to the rice cartel, the direct involvement in rice business by the farmers through cooperatives would provide significant income to farmers.

8. STRENGTHENING PLAN FOR THE AGANAN RIVER FEDERATION OF IRRIGATORS' ASSOCIATION (ARFIA)

8.1 Background on the ARFIA and the Post-Harvest Facilities

(1) The ARFIA organization and functions

In November 1995 the ARFIA has been registered with the Securities and Exchange Commission, comprising of the existing six irrigators' associations (IAs) in the Aganan RIS. The organization structure of ARFIA is shown in Figure 8.1.1. A Board of Trustees (BOT) consisting of three officers from each IA serves as the policy making body of ARFIA. The board is responsible for managing its organizational affairs consisting of the following functions:

1. To promote and coordinate system-wide operation in water delivery and distribution,
2. To acquire equipment, machineries and facilities required in the conduct of its farming activities,
3. To pool resources of its members for the upliftment of their socio-economic conditions particularly in the processing and marketing of their produce,
4. To coordinate the collection of loans, ISF and other dues of the IAs to any financing institution, and
5. To serve as a forum to discuss problems/suggestions relative to the O&M works of the IAs.

Four months later, in March 1996, the ARFIA has been provided with post-harvest facilities built in the municipality of Oton under the Japan Grant Aid Program. This equipment was intended to meet the requirements of its members for the hauling, drying and storage of paddy to obtain better farmgate prices. These facilities are important to the IA members to give them opportunities to benefit from the value-added derived from drying and storage of paddy.

(2) Present condition of the post-harvest facilities

Presently, the primary post-harvest facilities being operated by the ARFIA are the drying yards, two hauling trucks and two warehouses. The existing policies on the operation of tractors, drying yards and warehouses, particularly on service fee, are shown in **Table 8.1.1.** The capacities and utilization rates are given below:

Description	unit	Capacity	Actual utilization	Rate (%)
Drying yard	ton/day	81	4.0	5
Truck	ton/day	162	1.3	1
Warehouse	ton	2,430	608.0	25

(a) Drying yard

The designed capacity of drying yard is 81 tons/day for a 60-day harvesting period in the wet season. From August 1996 to September 1997, the volume of dried paddy was 1,667 tons including those dried in the dry season, as shown in the table below. This accounts for a low of 5% of the total capacity utilization. The total number of users were 119 as compared to the total ARFIA members of 1,502. Of the reported users, 10 were not ARFIA members.

Month	Dried Paddy (ton)	Capacity Utilization (%)
August, 1996	550	22
September	186	8
October	78	3
November	66	3
December	178	7
January, 1997	82	3
February	28	1
March	10	0
April	4	0
May	26	1
June	0	0
July	0	0
August	6	0
September	453	19
Total	1667	5

The present utilization of the drying yard is biased to MACABITU IA, which is in the same irrigation division as the post-harvest facilities' complex. This IA accounts for 72% of the total volume of dried paddy as shown in the next table.

Name of IA Users	Distribution of Dried Paddy(%)
LAMPACAPA	2
MACABITU	72
MACABITU & LAMPACAPA	3
MACABITU & SALAMBITU	0
SALAMBITU	12
SAMICASA	1
TACAS-BUHANG	1
Unknown	8
Total	100

Farmers and paddy traders are the primary users of the drying yard, accounting for 48% and 47%, respectively, as shown below in terms of the main business of users.

Main Business of Drying Yard Users	Distribution (%)
Creditor	2
Employee	2
Merchant	1
Trader	47
Farmer	48
Total	100

(b) Trucks

The two trucks are currently utilized to transport wet paddy from individual paddy farmers and to ship paddy outside of the post-harvest facilities. These trucks are scheduled to transport incoming and outgoing paddy at 162 tons/day. The actual utilization rate for the period August 1996 to September 1997 is only 1%, or 1.3 tons/day. Sixty four persons have used the trucks.

Month	Incoming(ton)	Outgoing(ton)	Total(ton)	Capacity utilization(%)
August 1996	64	20	84	2
September	87	57	144	3
October	15	5	20	0
November	44	14	58	1
December	54	42	96	2
January 1997	38	14	52	1
February	0	27	27	1
March	8	13	21	0
April	1	14	15	0
May	0	25	25	0
June	0	10	10	0
July	0	7	7	0
August	0	0	0	0
September	0	0	0	0
Total	311	248	559	1

The MACABITU IA members are also the main users, accounting for 76% of the total paddy handled by trucks, followed by SALAMBITU IA members for 11%. In terms of the main business of users, paddy traders share 43% of the total dried paddy transported by the trucks.

(c) Warehouses

The designed storage capacity of the warehouses is 2,430 tons of the paddy produced in the wet season. The actual volume of incoming paddy per month in the warehouses is given in the table below. The largest volume stored was 353 tons in September 1997. Total throughput from August 6, 1996 to October 18, 1997 was 608 tons. Sixty three persons used the warehouse during the period.

Month	Incoming (ton)	Peak Stock (ton)
August, 1996	33	
September	23	
October	12	
November	101	
December	66	
January, 1997	49	
February	41	
March	2	
April	0	
May	0	
June	0	
July	0	
August	0	
September	229	353
October	53	
Total	608	

Of the total deposited paddy, the users from the MACABITU IA area account for 70%. Those from SALAMBITU IA area come next at 10%. Paddy traders and creditors account for 36% and 9%, respectively, of the total paddy deposited to the warehouses.

Generally, the facilities are underutilized.

8.2 Problems

(1) Lack of working funds for the farming activities of the ARFIA members

Farmers in the Aganan area are poor with a little cash. About 51% of the Aganan farmers are indebted. An average debt accounts for 8,420 pesos per farm. Because of this situation, farmers have to sell their paddy immediately after harvesting without drying at rather low prices to get cash for the repayment of debt, education and medical treatments. Thus, many member farmers can not use the facilities. In addition to these, the shortage of cash prevents most farmers except large farms from usage of tracks, drying yards, dryers, labors and warehouses. The farmers can use the facilities in credit from working funds of the federation but only once because of the small capital of only 5,000 pesos. Farmers have to settle their debt for the subsequent..

(2) Expensive charges for the use of the facilities

Cost saving by drying in the Aganan facilities is only 0.5 pesos per 42 kg of paddy compared with the conventional drying with bamboo mats including transportation costs. This is due to inclusion of salaries for 7 staff who manage and operate the facilities. If member farmers participate in the operation and management through working committees, the charges would become cheaper. Loading, unloading and handling of paddy have to be contracted to particular workers to prevent pilferage instead of using farmers labor force.

(3) Farmer's low awareness of economic advantages of the facilities

Most farmers do not understand the economic advantage of the facilities. For example, paddy prices increase by 0.89 pesos per kg of dry paddy by drying from 25% to 14% moisture content. If more than 160 kg of wet paddy is dried, more income will be obtained even farmer's nominal own labor costs of 100 pesos are included in the cost. The low awareness is caused by the lack of participation of member farmers in the guidance of operation and utilization of the facilities.

(4) Low participation of members in the operation and management of the facilities

The low level of participation of IA members in the operation and management of post-harvest facilities is caused by the absence of formal training on such work prior to the turn-over of management responsibilities to the ARFIA.

(5) The first-come-first-served rule

The facilities have been dominated by traders. In term of quantity of paddy processed, they occupy 47% in drying, 43% in hauling and 36% in storage. The dominance is caused by high financial capability of the traders, and by the first-come-first-served rule. The traders dry a large volume of paddy, which includes paddy outside of the Aganan area, resulting in the long time occupation of the facilities. The long occupation deters small farmers who handle small volume of paddy from the utilization of the facilities.

(6) Lack of rice mills and marketing operation of rice

There is a 6 ton circulating dryers given by the Department of Agriculture(DA). The drying charge is 10 pesos per kg of wet paddy including the fuel cost. The utilization has been full even in the first wet season. ARFIA will be granted a rice mill by the DA, although the schedule is not yet decided.. When the value added increased by the joint operation of rice mills and the joint marketing of milled rice after the completion of rice mill complex including drying, milling, storage and marketing, the utilization rate of the facilities would be improved. The training in the marketing of milled rice, such as market promotion, pricing, quality control and ABC analysis, is presently absent.

8.3 Improvement Plan for the Strengthening of the ARFIA

The immediate objective of strengthening the ARFIA is to improve the financial position of its farmer-members to actively participate in the integration of the post-harvest facilities' operation with their farming activities. To achieve this, the following measures will be adopted:

(1) Provision of government loan

ARFIA has been promoting the participation of the federation in the Quedancor paddy collateral loan program since November 1996 but in vain due to some problems such as non-transfer of land ownership of the facilities to NIA. The NIA Aganan-Sta. Barbara RIS (ASBRIS) office has to persuade the Quedancor to accept the application and has to settle the land ownership problem as soon as possible.

(2) Capital build-up

The capital build-up shall be made to accumulate the working fund of the federation. Initially, the payment of membership deposits of at least 60 pesos will be collected twice a year in conformity with the harvest period for wet and dry cropping seasons , or at least 10 pesos per month. This initial capital build-up will be used for the operation of federation or buying farm inputs such as seeds, fertilizers and agro-chemical by members.

(3) Establishment of quota system for the utilization of post-harvest facilities

A quota system for the use of the post-harvest facilities, particularly drying yards and warehouses, will be introduced by the Project to replace the existing "first-come-first-served" rule in order to give equal opportunities to all the IAs and their members. The utilization schedule will be made based on the individual IA's schedules.

(4) Reduction of service charges by the promotion of group activities

The facilities have not been fully utilized due to the high service charges. The existing policies governing the operation of the facilities will be altered to permit the utilization of farmer' own cheap labor as much as possible. The facilities are seemed to be over-staffed with 1 manager, 1 secretary, 1 cashier, 1 accountant, and 3 security guards. The clerical work has not been well mechanized. Staffing will be adjusted by computerization of clerical work.

(5) Training

Given the lack of training and experience of the ARFIA in the general operation and management of post-harvest facilities, the Project will train the ARFIA members on the following aspects through the NIA IA training programs and the NFA training of post-harvest activities.

(i) Internal capital build-up (importance and management)
(ii) Economics and management of post-harvest facilities
(iii) Economics of agricultural credit and its financial management
(iv) Records management and computer usage
(v) Economics of rice marketing and points of its operation

(6) Promotion of rice milling and rice marketing

In order to increase added-value in the rice milling and marketing, the following activities will be done. It has to be stressed that the success in the rice milling and marketing are steady supply of rice to large buyers.

(i) Grant of rice mill from DA
(ii) Selection of traders who buy milled rice from the ARFIA
(iii) Selection of cooperatives who make joint marketing of rice with ARFIA
(iv) Selection of large rice buyers and rice wholesalers

If DA will not grant rice mill to ARFIA, ARFIA would select rice mills that will undertake rice milling and marketing, mills that will sell rice mills to ARFIA, or ARFIA will construct a rice mill.

9. CONCLUSIONS AND RECOMMENDATION

9.1 Conclusion

The economic internal rate of return (EIRR) of the Project consisting of the selected priority projects is estimated at 16.4%. The Project is found to be technically sound, economically feasible and financially viable. The feasibility study has specifically clarified the following advantage of the Project:

(a) Both the Jalaur proper and Suague RISs will be revitalized under the Project and the irrigation performance by both RISs will be remarkably improved. Thus, the revitalized RISs will contribute to improve the regional economy through increase in the agricultural productivity,

(b) The farm economy will be remarkably improved and stabilized as compared with the present condition,

(c) The Project will create a demand for farm labor due to the intensive farming activities, more intensive land use, and increase in the agricultural production. The Project will also improve the road network condition and generate the post-harvest business by farmers in the project area. All these will contribute to activating the regional economy, and

(d) The farmers' income in the project area is expected to increase considerably about 2 to 5 times through increase in crop production, especially paddy rice, under the Project.

The sustainability of O&M activities will be considerably improved with the turn over of management and ownership for sections of the irrigation system of both RISs to the IA through partial system management, and the direct incentives to farmers for owning the system would reduce future O&M cost by NIA.

In addition, the feasibility study has clarified that the Aganan River Federation of Irrigators' Association (ARFIA) should be strengthened through the following measures: i) provision of government loan, ii) capital build up, iii) setting up of quota system for the utilization of post-harvest facilities, iv) reduction of service charges by the promotion of group activities, v) training of the ARFIA members, and vi) promotion of rice milling and marketing.

9.2 Recommendation

(1) As mentioned above, the implementation of the Project is technically sound, economically feasible and financially viable. Moreover, the Project will give many direct and indirect social and economic benefits to farmers in the project area. Thus, it is recommended that the Project shall be implemented as early as possible.

(2) In order to ensure the successful and effective implementation of the Project, it is recommended that the proposed integrated-phased development approach be adopted as follows:

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 used the irrigation facilities and start partial system management. This phase coincides with the construction and sustainability period of the Project.

(3) To sustain the Project, it is recommended that the following proposed activities be taken by NIA and other agencies concerned:

(i) The model project for the watershed management and rehabilitation of the Suague sub-watershed area shall be implemented by DENR as early as possible to demonstrate the effects of the model project to the surrounding areas. The model project should be considered to be implemented under the Forest Sector Project, and

(ii) The present quarry activity downstream of the Suague RIS diversion dam shall be restricted to prevent the degradation of the river bed.

Tables

Table 3.1.1 Cropped Area and Cropping Intensity in the Study Area

		Existing River Irrigation System					
	unit	Aganan	Sta. Barbara	Jalaur Proper	Jalaur Extn.	Suage	Total
1 Gross Area	ha	6,520	4,820	12,930	5,670	4,280	34,220
2 Service Area	ha	4,863	3,399	8,825	2,616	2,958	22,661
Area which has been converted to non-agricultural utilization	ha	500	400	0	0	0	900
Area after review by team	ha	4,360	3,000	8,820	2,620	2,960	21,760
3 Reported Area by NIA *1							
Irrigated area (Planted area)							
Wet season *2	ha	4,050	2,710	6,870	2,310	2,600	18,540
Dry season *3	ha	1,230	2,110	6,450	2,010	2,460	14,260
Benefited Area							
Wet season *2	ha	4,050	2,710	6,120	2,210	2,580	17,670
Dry season *3	ha	1,230	2,110	4,910	1,630	1,870	11,750
Cropping Intensity (benefited area)							
Wet season	%	93%	90%	69%	84%	87%	81%
Dry season	%	28%	70%	56%	62%	63%	54%
Year-round	%	121%	161%	125%	147%	150%	135%
5 Other Cropping Area							
Rainfed paddy (Ist paddy) *4	ha	300	250	2,600	410	380	3,940
Rainfed paddy (2nd paddy) *4	ha	900	100	1,940	580	610	4,130
3rd Paddy *5	ha	200	200	1,200	250	50	1,900
Diversified Crops							
Mungbean (rainfed)	ha	400	200	600	100	150	1,450
Water melon *6	ha	500	150	100	10	20	780
Total	ha	2,300	900	6,440	1,350	1,210	12,200
6 Cropping Intensity							
Cropping Intensity of Paddy	%	153%	179%	190%	194%	185%	181%
1st Paddy	%	100%	98.7%	98.9%	100%	100%	99%
2nd Paddy	%	49%	74%	78%	84%	84%	73%
3rd Paddy	%	5%	7%	14%	10%	2%	9%
Cropping Intensity of Diversified Crops	%	21%	12%	8%	4%	6%	10%
Total Cropping intensity of Whole Crops	%	174%	191%	198%	198%	191%	191%

*1 Aganan & Sta. Barbara : 1996, Jalaur Prop., Jalaur Extn. & Suage: Average of 5 years (1992-1996)

*2 Reduced 360 ha of benefited/irrigated area in the Aganan RIS which has been converted to subdivision

*3 Reduced 230 ha of benefited/irrigated area in the Sta. Barbara RIS which has been converted to subdivision

*4 Partially irrigated from shallow tube wells or creeks by pumping

*5 Partially irrigated using canal water and shallow tube well/creek water

*6 Irrigated by manual using dug well water

Table 3.1.2 Paddy Production in Iloilo Province

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	Average 5 years	Average 10 years
A Production (ton)												
	534,167	504,763	469,288	352,413	500,749	560,220	682,782	669,467	553,488	608,926	614,977	543,626
Irrigated	161,353	206,008	198,483	165,678	193,951	260,914	392,646	390,272	335,339	364,587	348,752	266,923
Rainfed	372,814	298,755	270,805	186,735	306,798	299,306	290,136	279,195	218,149	244,339	266,225	276,703
Jan - Mar	189,039	167,542	191,280	89,763	180,431	134,427	215,481	256,546	145,791	231,770	196,803	180,207
Irrigated	58,187	81,691	64,347	34,560	68,024	57,719	104,471	118,772	98,516	134,940	102,884	82,123
Rainfed	130,852	85,851	126,933	55,203	112,407	76,708	111,010	137,774	47,275	96,830	93,919	98,084
Apr - Jun	20,481	1,409	14,419	1,383	7,145	9,950	14,676	28,008	12,251	27,816	18,540	13,754
Irrigated	14,743	1,256	13,224	1,364	7,096	9,950	14,676	28,008	12,251	27,060	18,389	12,963
Rainfed	5,738	153	1,195	19	49	0	0	0	0	756	151	791
Jul - Sep	29,855	123,755	131,954	144,145	47,543	38,809	62,642	250,870	185,315	195,173	146,562	121,009
Irrigated	6,823	57,985	58,080	62,292	25,787	20,571	48,657	152,520	99,932	116,543	87,645	64,919
Rainfed	23,062	65,770	73,874	81,853	21,756	18,238	13,985	98,350	85,383	78,630	58,917	56,090
Oct - Dec	294,762	212,057	131,635	117,122	265,630	377,034	389,983	134,043	210,131	154,167	253,072	228,656
Irrigated	81,600	65,076	62,832	67,462	93,044	172,674	224,842	90,972	124,640	86,044	139,834	106,919
Rainfed	213,162	146,981	68,803	49,660	172,586	204,360	165,141	43,071	85,491	68,123	113,237	121,738
B Harvested Area (ha)												
	213,870	208,750	190,870	150,680	206,010	203,380	205,100	208,540	194,350	220,254	206,325	200,180
Irrigated	52,460	62,370	62,910	53,890	57,440	67,200	92,230	96,420	93,900	113,310	92,612	75,213
Rainfed	161,410	146,380	127,960	96,790	148,570	136,180	112,870	112,120	100,450	106,944	113,713	124,967
Jan - Mar	81,400	80,440	82,990	61,020	86,710	72,830	77,190	83,760	66,830	87,080	77,538	78,025
Irrigated	21,270	26,270	22,260	18,740	25,000	22,030	29,100	30,770	34,450	44,980	32,266	27,487
Rainfed	60,130	54,170	60,730	42,280	61,710	50,800	48,090	52,990	32,380	42,100	45,272	50,538
Apr - Jun	8,520	610	5,280	1,120	3,380	3,840	4,950	7,780	4,210	8,810	5,918	4,850
Irrigated	6,030	440	4,560	1,100	3,340	3,840	4,950	7,780	4,210	8,430	5,842	4,468
Rainfed	2,490	170	720	20	40	0	0	0	0	380	76	382
Jul - Sep	14,040	46,280	54,560	54,060	16,420	11,910	17,000	74,330	56,300	69,503	45,809	41,440
Irrigated	1,850	16,520	19,740	18,900	7,540	5,130	11,650	36,210	24,080	35,316	22,477	17,694
Rainfed	12,190	29,760	34,820	35,160	8,880	6,780	5,350	38,120	32,220	34,187	23,331	23,747
Oct - Dec	109,910	81,420	48,040	34,480	99,500	114,800	105,960	42,670	67,010	54,861	77,060	75,865
Irrigated	23,310	19,140	16,350	15,150	21,560	36,200	46,530	21,660	31,160	24,584	32,027	25,564
Rainfed	86,600	62,280	31,690	19,330	77,940	78,600	59,430	21,010	35,850	30,277	45,033	50,301
C Unit Yield (ton/ha)												
Palay	2.50	2.42	2.46	2.34	2.43	2.75	3.33	3.21	2.85	2.76	2.98	2.71
Irrigated	3.08	3.30	3.16	3.07	3.38	3.88	4.26	4.05	3.57	3.22	3.80	3.50
Rainfed	2.31	2.04	2.12	1.93	2.07	2.20	2.57	2.49	2.17	2.28	2.34	2.22
Jan - Mar	2.32	2.08	2.30	1.47	2.08	1.85	2.79	3.06	2.18	2.66	2.51	2.28
Irrigated	2.74	3.11	2.89	1.84	2.72	2.62	3.59	3.86	2.86	3.00	3.19	2.92
Rainfed	2.18	1.58	2.09	1.31	1.82	1.51	2.31	2.60	1.46	2.30	2.04	1.92
Apr - Jun	2.40	2.31	2.73	1.23	2.11	2.59	2.96	3.60	2.91	3.16	3.04	2.60
Irrigated	2.44	2.85	2.90	1.24	2.12	2.59	2.96	3.60	2.91	3.21	3.06	2.68
Rainfed	2.30	0.90	1.66	0.95	1.23					1.99		
Jul - Sep	2.13	2.67	2.42	2.67	2.90	3.26	3.68	3.38	3.29	2.81	3.28	2.92
Irrigated	3.69	3.51	2.94	3.30	3.42	4.01	4.18	4.21	4.15	3.30	3.97	3.67
Rainfed	1.89	2.21	2.12	2.33	2.45	2.69	2.61	2.58	2.65	2.30	2.57	2.38
Oct - Dec	2.68	2.60	2.74	3.40	2.67	3.28	3.68	3.14	3.14	2.81	3.21	3.01
Irrigated	3.50	3.40	3.84	4.45	4.32	4.77	4.83	4.20	4.00	3.50	4.26	4.08
Rainfed	2.46	2.36	2.17	2.57	2.21	2.60	2.78	2.05	2.38	2.25	2.41	2.38

Average: 5 years (1987 - 1996), 10 years (1992 - 1996)
Source : DA Region VI, BAS

Table 3.1.3 Crop Production in the Study Area

Cropped Area (Unit: ha)

	Paddy Rice								Mung Bean	Water Melon	Sugar Cane	Total of Cropped Area
	Irrigated			Rainfed				Paddy Total				
	Wet	Dry	Subtotal	Wet	Dry	3rd	Subtotal					
Exsiting RIS												
Aganan	4,050	1,230	5,280	300	900	200	1,400	6,680	400	500	0	7,580
Sta. Barbara	2,710	2,110	4,820	250	100	200	550	5,370	200	150	0	5,720
Jalaur Proper	6,120	4,910	11,030	2,600	1,940	1,200	5,740	16,770	600	100	0	17,470
Jalaur Extension	2,210	1,630	3,840	410	580	250	1,240	5,080	100	10	0	5,190
Suage	2,580	1,870	4,450	380	610	50	1,040	5,490	150	20	0	5,660
Subtotal	17,670	11,750	29,420	3,940	4,130	1,900	9,970	39,390	1,450	780	0	41,620
Potential Area												
Oton			0	1,250	120		1,370	1,370				1,370
San Muguel			0	2,430	240		2,670	2,670				2,670
Sta. Barbara			0	800	80		880	880				880
New Lucena			0	390	40		430	430				430
Pototan			0	480	50		530	530				530
Barotac Nuevo			0	680	70		750	750			2,030	2,780
Subtotal	0	0	0	6,030	600		6,630	6,630	0	0	2,030	8,660
Total	17,670	11,750	29,420	9,970	4,730		16,600	46,020	1,450	780	2,030	50,280

Unit Yield (Unit : ton/ha)

	Paddy Rice								Mung Bean	Water Melon	Sugar Cane
	Irrigated			Rainfed				Paddy Average			
	Wet	Dry	Average	Wet	Dry	3rd	Average				
Exsiting RIS											
Aganan	3.56	3.40	3.52	2.24	2.24	2.00	2.21	3.25	0.40	4.0	
Sta. Barbara	3.86	3.56	3.73	2.24	2.24	2.00	2.15	3.57	0.40	4.0	
Jalaur Proper	3.40	3.30	3.36	2.24	2.24	2.00	2.19	2.96	0.40	4.0	
Jalaur Extension	3.70	3.43	3.59	2.24	2.24	2.00	2.19	3.25	0.40	4.0	
Suague	3.64	3.41	3.54	2.24	2.24	2.00	2.23	3.29	0.40	4.0	
Average	3.58	3.39	3.51	2.24	2.24	2.00	2.19	3.17	0.40	4.0	
Potential Area											
Oton				2.24	2.24		2.24	2.24			
San Muguel				2.24	2.24		2.24	2.24			
Sta. Barbara				2.24	2.24		2.24	2.24			
New Lucena				2.24	2.24		2.24	2.24			
Pototan				2.24	2.24		2.24	2.24			
Barotac Nuevo				2.24	2.24		2.24	2.24			45
Average				2.24	2.24		2.24	2.24			45
Average	3.58	3.39	3.51	2.24	2.24		2.21	3.04	0.40	4.0	45

Production (Unit: ton)

	Paddy Rice								Mung Bean	Water Melon	Sugar Cane
	Irrigated			Rainfed				Paddy Total			
	Wet	Dry	Subtotal	Wet	Dry	3rd	Subtotal				
Exsiting RIS											
Aganan	14,418	4,182	18,600	672	2,016	400	3,088	21,688	160	2,000	
Sta. Barbara	10,461	7,512	17,972	560	224	400	1,184	19,156	80	600	
Jalaur Proper	20,808	16,203	37,011	5,824	4,346	2,400	12,570	49,581	240	400	
Jalaur Extension	8,177	5,591	13,768	918	1,299	500	2,718	16,486	40	40	
Suage	9,391	6,377	15,768	851	1,366	100	2,318	18,086	60	80	
Subtotal	63,255	39,864	103,119	8,826	9,251	3,800	21,877	124,996	580	3,120	0
Potential Area											
Oton			0	2,800	269		3,069	3,069			
San Muguel			0	5,443	538		5,981	5,981			
Sta. Barbara			0	1,792	179		1,971	1,971			
New Lucena			0	874	90		963	963			
Pototan			0	1,075	112		1,187	1,187			
Barotac Nuevo			0	1,523	157		1,680	1,680			91,350
Subtotal	0	0	0	13,507	1,344	0	14,851	14,851	0	0	91,350
Total	63,255	39,864	103,119	22,333	10,595	3,800	36,728	139,847	580	3,120	91,350

Table 3.1.4 Collection of Irrigation Service Fee in the Study Area

Year	RIS	ISF Collectibles (Pesos 1,000)			ISF Actual Collection (Pesos 1,000)			ISF
		Dry Paddy	Wet Paddy	Total	Current Account	Back Account	Total	Collection Efficiency
1992	Jalaur Proper	3,745	3,189	6,934	2,696	423	3,119	39 %
	Jalaur Extension	1,756	1,210	2,966	1,181	221	1,402	40 %
	Suague	1,686	1,426	3,112	858	268	1,126	28 %
	Aganan	497	2,515	3,012	1,084	417	1,501	36 %
	Sta. Barbara	991	1,727	2,718	1,029	545	1,574	38 %
1993	Jalaur Proper	4,304	3,451	7,755	2,583	642	3,225	33 %
	Jalaur Extension	1,747	1,216	2,963	1,329	227	1,556	45 %
	Suague	1,368	1,414	2,782	996	434	1,430	36 %
	Aganan	355	2,528	2,883	1,438	172	1,610	50 %
	Sta. Barbara	1,362	1,696	3,058	1,523	470	1,993	50 %
1994	Jalaur Proper	4,252	3,231	7,483	1,797	796	2,593	24 %
	Jalaur Extension	1,375	1,180	2,555	816	245	1,061	32 %
	Suague	1,828	1,340	3,168	1,139	530	1,669	36 %
	Aganan	833	2,533	3,366	891	1,279	2,170	26 %
	Sta. Barbara	1,767	1,661	3,428	1,203	1,179	2,382	35 %
1995	Jalaur Proper	3,273	2,976	6,249	1,300	704	2,004	21 %
	Jalaur Extension	872	1,184	2,056	679	227	906	33 %
	Suague	1,107	1,417	2,524	782	410	1,192	31 %
	Aganan	865	2,331	3,196	520	2,199	2,719	16 %
	Sta. Barbara	1,394	1,649	3,043	1,166	995	2,161	38 %
1996	Jalaur Proper	3,903	4,910	8,813	2,111	1,152	3,263	24 %
	Jalaur Extension	845	1,579	2,424	807	310	1,117	33 %
	Suague	1,601	1,832	3,433	1,306	605	1,911	38 %
	Aganan	996	3,175	4,171	765	946	1,711	18 %
	Sta. Barbara	1,897	1,953	3,850	1,652	2,075	3,727	43 %
Average	Jalaur Proper	3,895	3,551	7,447	2,097	743	2,841	28 %
	Jalaur Extension	1,319	1,274	2,593	962	246	1,208	37 %
	Suague	1,518	1,486	3,004	1,016	449	1,466	34 %
	Aganan	709	2,616	3,326	940	1,003	1,942	29 %
	Sta. Barbara	1,482	1,737	3,219	1,315	1,053	2,367	41 %

Notes: ISF : Irrigation Service Fee
Current Account (CA) : ISF charge for the current cropping (wet & dry) year which such cropping was done.
Back Account (BA) : ISF charge for the previous cropping year which ISF were not collected in the previous year.
ISF Collection Efficiency = ISF Actual Collection (CA) / ISF Collectibles (CA)

Source: NIA JSRIS Office and ASRIS Office

Table 3.1.5 ISF Collection of All NISs

Year	Region	ISF Collectibles (Pesos 1,000)	ISF Actual Collection (Pesos 1,000)			ISF Collection Efficiency
			Current Account	Back Account	Total	
1994	1	29,072	10,535	3,944	14,479	36 %
	2	41,474	24,411	4,878	29,289	59 %
	3	45,869	17,439	6,139	23,578	38 %
	4	41,874	22,547	6,316	28,863	54 %
	5	18,809	8,127	3,743	11,870	43 %
	6	48,306	14,652	9,631	24,283	30 %
	7&8	13,104	6,345	1,300	7,645	48 %
	9	12,126	5,330	780	6,110	44 %
	10	21,780	12,511	3,193	15,704	57 %
	11	41,547	21,887	3,778	25,665	53 %
	12	36,704	16,717	5,841	22,558	46 %
	MRIIS	112,517	66,828	11,002	77,830	59 %
	UPRIIS	128,912	58,616	5,267	63,883	45 %
	Total	592,094	285,945	65,812	351,757	47 %
1995	1	29,699	9,509	3,632	13,141	32 %
	2	41,273	23,858	5,549	29,407	58 %
	3	44,568	17,778	7,506	25,284	40 %
	4	38,062	18,060	7,885	25,945	47 %
	5	21,197	9,675	5,441	15,116	46 %
	6	43,922	14,896	8,427	23,323	34 %
	7&8	13,814	6,702	2,730	9,432	49 %
	9	11,945	6,405	2,540	8,945	54 %
	10	21,667	15,225	4,242	19,467	70 %
*1	11	-	-	-	-	-
	12	34,919	15,848	6,230	22,078	45 %
	MRIIS	104,542	58,059	10,049	68,108	56 %
	UPRIIS	99,015	44,058	9,884	53,942	44 %
	Total	504,623	240,073	74,115	314,188	48 %
Average	1	29,386	10,022	3,788	13,810	34 %
	2	41,374	24,135	5,214	29,348	58 %
	3	45,219	17,609	6,823	24,431	39 %
	4	39,968	20,304	7,101	27,404	51 %
	5	20,003	8,901	4,592	13,493	44 %
	6	46,114	14,774	9,029	23,803	32 %
	7&8	13,459	6,524	2,015	8,539	48 %
	9	12,036	5,868	1,660	7,528	49 %
	10	21,724	13,868	3,718	17,586	64 %
	11	41,547	21,887	3,778	25,665	53 %
	12	35,812	16,283	6,036	22,318	45 %
	MRIIS	108,530	62,444	10,526	72,969	57 %
	UPRIIS	113,964	51,337	7,576	58,913	45 %
	Total	569,132	273,953	71,853	345,805	48 %

Notes: ISF : Irrigation Service Fee
Current Account (CA) : ISF charge for the current cropping (wet & dry) year which such cropping was done.
Back Account (BA) : ISF charge for the previous cropping year which ISF were not collected in the previous year.
ISF Collection Efficiency = ISF Actual Collection (CA) / ISF Collectibles (CA)
*1: No available data

Source: NIA Central Office

Table 3.2.1 Labor Requirement and Production Cost under With Project Condition

Crop Category		1st Paddy Irrigated			2nd Paddy Irrigated			Vegetables (Eggplant)		
		Qty	Price	Value	Qty	Price	Value	Qty	Price	Value
			peso	peso		peso	peso		peso	peso
Seeds	kg	100	15	1,500	100	15	1,500	0.25	4,000	1,000
Fertilizer										
N	kg	100	17	1,700	120	17	2,040	230	17	3,910
P2O5	kg	35	22	770	35	22	770	70	22	1,540
K2O	kg	35	11	385	35	11	385	90	11	990
14-14-14	bag	5	325		5	325		10	325	
Urea	bag	3	340		4	340		7	340	
Chemicals										
Herbicide	l	1	400	400	1	400	400	0.5	400	200
Insecticide	l	1.5	500	750	1.5	500	750	2	500	1,000
Fungicide	l	0.5	500	250	0.5	500	250	2	500	1,000
Others				250			250			100
Labor										
Hired	man-day	33	80	2,640	35	80	2,800	52	80	4,160
Family	man-day	31	0	0	32	0	0	43		0
Machine/Tool/Animal										
Handtractor				1,600			1,600			1,200
Carabao				0			0			0
Thresher				500			500			0
Blower				250			250			0
Pump				100			100			50
Others				150			150			100
Fuel/Oil				200			300			200
Irrigation Service Fee	peso			800			1,200			600
Harvesters Share	peso			2,360			2,440			0
Land Lease	peso			400			400			400
Land Tax	peso			140			140			140
Interest	Peso			570			600			770
Total	Peso			15,715			16,825			17,360

Crop Category		Perennial Fruits (Mango)								
		1st year			2 - 5 year			Bearing year		
		Qty	Price	Value	Qty	Price	Value	Qty	Price	Value
			peso	peso		peso	peso		peso	peso
Seedling	tree	100	70	7,000	5	70	350	5	70	350
Inter crop seed (Mungbean)	kg	20	50	1,000	20	50	1,000			0
Fertilizer										
N	kg	60	17	1,020	150	17	2,550	150	17	2,550
P2O5	kg	60	22	1,320	100	22	2,200	100	22	2,200
K2O	kg	40	11	440	60	11	660	60	11	660
14-14-14	bag		325			325			325	
Urea	bag		340			340			340	
Chemicals										
Herbicide	l	1.0	400	400	1.0	400	400	1.0	400	400
Insecticide	l	1.0	500	500	1.0	500	500	1.0	500	500
Fungicide	l	1.0	500	500	1.0	500	500	1.0	500	500
Others				300			300			300
Labor										
Hired	man-day	60	80	4,800	42	80	3,360	66	80	5,280
Family	man-day	50	0	0	33	0	0	55	0	0
Machine/Tool/Animal										
Handtractor				1,200			1,000			1,000
Carabao				0			0			0
Thresher				300			300			300
Blower				150			150			150
Pump				50			50			50
Others				100			100			100
Fuel/Oil				200			200			200
Irrig. Service Fee	peso			500			500			500
Harvesters' Share	peso									
Land Lease	peso			400			400			400
Land Tax	peso			140			140			140
Interest	Peso			610			660			710
Total	Peso			20,930			15,320			16,290
Average cost of mango period of 30 years:					16,315					

Table 3.2.2 Financial Profit and Project Benefit of the Study Area

	Without-Project			With-Project			Incremental		Incremental
	Cropped Area	Profit		Cropped Area	Profit		Cropped Area	Total Profit	Benefit per ha
	ha	per ha peso/ha	Total x 1000peso	ha	per ha peso/ha	Total x 1000peso	ha	x 1000peso	1000 peso/ha
Jalaur Proper									
1st Paddy Irrigated	5,910	14,270	84,336	8,820	27,180	239,728	2,910		
2nd Paddy Irrigated	4,620	13,110	60,568	8,820	26,070	229,937	4,200		
1st Paddy Rainfed	2,600	7,820	20,332	0			-2,600		
2nd Paddy Rainfed	1,940	7,420	14,395	0	7,420	0	-1,940		
Total	15,070		179,631	17,640		469,665	2,570	290,034	32.9
Jalaur Extension							0		
1st Paddy Irrigated	2,260	16,850	38,081	2,620	27,180	71,212	360		
2nd Paddy Irrigated	2,170	14,230	30,879	2,620	26,070	68,303	450		
1st Paddy Rainfed	360	7,820	2,815	0			-360		
2nd Paddy Rainfed	450	7,420	3,339	0	7,420	0	-450		
Total	5,240		75,114	5,240		139,515	0	64,401	24.6
Suague									
1st Paddy Irrigated	2,600	16,330	42,458	2,960	27,180	80,453	360		
2nd Paddy Irrigated	420	14,060	5,905	600	26,070	15,642	180		
1st Paddy Rainfed	360	7,820	2,815	0			-360		
2nd Paddy Rainfed	610	7,420	4,526	610	7,420	4,526	0		
Total	3,990		55,705	4,170		100,621	180	44,916	15.2
Aganan							0		
1st Paddy Irrigated	3,000	15,640	46,920	4,290	27,180	116,602	1,290		
2nd Paddy Irrigated	550	13,970	7,684	500	26,070	13,035	-50		
1st Paddy Rainfed	1,360	7,820	10,635	0			-1,360		
2nd Paddy Rainfed	900	7,420	6,678	900	7,420	6,678	0		
Vegetables	0			200	36,640	7,328	200		
Tree Fruits	0			70	58,010	4,061	70		
Total	5,810		71,917	5,960		147,704	150	75,787	17.4
Sta. Barbara									
1st Paddy Irrigated	2,700	18,220	49,194	2,960	27,180	80,453	260		
2nd Paddy Irrigated	880	15,340	13,499	1,000	26,070	26,070	120		
1st Paddy Rainfed	300	7,820	2,346	0			-300		
2nd Paddy Rainfed	100	7,420	742	100	7,420	742	0		
Vegetables	0			300	36,640	10,992	300		
Tree Fruits	0			40	58,010	2,320	40		
Total	3,980		65,781	4,400		120,577	420	54,796	18.3
Total									
1st Paddy Irrigated	16,470		260,989	21,650		588,447	5,180		
2nd Paddy Irrigated	8,640		118,535	13,540		352,988	4,900		
1st Paddy Rainfed	4,980		38,944	0			-4,980		
2nd Paddy Rainfed	4,000		29,680	1,610		11,946	-2,390		
Vegetables	0		0	500		18,320	500		
Tree Fruits	0		0	110		6,381	110		
Total	34,090		448,148	37,410		978,082	3,320	529,935	24.4

Table 3.2.3 List of Soil Erosion Control Measures

Descriptions	Merits	Demerits
Vegetative Measures		
1. Contour hedgerow (Strip cropping) Vegetative rows or strips established along the contour. Trees serve as live barrier to surface runoff and soil erosion. If the nitrogen fixing crops or trees such as leguminous crops are used, it can improve soil condition.	1. Economical 2. Adaptable to various conditions 3. Easier to establish and repair 4. Durable if maintained properly 5. Improve the soil condition, if nitrogen fixing crops are used	1. It takes some time to attain benefits 2. Less effective when slope is too steep 3. Hedgerows may pose competition with crops
2. Mulching The mulching is the covering of the soil with crop residues such as straw, maize stalks, palm fronds or standing stubbles. The effect of mulching is the reducing of raindrop impact and of the velocity of runoff.	1. Economical 2. Adaptable to various conditions 3. Easier to establish and repair 4. Keeping of soil moisture and temperature 5. Improve the soil condition	1. Application of mulch may be required on each cropping season in tropical area 2. It requires a large amount of grasses (materials) for mulching
3. Wattling It is vegetative structure established in contour line or intermittently along the contour. It is used to trap the soil particles that are eroded down with surface runoff. Cutting of brushwoods are interwoven to form fence.	1. Very effective and stable 2. Early achievement of protection 3. When bushwoods sprout, the leaves can be used as green manure or mulching materials	1. Difficult to find suitable sprouting brushwood rods. 2. Difficult to construct
4. Agroforestry It is a system to incorporate trees within a farming system by planting them on land.	1. Economically 2. Trees can provide fuels, fodder, fruits, etc. to the farmers.	1. It takes some time to attain benefits 2. Trees may pose competition with crops 3. Less effective when slope is too steep
Structural Measures		
5. Contour bunds They are earth bunds, 1.5 to 2 m wide, thrown across the slope to act as a barrier to runoff, to form a water storage area on their upslope side and to break up a slope into segments shorter in length than is required to generate overland flow. They are frequently used with strip-cropping system.	1. Relatively easier to construct and repair 2. They are suitable for slopes of 1 to 7 degree.	1. The effectiveness is limited when heavy rains continue long. 2. The effectiveness is limited when used in very steep slope.
6. Terraces They are series of level or nearly level strips running across the slopes supported by steep risers.	1. Most effective measures for minimising soil erosion	1. They require a lot of time and manpower to construct. 2. Soil erosion during construction stage may be high. 3. Not suitable for the sites in which topsoils only have thin layer.
7. Waterways (Contour Ditches and Drainage Canals) They are digging structures established in the hillsides to check the erosive power of surface runoff by tapping soil particles. Drainage canal (grass waterways) are used as the outlet for contour ditches. It runs downslope and empty into river system or other outlets.	1. Relatively easier to construct and repair 2. Ditches and canals can be good water impoundment structures that can hold water for plants.	1. The effectiveness is limited when heavy rains continue long. 2. The effectiveness is limited when used in very steep slope.
Cultural Measures		
8. Contour Plowing It is a plowing method to create furrows following the contour of the land.	1. It increases water absorption capacity of the soil. 2. It also reduces both the quantity and velocity of surface runoff.	1. A bit difficult to plow properly.
9. Contour Planting It is a planting method following the contour of the land. The crops planted act as barriers to the force of surface runoff.	1. Easy to adopt	1. The effect is not high, if only it is adopted .

Table 3.2.4 Probable Environmental Issues and Tentative Mitigation Measures

Environmental Issues	Main Causes	Significance at present	Remedial Measures to be considered	Significance in future	Relating project
1. Health hazard from chemicals	Improper use of agro-chemical with introduction of diversified cropping system and increasing crop intensity	moderate - minor	• Agricultural extension service for proper use • Introduction of IPM system	minor	all project
2. Deterioration of downstream water quality	Increase of fertilizer use by the introduction of intensive farming	moderate - minor	• Use of compost and green manure • Introduction of IPM system • Proper water management	minor	all project
3. Loss of farm land	New construction of farm pond	minor - moderate	• Making a consensus among RIS by using a participatory approach • Applying social supports to fill their economical gaps up	minor	Aganan, Sta. Barbara
4. Beneficial impacts on farm and regional economy	Drastically increase of farm production Increase of employment opportunity Ripple effect to the regional economy	major	-	major	all project
5. Reduction of excessive use of ground water	Stabilization of irrigation water throughout a year	major	-	major	all project

Table 3.3.1 Economic Rate of Return

Unit:million peso

Project Year	Jalaur proper Benefit	Cost	Net Benefit	Jalaur extension Benefit	Cost	Net Benefit	Suague Benefit	Cost	Net Benefit	Aganan Benefit	Cost	Net Benefit	Sta. Barbara Benefit	Cost	Net Benefit	Total Benefit	Cost	Benefit
1		336	-336		159	-159		124	-124		85	-85		96	-96	0	800	-800
2		336	-336		159	-159			0		57	-57		64	-64	0	615	-615
3	37		37	8		8	6		6	10		10	7		7	69		69
4	75		75	17		17	12		12	20		20	14		14	137		137
5	112		112	25		25	18		18	30		30	20		20	206		206
6	149		149	34		34	24		24	40		40	27		27	274		274
7	187		187	42		42	30		30	50		50	34		34	343		343
8	187		187	42		42	30		30	50		50	34		34	343		343
9	187		187	42		42	30		30	50		50	34		34	343		343
10	187		187	42		42	30		30	50		50	34		34	343		343
11	187		187	42		42	30		30	50		50	34		34	343		343
12	187		187	42		42	30		30	50		50	34		34	343		343
13	187		187	42		42	30		30	50		50	34		34	343		343
14	187		187	42		42	30		30	50		50	34		34	343		343
15	187		187	42		42	30		30	50		50	34		34	343		343
16	187		187	42		42	30		30	50		50	34		34	343		343
17	187		187	42		42	30		30	50		50	34		34	343		343
18	187		187	42		42	30		30	50		50	34		34	343		343
19	187		187	42		42	30		30	50		50	34		34	343		343
20	187		187	42		42	30		30	50		50	34		34	343		343
21	187		187	42		42	30		30	50		50	34		34	343		343
22	187		187	42		42	30		30	50		50	34		34	343		343
23	187		187	42		42	30		30	50		50	34		34	343		343
24	187		187	42		42	30		30	50		50	34		34	343		343
25	187		187	42		42	30		30	50		50	34		34	343		343
26	187		187	42		42	30		30	50		50	34		34	343		343
27	187		187	42		42	30		30	50		50	34		34	343		343
28	187		187	42		42	30		30	50		50	34		34	343		343
29	187		187	42		42	30		30	50		50	34		34	343		343
30	187		187	42		42	30		30	50		50	34		34	343		343
	187		187	42		42	30		30	50		50	34		34	343		343
IRR			18.49%			9.74%			15.58%			21.68%			14.72%			16.42%
Initial cost		671			318			124			142			160			1415	

Table 4.3.1 Average Yields of Paddy in the Project Area

(Unit: ton/ha)

RIS & Division	1992		1993		1994		1995		1996		Average	
	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet
Jalaur Proper												
1	3.38	3.56	3.45	3.50	3.25	3.27	3.39	2.94	3.44	3.43	3.38	3.34
2	3.35	3.62	3.40	3.55	3.41	3.36	3.24	3.35	3.41	2.95	3.36	3.37
3	3.73	3.86	3.64	3.72	3.74	4.09	3.32	3.61	3.48	3.33	3.58	3.72
4	3.33	3.47	3.44	3.51	3.35	3.10	3.34	3.28	3.29	3.30	3.35	3.33
5	3.25	3.54	3.40	3.59	3.38	3.25	3.28	3.47	3.03	3.42	3.27	3.45
6	2.64	3.35	3.20	3.59	3.37	3.34	3.34	3.36	2.63	3.68	3.03	3.46
7	3.06	3.25	3.09	3.23	3.11	2.67	3.20	3.24	3.13	3.07	3.12	3.09
8	3.39	3.34	3.40	3.34	3.30	3.43	3.25	3.32	3.51	3.31	3.37	3.35
9	2.86	3.74	3.25	4.04	3.47	3.60	3.59	3.37	3.64	3.27	3.36	3.61
10	3.41	3.30	3.22	3.35	3.05	3.23	3.33	3.32	3.19	3.13	3.24	3.27
11	3.05	3.39	3.69	3.57	2.33	3.60	3.43	3.26	3.49	3.45	3.20	3.45
Average	3.22	3.49	3.38	3.54	3.25	3.36	3.34	3.32	3.29	3.31	3.30	3.40
Suague												
1	3.57	3.81	3.68	3.87	3.49	3.69	3.51	4.11	3.81	4.07	3.61	3.91
2	3.44	4.08	3.41	4.10	3.37	3.44	3.62	4.43	3.33	3.70	3.43	3.95
3	3.44	3.62	3.44	3.66	3.51	3.52	3.40	3.64	3.49	3.47	3.45	3.58
4	3.31	2.68	3.16	3.39	3.34	3.22	2.79	3.04	3.11	3.22	3.14	3.11
Average	3.44	3.55	3.42	3.76	3.43	3.47	3.33	3.80	3.43	3.62	3.41	3.64

Average yields are computed at 42 kg per sack

Source : JSRIS Office, NIA Region VI

Table 4.4.1 Present Condition and Constraint of Diversion Dam

Name	Items	Present Condition	Problem / Constraint
Jalaur Diversion Dam	Main gate	New machine driven lifting (5 gates)	
		Old machine driven lifting (8 gates, 1968-)	
		Motors are over life duration (8 gates)	Shortage of fund for replacement of motors
	Scouring sluice gate	New machine driven lifting (2 gates)	
	Apron	Fine condition	
	Intake gates (right side)	Skin plate of gate is damaged (10 gates) & will be repaired under	
		ISPO II	
		Manual lifting system (10 gates)	Shortage of fund for installation of machines
	Intake gates (left side)	Technical trouble of lifting system (2 gates) due to cable suspension	Shortage of fund for replacement of machine &stem
	Trashrack	No installation	
	Communication System	No facilities	
Suague Diversion Dam	Scouring sluice gate	Rubber seals is rotten	Shortage of fund
		Technical trouble of lifting system due to cable suspension	Shortage of fund for replacement of machine &stem
	Scouring sluice	Floor slab at the scouring sluice is abraded.	Shortage of fund
	Apron	Floor slab at the downstream apron is abraded.	Shortage of fund
		No cut-off wall at the downstream from scouring sluice (right bank)	Shortage of fund
	Retaining wall	Crack of retaining wall (right bank) under repairing (ISOP II)	
		Damaged retaining wall (right bank) under repairing (ISOP II)	
		Scouring occurs at righ bank in downsream from rataining wall	Addtional gabion / concreste revetement, but shortage of fund
	Riverbed Protection	Steel sheet pile is exposed.	Shortage of fund
		Concrete block length is insufficient along the scouring sluice.	
		Steel sheet pile at downstream is exposed.	
	Intake gates	Lifting portion of gate are damaged	Shortage of fund
		Manual lifting system (2 gates)	Shortage of fund for replacement of machine &stem
	Trashrack	No installation	
	Communication System	No facilities	

Table 4.5.1 Present NIA O&M Staff and IA Contract by Division

RIS	Name of IA	Irrigation Service Area (ISA) (ha)	Turnout Service Area Group (TSAG) (nos.)	Length of Main Canal & Laterals (km)	Present Conditions (1997) IA Contract	Length of Type I Contract (km)	Charge of WRF Tender *1 (km)	No. of WRF Tech.	No. of WRF Tender
Jalaur proper RIS									
Div. 1	SISADA	296	12		Type I&II	3			
	BAPZAT	512	24		Type I	9			
(Sub-Total)		(808)	(36)	18		(12)	6	0 *2	2
Div. 2	JP-2	714	22	19	Type I	9	10	1	3
Div. 3	JP-3	892	21	10	Type I	5	5	1	3
Div. 4	JADD	572	13		Type I	4			
	J-JIN	375	8		Type I	4			
(Sub-Total)		(947)	(21)	13		(8)	5	1	3
Div. 5	POZA	594	9		Type I	4			
	JABAFA	160	1		Type II	0			
(Sub-Total)		(754)	(10)	10		(4)	6	1	3
Div. 6	CIDD	730	14	11	Type I	6	5	1	2
Div. 7	LOJAPRO	755	13	9	Type I	7	2	0 *2	2
Div. 8, 9, 10&11									
	Team Leader							1	-
	Assistant Team Leader							-	1
Div. 8	CAMP	838	23	11	Type I&II	9	2	0 *2	2
Div. 9	BAMAPA	373	8		Type I	3			
	MACAPA	410	8		Type I	6			
(Sub-Total)		(783)	(16)	10		(9)	1	1	1
Div. 10	CANROSCA	788	11	10	Type I	5	5	0 *3	1
Div. 11	PAGCAPUSO	811	13	11	Type I	9	2	0 *3	2
Total (Jalaur proper RIS)		8,820	200	132		83	49	7	25
Suague RIS									
Div. 1	SMEWBAT	387	9		Type I&II	3			
	JEBADA	608	14		Type I	7			
(Sub-Total)		(995)	(23)	12		(10)	2	1	2
Div. 2	SMEWBAT	67	2		Type I&II	2			
	AGDABASICA	593	17		Type I	6			
(Sub-Total)		(660)	(19)	8		(8)	0	0 *2	2
Div. 3	SUAGUE 3	543	16	12	Type I	9	3	0 *2	3
Div. 4	SMEWBAT	133	2	2	Type II	0			
	DIV. 4 SUAGUE	569	11		Type I	6			
(Sub-Total)		(702)	(13)	8		(6)	2	0 *2	3
Total (Suague RIS)		2,900	71	40		33	7	1	10
Grand-Total		11,720	271	172		116	56	8	35

Notes: WRF Tech. : Water Resources Facilities Technician
WRF Tender : Water Resources Facilities Tender
*1 : Length of canals under charge of WRF Tenders for the works equivalent to Type I contract by IA.
*2 : WRF Tender is acting for WRF Tech.
*3 : WRF Tender of Div.10 (Jalaur proper) is acting for WRF Tech. of Div.10&11 (Jalaur proper).

Source : NIA JSRIS Office

Table 4.5.2 Frequency of the Desilting Work

RIS	IA Name	a. Main canal	b. Lateral canal	c. Main farm ditch	d. Diversion dam
Jalaur Proper RIS					
Div. 1	1 SISADA	1/10years	1/3years	2/1year	-
	2 BAPZAT				
2	3 JP-2	1/5years	1/5years	2/1year	-
3	4 JP-3	1/7years	1/4years	2/1year	-
4	5 JADD	1/5years	1/5years	1/1year	-
	6 J-JIN				
5	7 POZA	-	1/10years	2/1year	-
	8 JABAFA				
6	9 CIDD	1/20years	1/20years	2/1year	-
7	10 LOJAPRO	-	1/5years	2/1year	-
8	11 CAMP	-	1/5years	2/1year	-
9	12 BAMAPA	-	1/4years	2/1year	-
	13 MACAPA				
10	14 CANROSCA	-	1/5years	2/1year	-
11	15 PAGCAPUSO	-	1/5years	2/1year	-
Diversion Dam		-	-	-	1/7years
Suague RIS					
Div. 1	16 SMEWBAT	1/10years	1/10years	2/1year	-
	17 JEBADA				
2	18 AGDABASICA	1/10years	1/10years	1/1year	-
3	19 SUAGUE 3	-	1/10years	No desilting ir	-
4	20 DIV. 4 SUAGUE	-	1/8years	No desilting ir	-
Diversion Dam		-	-	-	1/10years

Note : *1 : WM : WRF Technician, DT : WRF Tender, OP : WRF Operator

Source : Interview Survey on NIA O&M Staff
(WRF Technicians, Tenders and Operators)

Table 4.5.3 List of Present O&M Equipment

No.	Name of Equipment		Condition	Acquired	Age (years)	NIA Standard Economic Life (years)	Evaluation for use
A. Construction Equipment							
1.	Crawler Crane	25 t	Operable	1978	19	9	-
2.	Bulldozer	9 t	Operable	1981	13	6	-
3.	Backhoe	0.4 m3	Operable	1992	5	10	Useful
4.	Backhoe	0.8 m3	Operable	1978	19	10	-
5.	Motor Grader	L=2.2 m	For Disposal	1987	10	7	-
6.	Motor Grader	L=3.7 m	Operable	1984	13	7	-
7.	Motor Grader	L=3.7 m	Under Repair	1995	2	7	Useful
8.	Wheel Loader	1.5 m3	Under Repair	1987	10	7	Useful
9.	Wheel Loader w/Backhoe	0.6 / 0.15 m3	For Disposal	1987	10	7	-
10.	Wheel Loader w/Backhoe	0.8 / 0.25 m3	Operable	1992	5	7	Useful
11.	Dump Truck	6 t	Operable	1975	22	8	-
12.	Dump Truck	6 t	Under Repair	1975	22	8	-
13.	Cargo Truck	6 t	Operable	1986	11	8	Useful
14.	Cargo Truck	6 t	Operable	1984	13	8	Useful
15.	Electric Generator	75 kVA	Operable	1979	18	6	-
16.	Air Compressor	3 m3/min	Operable	1992	5	6	Useful
17.	Welding Machine	220 A	Operable	1979	18	4	-
B. Vehicles							
1.	Pick-up Truck-1	Single Cabin, 0.75 t	Operable	1996	1	6	Useful
2.	Pick-up Truck-2	Single Cabin, 0.75 t	Operable	1983	14	6	-
3.	Pick-up Truck-3	Double Cabin, 0.75 t	Operable	1985	12	6	-
4.	Pick-up Truck-4	Single Cabin, 1 t	Under Repair	1981	16	6	-
5.	Station Wagon		Operable	1980	17	7	-
6.	Motorcycle (20 nos.)	100 cc	Operable	1990	7	5	Useful
26.	Motorcycle-21	100 cc	Operable	1984	13	5	-
27.	Motorcycle-22	100 cc	Operable	1984	13	5	-
28.	Motorcycle-23	100 cc	Operable	1980	17	5	-
29.	Motorcycle-24	100 cc	Operable	1980	17	5	-
C. Office Equipment							
1.	Computer w/Printer		Operable	1997	0	-	Useful
2.	Computer w/Printer		Operable	1995	2	-	Useful
3.	Radio Set		Operable	1990	7	-	Useful
4.	Grass Cutter (Office Maintenance)		Operable	1997	0	-	Useful

Source : NIA Region VI Office and NIA JSRIS Office

Table 4.5.4 Actual Income and Expenses of JSRIS Office

(Unit : Pesos 1,000)

Description	Year 1992	1993	1994	1995	1996	Total
I. Actual Income						
A. ISF Collection						
a. Current Account	5,029.8	4,466.2	3,981.8	3,327.1	4,603.9	21,408.8
b. Back Account	924.4	1,885.4	2,333.1	903.2	2,008.3	8,054.4
Total (ISF Collection)	5,954.1	6,351.6	6,314.9	4,230.3	6,612.2	29,463.1
B. Equipment Rental	673.7	311.8	1,015.9	1,073.5	3,362.5	6,437.4
C. Other Incomes *1	20.6	0.3	9.4	7.6	16.0	53.9
Grand Total (Actual Income)	6,648.4	6,663.7	7,340.2	5,311.4	9,990.7	35,954.4
II. Actual Expenses						
A. Personal Services						
1. Salaries	2,856.6	2,788.1	4,011.7	5,712.0	6,098.5	21,466.9
2. Wages	37.9	16.2	6.4	1.2		61.7
3. Terminal Leave	270.9	99.5	182.0		185.9	738.3
4. Medical Allowance	201.6	205.3	215.7	267.0	214.7	1,104.3
5. Meal Allowance	63.7	66.1	71.6	84.0	69.5	354.9
6. Children Allowance	69.3	73.4	77.1	92.8	79.1	391.7
7. 13th month pay + P1,000.00 Cash Gift	776.6	448.6	495.7	286.3	1,006.8	3,014.0
8. GSIS Life & Retirement *2	186.3	237.6	291.3			715.2
9. Medicare Contribution	23.1	29.5	33.9	1.3	0.2	88.0
10. Home Development Mutual Fund	38.6	37.6	74.4			150.6
11. State Insurance Premium	18.3	23.3	24.8	0.1		66.5
12. Other Personal Services	683.9	954.4	1,329.5	1,781.1	1,489.2	6,238.1
a) PERA + ACA *3	497.9	865.4	1,149.5	1,234.0	1,085.9	4,832.7
b) PIB + Loyalty Award *4	186.0	89.0	180.0	547.1	206.0	1,208.1
c) Hazard Pay					59.3	59.3
d) Anniversary Bonus					138.0	138.0
13. Uniform Allowance (Industrial Security Guard)	1.0	1.0		3.9	5.4	11.3
Total (Personal Services)	5,227.8	4,980.6	6,814.1	8,229.7	9,149.3	34,401.5
B. Maintenance & Other Operating Expenses						
1. Contractual Services	217.1	244.1	266.3	177.0	54.9	959.4
2. Traveling expenses	34.6	31.4	25.2	14.1	11.1	116.4
3. Supplies/materials/parts/sundries	102.0	141.7	38.2	20.3	145.4	447.6
4. Water/Illumination & Power Services	44.0	40.3	33.8	17.0	0.1	135.2
5. Fuel and Oil for Vehicles				40.7		40.7
6. Communication Expenses				0.8		0.8
7. RATA/Other Allowances *5	8.4	13.2	32.7	23.4	46.8	124.5
8. Auditing Services	0.3	4.8				5.1
9. Rehabilitation/Repair of Equipment/Vehicles		0.3		0.6	2.4	3.3
10. Miscellaneous Expenses *6	76.9	81.8	74.7	28.4	47.9	309.7
11. Furniture/Equipment		88.0	0.5			88.5
12. Losses & Expenses on Collection in Kind	92.8					92.8
Total (Maintenance & Other Operating Expenses)	576.1	645.6	471.4	322.3	308.6	2,324.0
Grand Total (Actual Expenses)	5,803.9	5,626.2	7,285.5	8,552.0	9,457.9	36,725.5
Ref. Grand Total (Actual Expenses of only JSRIS)	5,803.9	5,626.2	6,201.4	7,160.8	8,146.9	32,939.2

Notes : CY 1994 to 1996 includes expenses of Barotac Viejo (BV) RIS Office.
Effective April 1994 BVRIS was merged with JSRIS.
Data of BVRIS are included from Apr. to Dec. in 1994 and full year in 1995 & 1996.

*1 : It consists of certification fees, sale of scrap and rent of office facilities.
*2 : GSIS : Government Service Insurance System
*3 : PERA : Personal Emergency and Relief Allowance, ACA : Additional Compensation Allowance
*4 : PIB : Productivity Incentive Bonus
*5 : RATA : Representation Allowance and Transportation Allowance
*6 : It consists of insurance/registration of buildings and vehicles, irrigation share in ISF collection, fiscal allowance and collection viability bonus.

Source : NIA Region VI Office

Table 4.6.1 Inventory of Existing Equipment and Vehicles of the JSRIS Office

Items	Quantity	Year Acquired	Operable	Inoperative (Needing repair)
A. Equipment				
1. Construction				
Case backhoe loader	1	1992	1	
Furukawa loader	1	1987		1
Furukawa backhoe loader	1	1987		1
Sumitomo excavator	1	1992	1	
Mitsubishi excavator	1	1978	1	
Fiat Allis buldozer	1	1984	1	
Champion grader	1	1995		1
Mitsubishi grader	1	1987		(For disposal) 1
Komatsu grader	1	1984	1	
Sumitomo crane	1	1978	1	
Fuso dumptruck	2	1975	1	1
Hino cargo truck	1	1984	1	
Hino cargo truck	1	1986		1
UNO air compresser	1	1992	1	
Komatsu electric generator	1	1979	1	
Seimetsu welding machine	1	1979	1	
Kawasaki grass cutter	1	1997	1	
Sub-total	18		12	6
2. Survey				
Transit	1	1978		1
Dumpy level	1	1978		1
Sub-total	2		0	2
3. Office equipment				
Computer set	2	1997	2	
Triumph typewriter	14	1979	14	
Olivetti typewriter	2	1980	1	1
Master steel safe	1	n.a.	1	
Carrier aircondition	2	1995	2	
Sony aircondition	1	1995	1	
Freedor	1	1980		1
Slide projector	1	1980	1	
Panasonic karaoke	1	1990	1	
Musicmate public address sing along	1	1990	1	
Olivetti adding machine	2	1977	2	
Canon camera	2	1994		2
Kodak camera	1	1995		1
Sub-total	31		26	5
4. Communication				
Neutec transmitter-receiver	1	1994.0	1	
Total	52		39	13
B. Vehicles				
Nissan patrol	1	1981		1
Nissan pick-up	1	1985	1	
Cherokee station wagon	1	1980	1	
Toyota pick-up	1	1983	1	
Toyota pick-up	1	1996	1	
Suzuki motorcycle	2	1980	2	
Suzuki motorcycle	2	1984	2	
Kawasaki motorcycle	20	1990	20	
Sub-total	29		28	1
TOTAL	81		67	14

Source: Data provided by the Jalaur-Suague RIS Office, NIA

n.a. not available

Table 5.1.1 Proposed Measures to Implement the Prioritized Solutions by the PRA Sessions and the JICA Study Team

	Irrigation Structure	Water Management and O&M	Institutions	Agricultural Production	Environment
PRA Sessions	1. repair and rehabilitation of damaged canal gates and turnouts 2. remove illegal turnouts and construct legal structures 3. construct water impounding dams 4. concrete lining	1. sufficient water distribution 2. training of water system management personnel (NIA & IA) 3. establishment of monitoring system 4. development of IA management capabilities 5. entrust ISF collection to the IA	1. training on value formation 2. reorganize the IA 3. continuous reminder to farmers of their obligations as IA officers and members 4. continue education to strengthen and improve IA 5. capital build-up 6. sustain cooperation 7. organize farm workers as members*1	1. organization of cooperative for market and credit assistance, and provision of of post-harvest facilities 2. government subsidy especially on farm inputs 3. eradication of pests 4. use organic fertilizer 5. strengthening of agricultural extension services including new farming technology	1. planting of trees in the watershed area 2. adoption of organic farming 3. prevention of slash and burn farming
JICA Study Team	1. rehabilitate and improve the existing diversion dams 2. renew the turnouts and provide feeder canal and measuring devices 3. improve canal systems through canal lining and embankment upgrading 4. provide settling basin and farm pond 5. improve the on-farm canal systems	1. provide proper and sufficient budget for water management and O&M works by improving ISF collection through the following: (a) proper turn-over of ISF collection function to the IAs (b) improvement of ISF evaluation policy for accurate and fair estimation of benefited area (c) establishment of proper database management for ISF billing and collection (d) streamlining of legal procedure for non-payment of ISF (e) increase of incentives to the IAs for ISF collection 2. improve and strengthen water management and O&M practices' skills of NIA staff and IAs through sufficient training by using practical O&M manual, establishment of computerized system and communication system, and and Type 1 & II contract implementation by the IAs 3. establish monitoring system on the basis of computerized system and communication system to be installed 4. strengthen the Jalaur-Suague RIS office through restructuring of its O&M sections, proper work load assignment for O&M staff and recruitment of additional O&M staff for improved Type I & II contract implementation	IAs 1. strengthen the institutional capability of IAs through sufficient and continuing training program, development of functional committees, establishment of IA office setting up of records management system and business tie-ups with operators of post-harvest facilities 2. rehabilitate existing farmers' cooperatives 3. develop women service cooperatives in areas with no existing farmers' corps 4. convert IAs into irrigation service cooperatives (ISCs) and merge other exising cooperatives with ISC. 5. provide training and assistance to the IAs/ ISCs to undertake partial system management 6. federate the ISCs at the RIS level NIA 1. strengthen IDOs capability for inter-agency collaboration through provision of training and establishment of inter-agency project steering and technical committees 2. renovate the NIA Regional Training Center 3. provide communication and transport equipment and training equipment/furnitures 4. improve database management on the basis of computerized system	Agriculture development 1. establish the cropping pattern in conformity with effective and maximum use of available water 2. increase paddy yields through improvement of farming technology such as fertilizer application, agro-chemical application, pest control, seeding method and low use of certified seed 3. optimum utilization of irrigation service area through rotational irrigation in the Suague RIS during the dry season 4. promote crop diversification in the Suague RIS during the dry season to minimize risk of paddy failure from drought and pest infestation Agricultural support services: Agricultural extension 1. field training and extension of new farming technologies to contact farmers through development of demonstration plots 2. farmer-to-farmer technology extension by contact farmers trained 3. training of extension staff of the Municipal Agricultural Office (MAO) 4. documentation and dissemination of new farming technologies Agricultural credit 1. loan restructuring of the existing farmers' cooperatives 2. institutional strengthening of cooperatives 3. development of expanded financial intermediation 4. introduction of irrigators' association development fund (IADF) Marketing and post-harvest facilities 1. access to existing post-harvest facilities and trucking fleet through establishment of business tie-ups with operators of such facilities 2. provision of working capital 3. intensive capacity building on agricultural marketing Farm-to-market road network 1. linkage of the existing NIA's service roads with the rural/barangay road after improvement 2. minor repair of the existing rural roads 3. provision of additional rural roads, bridge and crossing structures	1. strengthen coordination among concerned agencies (DENR, NIA, LGUs, DA, DAR and NGOs) 2. community organization 3. provide training and extension for staff of the concerned agencies on community organizing, watershed management and appropriate upland farming technologies 4. develop improved soil conservation measures 5. develop agro-forestry system such as randomly-mixed and row-intercrop agro-forestry 6. develop alternative energy source 7. social development through the adoption of participatory approach to planning and implementation 8. develop model project for sub-watershed rehabilitation and management

Note: *1 Specific proposal in one PRA session.

Table 5.2.1 Labor Requirement and Labor Balance

	Planted Area (ha)	Labor Requirement (man-day/ha) Total	Jan.	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Jalaur Proper														
1st Paddy	8,820	86	0	0	0	0	4	12	16	15	15	16	7	0
2nd Paddy	8,820	86	15	16	7	0	0	0	0	0	5	12	15	15
3rd Paddy *	1,200	66	3	13	13	23	13	0	0	0	0	0	0	0
Watermelon (3rd crop) *	100	80	12	20	24	16	8	0	0	0	0	0	0	0
Mungbean (rainfed, 3rd crop)*	600	17	5	1	1	7	3	0	0	0	0	0	0	0
Suague														
1st Paddy	2,900	86	0	0	0	0	4	12	16	15	15	16	7	0
2nd Paddy	1,100	86	15	16	7	0	0	0	0	0	5	12	15	15
Mungbean	1,800	49	10	13	8	0	0	0	0	0	0	0	6	11
3rd Paddy *	50	66	3	13	13	23	13	0	0	0	0	0	0	0
Watermelon (3rd crop) *	20	80	12	20	24	16	8	0	0	0	0	0	0	0
Mungbean (rainfed, 3rd crop)*	150	17	5	1	1	7	3	0	0	0	0	0	0	0

	Planted Area (ha)	Total Labor Requirement (man-day) Total	Jan.	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Jalaur Proper														
1st Paddy	8,820	758,520	0	0	0	0	37,926	106,193	144,119	136,534	128,948	144,119	60,682	0
2nd Paddy	8,820	758,520	128,948	144,119	60,682	0	0	0	0	0	45,511	106,193	136,534	136,534
3rd Paddy *	1,200	79,200	3,960	15,840	15,840	27,720	15,840	0	0	0	0	0	0	0
Watermelon (3rd crop) *	100	8,000	1,200	2,000	2,400	1,600	800	0	0	0	0	0	0	0
Mungbean (rainfed, 3rd crop)*	600	10,200	3,060	510	510	4,080	2,040	0	0	0	0	0	0	0
Total	19,540	1,614,440	137,168	162,469	79,432	33,400	56,606	106,193	144,119	136,534	174,460	250,312	197,215	136,534
Suague														
1st Paddy	2,900	249,400	0	0	0	0	12,470	34,916	47,386	44,892	42,398	47,386	19,952	0
2nd Paddy	1,100	94,600	16,082	17,974	7,568	0	0	0	0	0	5,676	13,244	17,028	17,028
Mungbean	1,800	88,200	17,640	23,814	14,994	0	0	0	0	0	0	0	11,466	20,286
3rd Paddy *	50	3,300	165	660	660	1,155	660	0	0	0	0	0	0	0
Watermelon (3rd crop) *	20	1,600	240	400	480	320	160	0	0	0	0	0	0	0
Mungbean (rainfed, 3rd crop)*	150	2,550	765	128	128	1,020	510	0	0	0	0	0	0	0
Total	6,020	190,250	34,892	42,976	23,830	2,495	1,330	0	0	0	5,676	13,244	28,494	37,314
Total Labor Requirement (man-days)	25,560	1,804,690	172,060	205,444	103,261	35,895	57,936	106,193	144,119	136,534	180,136	263,556	225,709	173,848
Available Labor Force **														
(persons)		25,660	25,660	25,660	25,660	25,660	25,660	25,660	25,660	25,660	25,660	25,660	25,660	25,660
(man-days) ***		6,158,400	513,200	513,200	513,200	513,200	513,200	513,200	513,200	513,200	513,200	513,200	513,200	513,200
Labor Balance (%) ****		29	34	40	20	7	11	21	28	27	35	51	44	34

Note
- *: Assumed at same conditions of area and farming practices
- **: Total labor force = (Households of beneficiaries and Farm-workers) x 2 persons = (6,350 + 6,480) x 2
- ***: Workable days = 20 days/month
- ****: Total Labor Requirement/Available Labor Force

Table 5.2.2 Agricultural Production under With and Without Project Conditions

	With-Project			Without-Project			Increment		
	Area (ha)	Yield (ton/ha)	Production (ton)	Area (ha)	Yield (ton/ha)	Production (ton)	Area (ha)	Yield (ton/ha)	Production (ton)
Jalaur Proper									
1st Paddy irrigated	8,820	5.00	44,100	6,120	3.40	20,808	2,700	1.60	23,292
2nd Paddy irrigated	8,820	5.00	44,100	4,910	3.30	16,203	3,910	1.70	27,897
(Irrigated Total)	17,640	5.00	88,200	11,030	3.36	37,011	6,610	1.64	51,189
1st Paddy rainfed	0		0	2,600	2.24	5,824	-2,600		-5,824
2nd Paddy rainfed	0		0	1,940	2.24	4,346	-1,940		-4,346
3rd Paddy	1,200	2.24	2,688	1,200	2.24	2,688	0	0.00	0
(Paddy Total)	18,840	4.82	90,888	16,770	2.24	49,869	2,070	2.58	41,019
Watermelon	100	4.00	400	100	4.00	400	0	0.00	0
Mungbean rainfed	600	0.40	240	600	0.40	240	0	0.00	0
Total	19,540			17,470			2,070		
Suague									
1st Paddy irrigated	2,900	5.00	14,500	2,540	3.64	9,246	360	1.36	5,254
2nd Paddy irrigated	1,100	5.00	5,500	1,870	3.41	6,377	-770	1.59	-877
Mungbean partially irrigated	1,800	1.00	1,800	0		0	1,800	1.00	1,800
(Irrigated Total)	5,800			4,410			1,390		
1st Paddy rainfed	0		0	360	2.24	806	-360		-806
2nd Paddy rainfed	0		0	610	2.24	1,366	-610		-1,366
3rd Paddy	50	2.24	112	50	2.24	112	0	0.00	0
(Paddy Total)	4,050	4.97	20,112	5,430	3.30	17,907	-1,380	1.67	2,205
Watermelon	20	4.00	80	20	4.00	80	0	0.00	0
Mungbean rainfed	150	0.40	60	150	0.40	60	0	0.00	0
Total	6,020			5,600			420		
Total									
1st Paddy irrigated	11,720	5.00	58,600	8,660	3.47	30,054	3,060	1.53	28,546
2nd Paddy irrigated	9,920	5.00	49,600	6,780	3.33	22,580	3,140	1.67	27,020
Mungbean partially irrigated	1,800	1.00	1,800	0		0	1,800	1.00	1,800
(Irrigated Total)	23,440			15,440			8,000		
1st Paddy rainfed	0			2,960	2.24	6,630	-2,960	-2.24	-6,630
2nd Paddy rainfed	0			2,550	2.24	5,712	-2,550	-2.24	-5,712
3rd Paddy	1,250	2.24	2,800	1,250	2.24	2,800	0	0.00	0
(Paddy Total)	22,890	4.85	111,000	22,200	3.05	67,776	690	1.80	43,224
Watermelon	120	4.00	480	120	4.00	480	0	0.00	0
Mungbean rainfed	750	0.40	300	750	0.40	300	0	0.00	0
Total	25,560			23,070			2,490		

Table 5.2.3 Production Cost under Without-project Conditions

	Unit	1st Paddy Irrigated			2nd Paddy Irrigated			Paddy Irrigated (transplant)			3rd Paddy			Paddy Rainfed			Watermelon			Mungbean Rainfed		
		Qty	Price	Value	Qty	Price	Value	Qty	Price	Value	Qty	Price	Value	Qty	Price	Value	Qty	Price	Value	Qty	Price	Value
		Palay	peso	peso	Palay	peso	peso	Palay	peso	peso	Palay	peso	peso	Palay	peso	peso		peso	peso			
Production Cost																						
Seeds	kg	140	11	1,540	140	11	1,540	100	11	1,100	140	11	1,540	140	11	1,540	4	800	3,200	25	30	750
Fertilizer																						
N	kg	93	17	1,581	93	17	1,581	93	17	1,581	60	17	1,020	60	17	1,020	50	17	850	30	17	510
P2O5	kg	28	22	616	28	22	616	28	22	616	14	22	308	14	22	308	14	22	308	0	22	0
K2O	kg	13	11	143	13	11	143	13	11	143	7	11	77	10	11	110	14	11	154	0	11	0
Chemicals																						
Herbicide	l	1	350	350	1	350	350	0.5	350	175	0.5	350	175	0.5	350	175	1	400	400		0	0
Insecticide	l	1	500	500	1	500	500	1	500	500	1	500	500	1	500	500	1	500	500		0	0
Fungicide	l	0.5	500	250	0.5	500	250	0.5	500	250	0	500	0	0	500	0	1	500	500		0	0
Rodenticide				100			100			100			100			100						
Molulicide		1	400	400	1	400	400	0.5	400	200	0	400	0	0	400	0					0	0
Others				150			150			150			150			150			100			
Labor		69			71			99			56			56			80			17		
Hired	man-day	35	80	2,800	36	80	2,880	50	80	4,000	28	80	2,240	28	80	2,240	40	80	3,200	9	80	720
Family	man-day	34	0	0	35	0	0	49	0	0	28	0	0	28	0	0	40	0	0	8	0	0
Machine/Tool/Animal																						
Handtractor/Tractor	day			1,400			1,400			1,400			1,400			1,400			0			0
Cambao	day			200			200			200			200			200			0			0
Thresher	day			400			400			400			350			350			0			150
Blower	day			200			200			200			180			180			0			100
Pump				100			200			200			250			100			100			0
Other				150			150			150			150			150			100			50
Fuel/Oil				50			150			150			150			100			200			0
(subtotal)				10,930			11,210			11,515			8,790			8,623			9,612			2,280
Irrigation Service Fee *1	peso			800			1,200			1,200			0			0			0			0
Harvester Share *2	peso			3,968			3,647			3,647			2,402			2,402			4,000			1,250
Land Lease	peso																					
Land Tax	peso			140			140			140			140			140			140			140
Interest *3	Peso			1,749			1,794			1,842			1,406			1,380			1,538			365
Total	Peso			17,587			17,991			18,344			12,738			12,545			15,290			4,035
Family Labor *4	Peso	34	80	2,720	35	80	2,800	49	80	3,920	28	80	2,240	28	80	2,240	40	80	3,200	8	80	640
Total	Peso			20,307			20,791			22,264			14,978			14,785			18,490			4,675

*1 Pesos 8,000 for wet season paddy. Pesos12,000 for dry season, free for 3rd and rainfed paddy

*2 Applied 1/8 (12.5) of gross yield for all crops

*3 Cash expences x 0.5 x 4 months x 8% interest/month = 16 % x subtotal

*4 Family labor cost is assumed at P80/day taking consideration of employment opportunities of other jobs

Table 5.2.4 Production Cost under With-project Conditions

	Unit	1st Paddy Irrigated (direct seeding)			1st Paddy Irrigated (transplanting)			2nd Paddy Irrigated (direct seeding)			2nd Paddy Irrigated (transplanting)			Mungbean Irrigated		
		Qty	Price	Value	Qty	Price	Value	Qty	Price	Value	Qty	Price	Value	Qty	Price	Value
		Paddy	peso	peso	Paddy	peso	peso	Paddy	peso	peso	Paddy	peso	peso		peso	peso
Production Cost																
Seeds	kg	100	16	1,600	50	16	800	100	16	1,600	50	16	800	25	30	750
Fertilizer																
N	kg	100	17	1,700	100	17	1,700	100	17	1,700	100	17	1,700	30	17	510
P2O5	kg	35	22	770	35	22	770	35	22	770	35	22	770	30	22	660
K2O	kg	35	11	385	35	11	385	35	11	385	35	11	385	30	11	330
Chemicals																
Herbicide	l	1.0	350	350	1.0	350	350	1.0	350	350	1.0	350	350	0.5	400	200
Insecticide	l	1.5	500	750	1.5	500	750	1.5	500	750	1.5	500	750	0.5	500	250
Fungicide	l	1.0	500	500	1.0	500	500	1.0	500	500	1.0	500	500	0.5	500	250
Rodenticide				150			150			150			150			
Molluscide		1.0	400	400	1.0	400	400	1.0	400	400	1.0	400	400			
Others				200			200			200			200			100
Labor Total requirement		80			80			80			104			49		
Hired	man-day	40	80	3,200	52	80	4,160	40	80	3,200	52	80	4,160	25	80	2,000
Family	man-day	40	0	0	52	0	0	40	0	0	52	0	0	24	0	0
Machine/Tool/Animal																
Handtractor/Tractor				1,600			1,600			1,600			1,600			1,600
Carabao				0			0			0			0			0
Thresher				500			500			500			500			200
Blower				250			250			250			250			100
Pump																0
Other				150			150			150			150			100
Fuel/Oil				100			100			100			100			100
Subtotal				12,605			12,765			12,605			12,765			7,150
Irrigation Service Fee *1	peso			800			800			1,200			1,200			0
Harveste'sr Share *2	peso			5,363			5,363			5,363			5,363			3,125
Land Lease	sacks															
Land Tax	peso			140			140			140			140			140
Interest *3	Peso			420			425			420			425			238
Total				19,328			19,493			19,728			19,893			10,653
Average of Paddy *5		(1st Paddy)			19,411			(2nd Paddy)			19,811					
Family Labor *4	Peso	40	80	3,200	52	80	4,160	40	80	3,200	52	80	4,160	24	80	1,920
Total	Peso			22,528			23,653			22,928			24,053			12,573
Average of Paddy *5	Peso	(1st Paddy)			23,091			(2nd Paddy)			23,491					

*1 Pesos 8,000 for wet season paddy, Pesos12,000 for dry season, free for 3rd and rainfed paddy

*2 Applied 1/8 (12.5) of gross yield for all crops

*3 Cash expences x 0.5 x 4/12 year x 20% interest/year = 3.33 % x subtotal

*4 Family labor cost is assumed at P80/day taking consideration of employment opportunities of other jobs

*5 Assumed that transplanting method will be increase by 50% of paddy area

Table 5.2.5 Profit per Hectare With and Without Project Condition

	With Project						Without Project					
	Output				Production Cost	Net Profit	Output				Production Cost	Net Profit
	Output	Qty ton	Price peso/ton	Value peso	peso	peso	Output	Qty ton	Price peso/ton	Value peso	peso	peso
1st Paddy irrigated **												
Jalaur proper	Paddy	5.0	8,580	42,900	23,091	19,809	Paddy	3.40	8,580	29,172	20,307	8,865
					19,411 *	23,489 *					17,587 *	11,585 *
Suague	Paddy	5.0	8,580	42,900	23,091	19,809	Paddy	3.64	8,580	31,231	20,307	10,924
					19,411 *	23,489 *					17,587 *	13,644 *
2nd Paddy irrigated **												
Jalaur proper	Paddy	5.0	8,580	42,900	23,491	19,409	Paddy	3.30	8,580	28,314	20,791	7,523
					19,811 *	23,089 *					17,991 *	10,323 *
Suague	Paddy	5.0	8,580	42,900	23,491	19,409	Paddy	3.41	8,580	29,258	20,791	8,467
					19,811 *	23,089 *					17,991 *	11,267 *
1st paddy rainfed	Paddy						Paddy	2.24	8,580	19,219	14,785	4,434
											12,545 *	6,674 *
2nd paddy rainfed	Paddy						Paddy	2.24	8,580	19,219	14,785	4,434
											12,545 *	6,674 *
Mungbean partially irrigated	Dry bean	1.0	25,000	25,000	12,573	12,427						
					10,653 *	14,347 *						
3rd crops ***												
3rd paddy	Paddy	2.24	8,580	19,219	14,978	4,241	Paddy	2.24	8,580	19,219	14,978	4,241
					12,738 *	6,481 *					12,738 *	6,481 *
Watermelon	Fruits	4.0	8,000	32,000	18,490	13,510	Fruits	4.0	8,000	32,000	18,490	13,510
					15,290 *	16,710 *					15,290 *	16,710 *
Mungbean	Dry bean	0.4	25,000	10,000	4,675	5,325	Dry bean	0.4	25,000	10,000	4,675	5,325
					4,035 *	5,965 *					4,035 *	5,965 *

* : Production cost and net profit are excluded family labor.

** : Average of direct seeding and transplanting

*** : With-project is assumed to be same as without project

Table 5.2.6 Financial Production Value and Incremental Benefit

(Unit: million pesos)

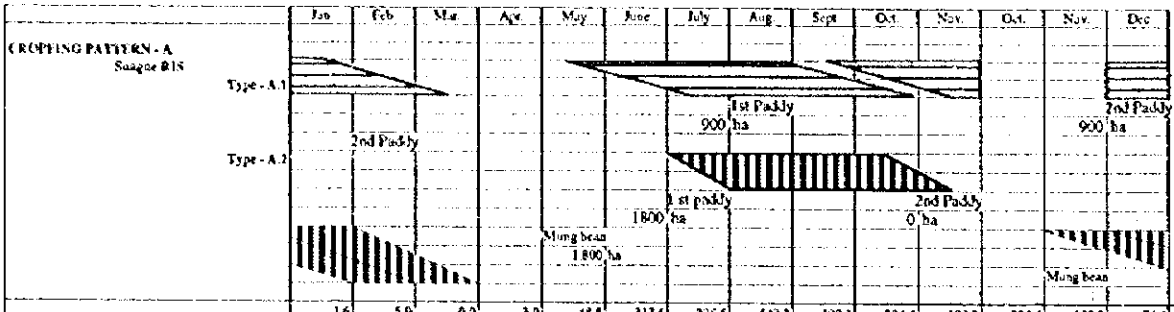
	With Project				Without Project				Increment		
	Cropped Area (ha)	Gross Income	Production Cost	Net Profit	Cropped Area (ha)	Gross Income	Production Cost	Net Profit	Gross Income	Production Cost	Net Profit
Jalaur Proper											
1st Paddy irrigated	8,820	378.4	203.7	174.7	6,120	178.5	124.3	54.3	199.8	79.4	120.5
2nd Paddy irrigated	8,820	378.4	207.2	171.2	4,910	139.0	102.1	36.9	239.4	105.1	134.2
1st Paddy rainfed	0	0.0	0.0	0.0	2,600	50.0	38.4	11.5	-50.0	-38.4	-11.5
2nd Paddy rainfed	0	0.0	0.0	0.0	1,940	37.3	28.7	8.6	-37.3	-28.7	-8.6
3rd Paddy	1,200	23.1	18.0	5.1	1,200	23.1	18.0	5.1	0.0	0.0	0.0
Watermelon	100	3.2	1.8	1.4	100	3.2	1.8	1.4	0.0	0.0	0.0
Mungbean rainfed	600	6.0	2.8	3.2	600	6.0	2.8	3.2	0.0	0.0	0.0
Total	19,540	789	433	356	17,470	437	316	121	351.9	117.4	234.6
Suague											
1st Paddy irrigated	2,900	124.4	67.0	57.4	2,540	79.3	51.6	27.7	45.1	15.4	29.7
2nd Paddy irrigated	1,100	47.2	25.8	21.3	1,870	54.7	38.9	15.8	-7.5	-13.0	5.5
Mungbean partially irrigated	1,800	45.0	22.6	22.4	0	0.0	0.0	0.0	45.0	22.6	22.4
1st Paddy rainfed	0	0.0	0.0	0.0	360	6.9	5.3	1.6	-6.9	-5.3	-1.6
2nd Paddy rainfed	0	0.0	0.0	0.0	510	11.7	9.0	2.7	-11.7	-9.0	-2.7
3rd Paddy	50	1.0	0.7	0.2	50	1.0	0.7	0.2	0.0	0.0	0.0
Watermelon	20	0.6	0.4	0.3	20	0.6	0.4	0.3	0.0	0.0	0.0
Mungbean rainfed	150	1.5	0.7	0.8	150	1.5	0.7	0.8	0.0	0.0	0.0
Total	6,020	220	117	103	5,500	156	107	49	63.9	10.6	53.3
Total											
1st Paddy irrigated	11,720	503	271	232	8,660	258	176	82	244.9	94.8	150.2
2nd Paddy irrigated	9,920	426	233	193	6,780	194	141	53	231.8	92.1	139.8
Mungbean partially irrigated	1,800	45	23	22	0	0	0	0	45.0	22.6	22.4
1st Paddy rainfed	0	0	0	0	2,960	57	44	13	-56.9	-43.8	-13.1
2nd Paddy rainfed	0	0	0	0	2,450	49	38	11	-49.0	-37.7	-11.3
3rd Paddy	1,250	24	19	5	1,250	24	19	5	0.0	0.0	0.0
Watermelon	120	4	2	2	120	4	2	2	0.0	0.0	0.0
Mungbean rainfed	750	8	4	4	750	8	4	4	0.0	0.0	0.0
Total	25,560	1,009	551	458	22,970	593	423	170	415.9	127.9	287.9

Table 5.3.1 Irrigation Water Requirement

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug	Sept	Oct.	Oct.	Nov.	Dec.	
CROPPING PATTERN - A Jalaur pro. RIS	2nd Paddy				For Suague RIS		8,820 200	1st Paddy ha ha		For Suague RIS		8,820 200	2nd Paddy ha ha	
Probable Monthly Rainfall	1.6	5.9	0.0	3.0	48.8	337.6	226.6	439.2	190.1	224.4	224.4	188.2	34.4	1,750
Potential Evapo-transpiration	155.0	154.0	213.9	207.0	179.8	139.0	120.9	133.3	117.0	130.2	130.2	120.0	139.5	1508.6
CROPPING PATTERN - A														
2nd Paddy														
Crop Coefficient (Kc)	1.18	1.20	1.10								0.87	1.01	1.07	
Crop Evapotranspiration (ETcrop)	182.9	184.8	235.3								113.3	121.2	149.3	987
Percolation	62.0	56.0	62.0								62.0	60.0	62.0	364
Effective Rainfall *	1.6	5.9	0.0								150.3	141.2	67.7	367
Area Factor	0.93	0.50	0.06								0.30	0.80	1.00	
Puddling Water											75.0	25.0		150
Net Irrigation Requirement	228	117	19								30	92	141	630
1st Paddy														
Crop Coefficient (Kc)					0.90	0.98	1.09	1.11	1.18	1.16				
Crop Evapo transpiration (ETcrop)					161.8	135.2	131.8	148.0	138.1	151.0				866
Percolation					46.5	45	46.5	46.5	45	45				275
Effective Rainfall *					43.9	168.8	158.6	202.1	142.6	150.3				866
Area Factor					0.10	0.40	0.90	1.00	0.82	0.33				
Puddling Water					37.5	75.0	37.5							150
Net Irrigation Requirement				0	20	35	51	0	33	15				154
Irrigation Efficiency	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	
Conveyance Efficiency 72 % **	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	
Application Efficiency 70 % of paddy field **	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	
Gross Irrigation Requirement (mm)	453	233	37	0	40	69	102	0	66	29	59	183	285	1555.5
(lit/Sec/ha)	1.69	0.96	0.14	0.00	0.15	0.26	0.38	0.00	0.25	0.11	0.22	0.70	1.06	
Irrigation Service Area (ha)	9,020	9,020	9,020		9,020	9,020	9,020	9,020	9,020	9,020	9,020	9,020	9,020	
Seasonal Requirement (m3/sec)	15.24	8.69	1.24		1.35	2.39	3.44	0.00	2.29	1.03	2.00	6.36	9.59	

J	F	M	A	M	J	J	A	S	O	N	D
15.24	8.69	1.24	0.00	1.35	2.39	3.44	0.00	2.29	1.03		
									2.00	6.36	9.59
15.24	8.69	1.24	0.00	1.35	2.39	3.44	0.00	2.29	3.03	6.36	9.59

Table 5.3.2 Irrigation Water Requirement



	Jan	Feb	Mar	Apr.	May	June	July	Aug	Sept	Oct	Nov.	Oct.	Nov.	Dec	
	16	5.9	0.0	3.0	48.8	337.6	226.6	449.2	190.1	224.4	188.2	224.4	188.2	24.4	1,938
Potential Evapo-transpiration	155.0	154.0	213.9	207.0	179.8	138.0	120.9	133.3	117.0	130.2	120.0	130.2	120.0	139.5	1928.6
CROPPING PATTERN - A.1															
2nd Paddy															
Crop Coefficient (Kc)	1.18	1.16	1.10						0.90	0.98	1.09			1.11	
Crop Evapo-transpiration (ETcrop)	182.9	178.6	235.3						105.3	127.6	130.8			154.8	1,115
Percolation	62.0	56.0	62.0						62.0	62.0	62.0			62.0	426
Effective Rainfall *	1.6	5.9	0.0						142.6	150.3	141.2			67.7	509
Area Factor	0.82	0.33	0.00						0.10	0.40	0.90			1.00	
Puddling Water									37.5	75.0	37.5				150
Net Irrigation Requirement	300	74	0						6	46	80			149	555
Irrigation Efficiency	0.50	0.50	0.50						0.50	0.50	0.50	0.50	0.50	0.50	
Conveyance Efficiency 72 % **	0.72	0.72	0.72						0.72	0.72	0.72	0.72	0.72	0.72	
Application Efficiency 70 % of paddy field **	0.70	0.70	0.70						0.70	0.70	0.70	0.70	0.70	0.70	
Gross Irrigation Requirement (mm)	396	148	0						12	91	159	0	0	296	
(lit/sec/ha)	1.48	0.61	0.00						0.05	0.35	0.61	0.00	0.00	1.10	
1st Paddy															
Crop Coefficient (Kc)					0.90	0.98	1.09	1.11	1.18	1.16					
Crop Evapo-transpiration (ETcrop)					161.8	135.2	131.8	148.0	138.1	151.0					866
Percolation					46.5	45	46.5	46.5	45	45					275
Effective Rainfall *					43.9	168.8	158.6	202.1	142.6	150.3					866
Area Factor					0.10	0.40	0.90	1.00	0.82	0.33					
Puddling Water					37.5	75.0	37.5								150
Net Irrigation Requirement					20	35	51	0	33	15					154
Irrigation Efficiency	0.50	0.50	0.50		0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	
Conveyance Efficiency 72 % **	0.72	0.72	0.72		0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	
Application Efficiency 70 % of paddy field **	0.70	0.70	0.70		0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	
Gross Irrigation Requirement (mm)	396	148	0		40	69	102	0	78	120	159	0	0	296	1407.9
(lit/sec/ha)	1.48	0.61	0.00		0.15	0.26	0.38	0.00	0.30	0.46	0.61	0.00	0.00	1.10	
Irrigation Survice Area (ha)	900	900	900		900	900	900	900	900	900				900	
										900	900				
Seasonal Requirement (m3/sec)	1.33	0.55	0.00		0.14	0.24	0.34	0.00	0.27	0.40	0.55	0.00	0.00	0.99	
CROPPING PATTERN - A.2															
1st Paddy															
Crop Coefficient (Kc)							1.00	1.10	1.18	1.09	1.02				
Crop Evapo-transpiration (ETcrop)							120.9	146.6	137.5	141.3	122.4				669
Percolation							60.0	62.0	60.0	62.0	60.0				304
Effective Rainfall *							158.6	202.1	142.6	150.3	141.2				795
Area Factor							0.50	1.00	1.00	0.50	0.00				
Puddling Water							150.0								150
Net Irrigation Requirement							86	6	55	26	0				174
Irrigation Efficiency	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	
Conveyance Efficiency 72 % **	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	
Application Efficiency 70 % of paddy field **	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	
Gross Irrigation Requirement (mm)	0	0	0	0	0	0	171	13	109	52	0	0	0	0	345.2
(lit/sec/ha)	0.00	0.00	0.00	0.00	0.00	0.00	0.64	0.05	0.42	0.20	0.00	0.00	0.00	0.00	
Irrigation Survice Area (ha)	0						1,800	1,800	1,800	1,800	1,800			0	
Seasonal Requirement (m3/sec)	0.00	0.00	0.00	0.00	0.00	0.00	1.15	0.09	0.76	0.36	0.00	0.00	0.00	0.00	
Mungbean															
Crop Coefficient (Kc)	0.00	0.00	0.00										0.00	0.00	
Crop Evapotranspiration (ETcrop)	0.0	0.0	0.0										0.0	0.0	0
Effective Rainfall *	0.0	0.0	0.0										74.0	53.0	127
Area Factor	1.00		0.00										1.00	1.00	
Supplemental water for germination	9.0												9.0	9.0	
Net Irrigation Requirement	9	0	0										0	0	9
Irrigation Efficiency	0.50	0.50	0.50										0.50	0.50	
Conveyance Efficiency 72 % **	0.72	0.72	0.72										0.72	0.72	
Application Efficiency 70 % **	0.70	0.70	0.70										0.70	0.70	
Gross Irrigation Requirement 2 (mm)	18	0	0										0	0	18.9
(lit/sec/ha)	0.07	0.00	0.00										0.00	0.00	
Irrigation Survice Area (ha)	1,800	1,800	1,800										1,800	1,800	
Seasonal Requirement 2 (m3/sec)	0.12	0.00	0.00										0.00	0.00	

	J	F	M	A	M	J	J	A	S	O	N	D
1st and 2nd paddy (Type-A1)	1.33	0.55	0.00	0.00	0.14	0.24	0.34	0.00	0.27	0.40	0.55	
										0.00	0.00	0.99
1st and 2nd paddy (Type-A2)	0.00	0.00	0.00	0.00	0.00	0.00	1.15	0.09	0.76	0.36	0.00	
										0.00	0.00	0.00
Mungbean	0.12	0.00	0.00								0.00	0.00
	1.45	0.55	0.00	0.00	0.14	0.24	1.49	0.09	1.03	0.77	0.55	0.99

Table 5.4.1 Proposed No. of NIA O&M Staff by Division

RIS	Name of IA	Irrigation Service Area (ha)	Length of Main Canal & Laterals (km)	IA Contract	Present Conditions (1997) Length of Type I Contract (km)	Charge of WRF Tender *1 (km)	No. of WRF Tech.	No. of WRF Tender	Phase I *5 Proposed No. of WRF Tech.	Phase I *5 Proposed No. of WRF Tender	Phase I Balance No. of WRF Tech.	Phase I Balance No. of WRF Tender	Phase II *5 Proposed No. of WRF Tech.	Phase II *5 Proposed No. of WRF Tender	Phase II Balance No. of WRF Tech.	Phase II Balance No. of WRF Tender
Jalaur proper RIS																
Div. 1	SISADA	296		Type I&II	3									1		
	BAPZAT	512		Type I	9									1		
(Sub-Total)		(808)	18		(12)	6	0 *2	2	1	3	+1	+1	1	(2)	+1	0
Div. 2	JP-2	714	19	Type I	9	10	1	3	1	3	0	0	1	1	0	-2
Div. 3	JP-3	892	10	Type I	5	5	1	3	1	3	0	0	1	1	0	-2
Div. 4	JADD	572		Type I	4									1		
	J-JIN	375		Type I	4									1		
(Sub-Total)		(947)	13		(8)	5	1	3	1	3	0	0	1	(2)	0	-1
Div. 5	POZA	594		Type I	4									1		
	JABAFA	160		Type II	0									1		
(Sub-Total)		(754)	10		(4)	6	1	3	1	3	0	0	1	(2)	0	-1
Div. 6	CIDD	730	11	Type I	6	5	1	2	1	3	0	+1	1	1	0	-1
Div. 7	LOJAPRO	755	9	Type I	7	2	0 *2	2 *4	1	3	+1	+1	1	1	+1	+1
Div. 8, 9, 10&11																
	Team Leader						1	-	0	-	-1	-	0	-	-1	-
	Assistant Team Leader						-	1	-	0	-	-1	-	0	-	-1
Div. 8	CAMP	838	11	Type I&II	9	2	0 *2	2	1	3	+1	+1	1	1	+1	-1
Div. 9	BAMAPA	373		Type I	3									1		
	MACAPA	410		Type I	6									1		
(Sub-Total)		(783)	10		(9)	1	1	1	1	3	0	+2	1	(2)	0	+1
Div. 10	CANROSCA	788	10	Type I	5	5	0 *3	1	1	3	+1	+2	1	1	+1	0
Div. 11	PAGCAPUSO	811	11	Type I	9	2	0 *3	2	1	3	+1	+1	1	1	+1	-1
Total (Jalaur proper RIS)		8,820	132		83	49	7	25	11	33	±4	±8	11	15	±4	-10
Suague RIS																
Div. 1	SMEWBAT	387		Type I&II	3									1		
	JEBADA	608		Type I	7									1		
(Sub-Total)		(995)	12		(10)	2	1	2	1	3	0	+1	1	(2)	0	0
Div. 2	SMEWBAT	67		Type I&II	2									1		
	AGDABASICA	593		Type I	6											
(Sub-Total)		(660)	8		(8)	0	0 *2	2	1	2	+1	0	1	(1)	+1	-1
Div. 3	SUAGUE 3	543	12	Type I	9	3	0 *2	3	1	2	+1	-1	1	1	+1	-2
Div. 4	SMEWBAT	133		Type II	0									1		
	DIV. 4 SUAGUE	569		Type I	6											
(Sub-Total)		(702)	8		(6)	2	0 *2	3	1	2	+1	-1	1	(1)	+1	-2
Total (Suague RIS)		2,900	40		33	7	1	10	4	9	±3	-1	4	5	±3	-5
Grand-Total		11,720	172		116	56	8	35	15	42	±7	±7	15	20	±7	-15

Notes: WRF Tech. : Water Resources Facilities Technician
WRF Tender : Water Resources Facilities Tender
*1 : Length of canals under charge of WRF Tenders for the works equivalent to Type I contract by IA.
*2 : WRF Tender is acting for WRF Technician.
*3 : WRF Tender of Div.10 (Jalaur proper) is acting for WRF Technician of Div.10&11 (Jalaur proper).
*4 : One WRF Operator is designated as a acting WRF Technician and counted as a WRF Tender.
*5 : No. of proposed O&M staff is within the approved No. of positions by Department of Budget and Management.

Source : NIA JSRIS Office

Table 5.4.2 Proposed Training Plan for Water Management and O&M Practice, and ISF Collection

Description	Trainee	Trainer	Location *1 NIA Training Center	Location *2 Field and Office (OJT)	Project Implementation Year 1 2 3 4 5 6 7 8 9 10
Phasing for the Improvement Plan of Water Management and O&M practice, and ISF Collection					Phase I / Phase II
Detailed Design					
Construction of Project Facilities					
O&M Manual					
- Preparation of Draft O&M Manual by consultant (O&M Expert : 6 M/M)					
- Revise and Finalization of O&M Manual by consultant (O&M Expert) through the actual activities					
Rehabilitation and Improvement of Irrigation Facilities / Installation of Measuring Devices					
Rehabilitation of NIA Regional Training Center					
Establishment of Computerized System and Communication System					
Procurement of O&M Equipment and Instrument for the Training					
1. Water Management *5					
(1) Hydrology / Meteorology Water Discharge Recording	Hydrologist (NIA) Irrigation Engineer (NIA) Operation Engineer (NIA)	Consultant *3 (Irrigation Engineer)	O	O	
(2) Cropping Calendar / Farm Activities	Irrigation Engineer (NIA) Operation Engineer (NIA) Agriculturist (NIA) MAO (Municipality)	Consultant *3 (Irrigation Engineer)	O	O	
(3) Water Balance / Irrigation Water Requirement	Irrigation Engineer (NIA) Operation Engineer (NIA)	Consultant *3 (Irrigation Engineer)	O	O	
(4) Water Delivery and Distribution Schedule	Irrigation Engineer (NIA) Operation Engineer (NIA) IA	Consultant *3 (Irrigation Engineer)	O	O	
(5) Computer Operation and Management	Hydrologist (NIA) Irrigation Engineer (NIA) Agriculturist (NIA) Operation Engineer (NIA)	Consultant *3 (Irrigation Engineer)	O	O	
2. O&M Practices *5					
(1) Operation Work					
- Operation of Water Control Structures / Measuring Water Discharge (Intake gate, Sluice gate, Head gate, Check and Turnout)	Operation Engineer (NIA) WRF Technician (NIA) WRF Operator (NIA) WRF Tender (NIA) IA	Consultant *3 (O&M Expert) Operation Engineer (NIA) *4	O	O	
(2) Maintenance Work					
- Maintenance of Water Control Structures	Maintenance Engineer (NIA) WRF Technician (NIA) WRF Operator (NIA) WRF Tender (NIA) IA	Consultant (O&M Expert) Maintenance Engineer (NIA) *4	O	O	
- Desilting (Canals, Diversion Dam, Settling Basin)			O	O	
- Maintenance of On-farm facilities (Main farm ditch and others)			O	O	
- Other Maintenance (Service Road, Other Facilities)			O	O	
3. ISF Collection *5					
(1) Collection and Billing Record (Database Management)	Billing Clerk (NIA) Collector (NIA & IA) Cashier (NIA) IDO (NIA)	Consultant (O&M Expert)	O	O	
(2) Collection Practice	Billing Clerk (NIA) Collector (NIA & IA) Cashier (NIA) IDO (NIA)	Consultant (O&M Expert)	O	O	
(3) Computer Operation and Management	Billing Clerk (NIA) Cashier (NIA)	Consultant (O&M Expert)	O	O	

Notes :
- *1 NIA regional training center, Pulolan
- *2 Field : Actual field (Jalaur proper RIS and Suague RIS), Office : JSRIS Office
- *3 Consultant assigned for technical assistance in the project
- *4 Operation and Maintenance Engineers will be also a trainer for WRF Technicians, Operator & Tender and IA after training by consultant.
- *5 Frequency of training : 1 day a week by training item (2 hours a day)
  : 5 days a week for the Water Management.
  : 5 days a week for the O&M practice and ISF collection

Table 5.5.1 Training Plan for Institutional Strengthening and Cooperative Development

Development Stage	Description
Preconstruction Period	Recruitment and dispatch of consultants (84 M/M)*1
	Recruitment and site assignment of 4 NGOs
	Detailed design
	Renovation of NIA Regional Training Center
	Establishment of IA office
	Procurement of training equipment and materials
	Establishment of Project Steering Committee and Project Technical Committee
	Activation of the IA/TSAG/communities
	Formation of education clusters in each IA
Construction and Sustainability Period	Construction / rehabilitation of facilities

Training Program	Trainees (nos.)	Trainers	Method/Process	Location: Training center*2	Location: Field (OJT)*3
1 Institutional Strengthening					
1.1 Basic course on community organizing	IA/TSA officers/members	NGOs	Seminar	O	O
1.2 Organizational development and management	Cooperative officers/members	Consultant *IS	Workshop	O	O
1.3 Participatory planning and decision making process/method	IDOs		On-the-job	O	O
1.4 Information dissemination materials writing			Newsletter publishing	O	O
1.5 Federation establishment and networking	IA/cooperative officers	NGOs Consultant *IS	Seminar, Workshop On-the-job	O	O
1.6 Record system management	CoMET members	NGOs	Seminar	O	O
1.7 Management of continuing membership education program	IA/TSA officers/members	Consultants *IS, *CED	Workshop	O	O
1.8 Benefit/progress monitoring and evaluation		IDOs	On-the-job	O	O
2 Cooperative Development and Management				O	O
2.1 Pre-membership education seminar	IA members, other farmers	NGOs, CDA	Seminar, group meeting	O	O
2.2 Cooperative organization and management	Cooperative officers/members	NGOs, MAOs' CDOs*5	Seminar	O	O
2.3 Credit borrowing/restructuring and management	MAOs' CDOs	Consultant *CED	Workshop	O	O
2.4 Capital build up and expansion	IDOs	LBP Specialists	Trade fair/exhibition	O	O
2.5 Financial management (accounting and control)	Finance committees (IA/TSAG)	DA/PAO Specialists	On-the-job	O	O
2.6 Managing business linkaging (leasing and renting)		CASA Officers *6		O	O
3 Post-Harvest Processing and Marketing					
3.1 Planning and management of integrated post-harvest processing	Cooperative officers/members	NGOs		O	O
Method of collection and hauling	MAOs' CDOs	Consultant *CED	Seminar		
Trucking, drying and warehousing arrangements		MAOs' CDOs*5	On-the-job		
Task definition and monitoring procedure			Field Tour		
3.2 Agricultural marketing	Cooperative officers/members	NGOs		O	O
Price and market monitoring/information	MAOs' CDOs	Consultant *CED	Seminar		
Group buying and selling		MAOs' CDOs*5	Workshop		
Bulk buying of farm inputs			Trade fair/exhibition		
3.3 Operation and management of post-harvest facilities *4			Field Tour	O	O
Technical Assistance					
Facilitation in group planning workshops, seminars, etc.	TSA/IA BOD, Committees	NGOs	ZOPP Technique		O
Process/learnings documentation for dissemination to IAs/ISCs	Cooperatives	Consultants *IS *CED	Group reflection		O
Regular technical advice	IDOs and MAOs' CDOs	MAOs' CDOs*5	Coaching		O

Notes: *1 Two consultants: (i) Institutional Strengthening, IS (48 M/M) and Credit and Enterprise Development, CED (36 M/M)

*2 NIA Regional Training Center, Pototan

*3 Field refers to the IA coverage areas in the Jalaur proper and Suague RIS

*4 Contingent on the technical and financial capacity of the farmers' cooperatives to buy and manage its own facilities.

*5 MAOs' cooperative development officers (CDOs) will also act as trainers after attending the proper training from the consultant and NGOs.

*6 A group of big paddy rice traders in Iloilo province

*7 IA will take the lead role for the continuous education program of its members in the sustainability period.

Table 5.5.2 Proposed Equipment and Facilities for Training, Communication and Transportation

Description	Number
I. Strengthening of NIA	
A. Training and Communication Equipment	
1. Overhead Projector	1
- Screen with tripod	1
- Transparency maker	1
- TP marking kit	1
2. Slide Projector with Screen	1
3. Audio Set with Power Amplifier	1
- Speaker	1
- Tripod	1
- Audio rack	1
4. Cassette Deck	
- Dynamic microphone	1
- Microphone stand (Floor)	2
- Microphone stand (Table)	2
- Connecting cables	1 roll
5. Video Camera with Recorder	
- VTR	1
- Color moniter	1
- TV/VTR rack	2
- Cables	1 roll
6. Camera and Accessories	2 sets
- Camera case	
- Standard, macro, wide and zoom lens	
- Close-up lens	
- Filter	
- Speed and macro speed light	
- Tripod with case	
- Carrying case	
- Exposure meter	
- Battery for camera	
- Battery for exposure/speed light	
7. Electric Mimeographing Machine	1
8. Stencil Scanning Machine	1
9. Bookbinding machine	1
10. Xerox Copier	1
11. Electric Fan	4
12. Portable Hand-Held Radio Transceiver	21
13. Computer Set with Accessories	2
14. Steel Cabinet	4
B. Furnitures and Fixtures	
1. Table (Training Center/JSRIS office)	10
2. Chair (Training Center/JSRIS office)	40
3. Air Conditioner	
- Package type	1
- Window/wall type	3
C. Transport Facilities	
1. Mini Bus (Training Center)	1
2. Pick Up (O&M Staff and IDOs)	3
3. Motorcycles (O&M Staff)	41

Description	Number
II. Strengthening of the IAs	
A. Office Equipment	
1. Working table (long), 2 for each IA	40
2. Working chairs (20/IA)	400
3. Steel cabinet	20
4. Wooden blackboard	20
B. Communication Equipment	
1. Portable Hand-Held Radio Tranceiver	20
III. Upgrading of MAO Agricultural Extension Services	
A. Communication Equipment	
1. Audio-visual aids	15
2. White Board with Pens	14
3. Camera Set	7
B. Transport Facility	
1. Motorcycles	35
C. Techno-Demo Farms	
1. Moisture meter	15
2. Soil test kit	20
3. Input supply, ha	360

Table 5.6.1 Training Plan for Agricultural Development and Extension

				Location		Year 1	2	3	4	5	6	7	8	9	10
Project Implementation	Period I (Design & Tender Administration) Period II (Construction Period) Period III (Sustainability)														
Training for Agricultural Sector	(I) Development and built-up stage for activation of extension services (II) Self-operation stage														
	Preparation of Training and Monitoring/Evaluation Manual Staff and Farmers Training Monitoring/Evaluation														
Consultant	Assignment Period of Consultant(s) (Agricultural Expert)														
Training Program	Trainee (number of trainee)	Trainer	Method/Process	Training center	Field										
1 Farming Technology															
Paddy rice Crop diversification Land preparation	ATs of MAO (80) Agriculturist of NGO and NIA	Specialists of DA/PAO and research, Consultant(s)	Seminar, Workshop, Research farm, Techno-demo farm	x	x										
Seed treatment/Seedling Fertilization Pest/disease control Weed control	Contact Farmers (300)	Specialists of DA/PAO and research, Consultant(s)	Seminar, Workshop, Research farm, Techno-demo farm	x	x										
Snail and Rat control Farm mechanization Organic farming Post-harvest Monitoring/Evaluation	Ordinary farmers (6,400)	ATs of MAO, Contact farmers	Techno-demo farm Field school Field tour Group discussion		x										
2 Extension Activity															
Group organizing Leadership	ATs of MAO (80)	Specialists of DA/PAO and research, Consultant(s)	Seminar, Workshop,	x	x										
Pamphlets Preparing	Contact Farmers (300)	ATs of MAO	Seminar, Workshop,	x	x										
3 Seed Production															
Technical service Seed inspection	ATs of MAO (30)	Specialists of DA/PAO and research, Consultant(s)	Seminar, Workshop, Research farm,	x	x										
Seed distribution	Seed Grower (80)	ATs of MAO	Seminar, Workshop, Research farm,	x	x										
Implementation of Improved Extension Services															
1 Training to ATs, contact farmers and seed growers												Sustainability stage			
2 Activities by MAO															
3 Provision of techno-demo farms		360 plots during 4.5 years (9 cropping season)													
4 Activities by contact farmers															
5 Seed production															
6 Documentation and dissemination of improved farming practices															
7 Provision of facilities and equipment															
Audio set		15 unit													
Soil test kit		20 unit													
White board with pens		14 unit													
Camera set		7 unit													
Cereal moisture meter		15 unit													
Motorcycle		35 unit													
Input supply for techno-demo farms		360 ha in total													

Table 5.8.1 Assessment of Probable Environmental Impacts

Probable / Potential Impacts	Stage				Comments / recommended mitigation measures
	Construction		Operation		
	Without	With	Without	With	
1. Health hazard from mishandling of agrochemical use	-	-	2-3N d-s-r	3N	• The hazard will be minimized by proper handling of chemical under proposed extension works. • IPM or proper use of agrochemicals will be included in the improved farming practices (plan) and extension program.
2. Deterioration of water quality in downstream (1) Pollution of agrochemical and Eutrification of fertilizer	-	-	2N d-s-r	3N	• Proper water management taking agro-input use into consideration will be undertaking • IPM or proper use of agro-input including use of organic matter will be included in the improved farming practices (plan) and extension program.
(2) Pollution of construction materials	3N	-	-	-	• Proper disposal of construction waste shall be enforced thoroughly.
3. Loss of farm land due to construction of farm pond	2-3N d-l-ir	3N	2-3N d-l-ir	3N	• Full compensate for farm land shall be taken to the owner and tenant farmer under enough discussion with them.
4. Reduction of downstream flows that affect downstream ecology and users of water	3N	-	-	-	• Unlikely
5. Reduction of excessive water use of ground water	-	-	-	1-2P d-l	• The ground water table will stabilize due to reduction of excessive use of ground water in dry season.
6. Conflicts over inequalities in water distribution throughout service area	-	-	3N	-	• Crop intensity will be 200% and cropping pattern will be rotated in the area under the plan. • Proper water management by IAs could utilize water efficiently and minimize such conflict.
7. Increase of construction-related employment opportunity	1P d-s	1P d-s	-	-	• The construction works will provide temporary job opportunity to the villagers nearby.
8. Increase of crop production (which results in the increase of farm income)	-	-	1P d-l	1P d-l	• The biggest positive effect of the project. Â@This • will lead to higher living standard of the population.
9. Increase of agricultural-related employment opportunity	-	-	1P d-l	1P d-l	• Employment opportunity in marketing of inputs and outputs, processing, etc. will be increased substantially.

Remarks : <1 "with" indicates future condition with mitigation measures

Significance of impact
1 : Significant
2 : Moderate
3 : Minor

Feature of impact
P : Positive
N : Negative

Characteristics of impact
D : Direct
ID : Indirect
S : Short term
L : Long term
R : Reversible
IR : Irreversible

The feature of impacts is indicated as follow:

1P d-s-r meaning that the positive impact would be significant, direct, short term, and reversible.

2N d-s-r meaning that the negative impact would be significant, direct, long term, and reversible.

Table 6.3.1 Summary of Project Costs

(Unit : 1,000 pesos)

Work Item	Jalaur Proper RIS			Suague RIS			Grant Total		
	L/C	F/C	Total	L/C	F/C	Total	L/C	F/C	Total
1 Construction Cost	325,390	374,169	699,560	111,563	118,213	229,776	436,954	492,382	929,336
1.1 Improvement of Diversion Dam	1,443	5,773	7,216	26,025	40,121	66,146	27,468	45,894	73,362
1.2 Irrigation Canal and Related Structures	262,343	296,227	558,570	66,854	61,341	128,195	329,196	357,568	686,765
1.3 Drainage Canal and Related Structures	18,375	39,616	57,992	1,076	1,035	2,110	19,451	40,651	60,102
1.4 Service Road	25,807	11,015	36,821	7,426	3,170	10,596	33,233	14,185	47,418
1.5 Rural Road and Related Structures	13,885	18,000	31,885	9,307	11,672	20,979	23,192	29,672	52,864
1.6 IA Office	2,625	2,625	5,250	875	875	1,750	3,500	3,500	7,000
1.7 Training Center	913	913	1,825	0	0	0	913	913	1,825
2 Procurement of Equipment	0	56,053	56,053	0	3,998	3,998	0	60,050	60,050
2.1 O & M Works	0	48,793	48,793	0	1,578	1,578	0	50,371	50,371
2.2 Institutional Development & Agr. Extension	0	7,260	7,260	0	2,420	2,420	0	9,680	9,680
3 Cost & Expenditure of Training Materials	5,004	5,004	10,008	1,668	1,668	3,336	6,672	6,672	13,344
4 Engineering Services Costs	58,999	73,172	132,171	19,976	42,371	62,347	78,975	115,543	194,519
4.1 Civil Works	32,539	37,417	69,956	11,156	11,821	22,978	43,695	49,238	92,934
4.2 Procurement & Training	26,460	35,755	62,215	8,820	30,550	39,370	35,280	66,305	101,585
5 Irrigators' Association Development Fund	0	6,150	6,150	0	2,050	2,050	0	8,200	8,200
6 Administration Cost	6,608	8,705	15,312	2,265	2,478	4,742	8,873	11,182	20,055
7 Land Acquisition Cost	37,174	0	37,174	7,201	0	7,201	44,375	0	44,375
8 Physical Contingency	43,318	51,710	95,028	14,267	16,873	31,140	57,585	68,583	126,168
9 Price Contingency	97,714	37,054	134,767	30,425	12,095	42,520	128,139	49,149	177,288
Total	574,207	612,016	1,186,223	187,365	199,746	387,111	761,572	811,762	1,573,334

Table 6.3.2 Construction Costs of Civil Works

(Unit : 1,000 pesos)

Work Item	Jalaur Proper RIS			Suague RIS			Grant Total		
	L/C	F/C	Total	L/C	F/C	Total	L/C	F/C	Total
1 Construction Cost									
1.1 Improvement of Diversion Dam	1,443	5,773	7,216	26,025	40,121	66,146	27,468	45,894	73,362
(1) Replacement of the gates *1	1,439	5,754	7,193	439	1,755	2,193	1,877	7,509	9,386
(2) Trash rack *2	5	19	24	0	2	2	5	21	26
(3) River treatment *2	0	0	0	15,865	29,511	45,376	15,865	29,511	45,376
(4) Dam improvement *1	0	0	0	9,720	8,854	18,574	9,720	8,854	18,574
1.2 Irrigation Canal and Related Structures	262,343	296,227	558,570	66,854	61,341	128,195	329,196	357,568	686,765
(1) Main canal	96,793	115,124	211,918	9,852	10,864	20,716	106,645	125,988	232,634
(a) Earth works *1	35,903	52,799	88,702	5,179	6,201	11,380	41,081	59,001	100,082
(b) Canal lining *2	60,891	62,325	123,216	4,673	4,662	9,336	65,564	66,988	132,552
(2) Lateral canal	55,760	61,275	117,034	26,459	18,218	44,677	82,218	79,492	161,711
(a) Earth works *1	38,333	43,442	81,775	13,460	13,514	26,974	51,793	56,956	108,749
(b) Canal lining *2	17,426	17,833	35,259	12,999	4,704	17,703	30,425	22,536	52,961
(3) Feeder canal *2	5,905	5,945	11,850	1,962	1,542	3,504	7,867	7,487	15,354
(4) Settling basin *2	11,345	10,690	22,035	1,535	1,371	2,906	12,880	12,061	24,941
(5) Related structures *1	49,264	55,535	104,799	16,015	20,883	36,898	65,279	76,418	141,697
(6) On-farm facilities *2	43,275	47,658	90,934	11,031	8,464	19,495	54,307	56,122	110,429
1.3 Drainage Canal and Related Structures	18,375	39,616	57,992	1,076	1,035	2,110	19,451	40,651	60,102
(1) Improvement of Abangay *2	8,703	27,953	36,656	0	0	0	8,703	27,953	36,656
(2) Secondary drain *2	1,868	5,962	7,830	148	474	622	2,017	6,436	8,452
(3) Bridge *2	4,175	3,632	7,807	0	0	0	4,175	3,632	7,807
(4) Related structures *1	3,630	2,069	5,699	927	561	1,488	4,557	2,630	7,187
1.4 Service Road *1	25,807	11,015	36,821	7,426	3,170	10,596	33,233	14,185	47,418
1.5 Rural Road and Related Structures	13,885	18,000	31,885	9,307	11,672	20,979	23,192	29,672	52,864
(1) Barangay road *1	8,577	15,215	23,792	5,405	9,624	15,029	13,982	24,839	38,820
(2) Related structures *1	5,308	2,785	8,094	3,903	2,048	5,950	9,211	4,833	14,044
1.6 IA Office *2	2,625	2,625	5,250	875	875	1,750	3,500	3,500	7,000
1.7 Training Center *1	913	913	1,825	0	0	0	913	913	1,825
Sub-Total	325,390	374,169	699,560	111,563	118,213	229,776	436,954	492,382	929,336
2 Engineering Services Costs	32,539	37,417	69,956	11,156	11,821	22,978	43,695	49,238	92,934
3 Administration Cost	6,508	7,483	13,991	2,231	2,364	4,596	8,739	9,848	18,587
4 Land Acquisition Cost	37,174	0	37,174	7,201	0	7,201	44,375	0	44,375
5 Physical Contingency	40,161	41,907	82,068	13,215	13,240	26,455	53,376	55,147	108,523
Total	441,772	460,976	902,749	145,367	145,639	291,006	587,139	606,615	1,193,754

Note *1 Rehabilitation Works
*2 Upgrading Works

Table 6.3.3 Costs of Procurement and Institutional Development Works

(Unit: 1,000 pesos)

		Jalaur Proper RIS			Suague RIS			Total Amount		
		L/C	F/C	Total	L/C	F/C	Total	L/C	F/C	Total
1	Construction Works									
1.1	Construction of IA Office	2,625	2,625	5,250	875	875	1,750	3,500	3,500	7,000
1.2	Renovation of Training Center	913	913	1,825	0	0	0	913	913	1,825
	Subtotal	3,538	3,538	7,075	875	875	1,750	4,413	4,413	8,825
2	Procurement of Equipment									
2.1	O & M Works									
	(1) O & M Equipment	0	48,793	48,793	0	1,578	1,578	0	50,371	50,371
2.2	Institutional Development & Agr. Extension									
	(1) Training & Communication	0	892	892	0	297	297	0	1,190	1,190
	(2) Office equipment	0	383	383	0	128	128	0	510	510
	(3) Transport facilities	0	3,750	3,750	0	1,250	1,250	0	5,000	5,000
	(4) Techno-demo farms	0	2,235	2,235	0	745	745	0	2,980	2,980
	Sub-total	0	7,260	7,260	0	2,420	2,420	0	9,680	9,680
3	Cost & Expenditure of Training Materials	5,004	5,004	10,008	1,668	1,668	3,336	6,672	6,672	13,344
4	Engineering Services Costs	26,460	35,755	62,215	8,820	30,550	39,370	35,280	66,305	101,585
4.1	for implementation of training program	26,460	30,150	56,610	8,820	30,150	38,970	35,280	60,300	95,580
4.2	for procurement of equipment	0	5,605	5,605	0	400	400	0	6,005	6,005
5	Irrigators' Association Development Fund (IADF)	0	6,150	6,150	0	2,050	2,050	0	8,200	8,200
6	Administration Cost for Institutional Development and Procurement	100	1,221	1,321	33	113	147	133	1,334	1,468
7	Physical Contingency	3,156	9,803	12,960	1,052	3,633	4,685	4,209	13,436	17,645
	Total	38,258	117,524	155,782	12,449	42,886	55,335	50,707	160,410	211,117

Table 6.3.4 Summary of Costs on Construction, Procurement & Institutional Development

(Unit : 1,000 pesos)

	Work Item	Jalaur Proper RIS			Suague RIS			Grant Total		
		L/C	F/C	Total	L/C	F/C	Total	L/C	F/C	Total
1	Construction Cost	325,390	374,169	699,560	111,563	118,213	229,776	436,954	492,382	929,336
1.1	Improvement of Diversion Dam	1,443	5,773	7,216	26,025	40,121	66,146	27,468	45,894	73,362
1.2	Irrigation Canal and Related Structures	262,343	296,227	558,570	66,854	61,341	128,195	329,196	357,568	686,765
1.3	Drainage Canal and Related Structures	18,375	39,616	57,992	1,076	1,035	2,110	19,451	40,651	60,102
1.4	Service Road	25,807	11,015	36,821	7,426	3,170	10,596	33,233	14,185	47,418
1.5	Rural Road and Related Structures	13,885	18,000	31,885	9,307	11,672	20,979	23,192	29,672	52,864
1.6	IA Office	2,625	2,625	5,250	875	875	1,750	3,500	3,500	7,000
1.7	Training Center	913	913	1,825	0	0	0	913	913	1,825
2	Procurement of Equipment	0	56,053	56,053	0	3,998	3,998	0	60,050	60,050
2.1	O & M Works	0	48,793	48,793	0	1,578	1,578	0	50,371	50,371
2.2	Institutional Development & Agr. Extension	0	7,260	7,260	0	2,420	2,420	0	9,680	9,680
3	Cost & Expenditure of Training Materials	5,004	5,004	10,008	1,668	1,668	3,336	6,672	6,672	13,344
4	Engineering Services Costs	58,999	73,172	132,171	19,976	42,371	62,347	78,975	115,543	194,519
4.1	Civil Works	32,539	37,417	69,956	11,156	11,821	22,978	43,695	49,238	92,934
4.2	Procurement of Equipment	0	5,605	5,605	0	400	400	0	6,005	6,005
4.3	Implementation of Training Program	26,460	30,150	56,610	8,820	30,150	38,970	35,280	60,300	95,580
5	Irrigators' Association Development Fund (IADF)	0	6,150	6,150	0	2,050	2,050	0	8,200	8,200
6	Administration Cost	6,608	8,705	15,312	2,265	2,478	4,742	8,873	11,182	20,055
6.1	Civil Works	6,508	7,483	13,991	2,231	2,364	4,596	8,739	9,848	18,587
6.2	Procurement & Implementation of Training	100	1,221	1,321	33	113	147	133	1,334	1,468
7	Land Acquisition Cost	37,174	0	37,174	7,201	0	7,201	44,375	0	44,375
8	Physical Contingency	43,318	51,710	95,028	14,267	16,873	31,140	57,585	68,583	126,168
8.1	Civil Works	40,161	41,907	82,068	13,215	13,240	26,455	53,376	55,147	108,523
8.2	Procurement & Implementation of Training	3,156	9,803	12,960	1,052	3,633	4,685	4,209	13,436	17,645
	Total	476,493	574,963	1,051,455	156,941	187,650	344,591	633,433	762,613	1,396,046

Table 7.1.1 Economic Incremental Benefit

	Without-Project			With-Project			Incremental		Incremental	Cropping Intensity		Service
	Cropped Area	Profit per ha	Profit Total	Cropped Area	Profit per ha	Profit Total	Cropped Area	Total Profit	Benefit per ha	Without	With	Area
	ha	peso/ha	x 1000peso	ha	peso/ha	x 1000peso	ha	x 1000peso	1000 peso/ha	%	%	ha
Jalaur Proper												8,820
1st Paddy Irrigated, direct	6120	11,019	48,594	4,410	20,126	88,756	-1,710					
2nd Paddy Irrigated, direct	4910	10,313	45,483	4,410	19,545	86,194	-500					
1st Paddy Irrigated, trans.	0			4,410	18,747	82,673	4,410					
2nd Paddy Irrigated,trans.	0			4,410	18,747	82,673	4,410					
1st Paddy Rainfed	2600	5,954	15,480	0	0	0	-2,600					
2nd Paddy Rainfed	1940	5,954	11,551	0	0	0	-1,940					
3rd paddy	1200	5,821	6,985	1,200	5,821	6,985	0					
watermelon	100	13,911	1,391	100	13,911	1,391	0					
mungbean rainfed	600	4,963	2,978	600	4,963	2,978	0					
Total	17,470		132,461	19,540		351,650	2,070	219,189	24.9	198	222	
Suague												2,900
1st Paddy Irrigated, direct	2540	12,709	32,281	1,450	20,126	29,183	-1,090					
2nd Paddy Irrigated, direct	1870	11,093	20,745	550	19,545	10,750	-1,320					
1st Paddy Irrigated, trans.	0		0	1,450	18,747	27,183	1,450					
2nd Paddy Irrigated,trans.	0		0	550	18,747	10,311	550					
1st Paddy Rainfed	360	5,954	2,143	0		0	-360					
2nd Paddy Rainfed	610	5,954	3,632	0	0	0	-610					
3rd paddy	50	5,821	291	50	5,821	291	0					
watermelon	20	13,911	278	20	13,911	278	0					
mungbean rainfed	150	4,963	744	150	4,963	744	0					
mungbean irrigated	0	0	0	1,800	11,445	20,601	1,800					
Total	5,600		60,115	6,020		99,341	420	39,226	13.5	193	208	
Total												11,720
1st Paddy Irrigated, direct	8,660		80,875	5,860		117,939	-2,800					
2nd Paddy Irrigated, direct	6,780		66,227	4,960		96,944	-1,820					
1st Paddy Irrigated, trans.	0		0	5,860		109,855	5,860					
2nd Paddy Irrigated,trans.	0		0	4,960		92,983	4,960					
1st Paddy Rainfed	2,960		17,624	0		0	-2,960					
2nd Paddy Rainfed	2,550		15,183	0		0	-2,550					
3rd paddy	1,250		7,276	1,250		7,276	0					
watermelon	120		1,669	120		1,669	0					
mungbean rainfed	750		3,722	750		3,722	0					
mungbean irrigated	0		0	1,800		20,601	1,800					
Total	23,070		192,576	25,560		450,991	2,490	258,415	22.0	197	218	

Table 7.1.2 Economic Prices (1/2 : for Paddy)

Rice	Unit	1997	2000	2005	2010
WB price,1990 constant, FOB Bangkok	$/t	301	279	267	262
WB price,1997 constant, FOB Bangkok	$/t	330	306	293	287
Quality discount	%	20	20	20	20
Ocean freight & insurance	$/t	53	53	53	53
CIF, Iloilo	$/t	317	298	287	283
In peso, 1US$ = 35.1 peso	P/t	11127	10451	10079	9931
Port handling & other costs	P/t	145	145	145	145
Importer's margin, 7.5% of CIF	P/t	835	784	756	745
Ex-warehouse price(a)	P/t	12106	11380	10980	10821
Transport cost to markets(b)	P/t	58	58	58	58
70peso/3km/ton*0.83(SCF)					
Trader's margin, 2% of (a)+(b)	P/t	243	229	221	218
Wholesale price	P/t	12407	11667	11258	11096
Transport cost to mill	P/t	388	388	388	388
467peso/20km/ton x 0.83					
Ex-mill price	P/t	12019	11279	10870	10708
Milling cost	P/t	332	332	332	332
By-product value, 100kg x 5.5P x 0.83	P/t	457	457	457	457
Pre-mill price	P/t	12144	11404	10995	10833
Palay equivalent price, x 0.65	P/t	7894	7413	7147	7042
Transport cost to mill, 4km	P/t	77	77	77	77
Farm gate price of palay	P/t	7816	7335	7070	6964

Table 7.1.2 Economic Prices (2/2 : for Fertilizers)

Urea	Unit	1997	2000	2005	2010
WB price,1990 constant, FOB Indonesia	$/t	146	143	135	128
WB price,1997 constant, FOB Indonesia	$/t	160	157	148	140
Ocean freight & insurance	$/t	53	53	53	53
CIF, Iloilo	$/t	213	210	201	193
In peso	P/t	7482	7366	7058	6789
Marketing cost, 7% of CIF estimated by ADB	P/t	524	516	494	475
Retail price	P/t	8006	7882	7553	7264
Transport cost to farm,	P/t	388	388	388	388
Farm gate price	P/t	8394	8270	7941	7652
Farm gate price of nitrogen	P/kg	18.7	18.4	17.6	17.0
TSP	Unit	1997	2000	2005	2010
WB price,1990 constant, FOB Indonesia	$/t	157	126	114	104
WB price,1997 constant, FOB Indonesia	$/t	172	138	125	114
Ocean freight & insurance	$/t	53	53	53	53
CIF, Iloilo	$/t	225	191	178	167
In peso	P/t	7906	6693	6261	5846
Marketing cost, 7% of CIF estimated by ADB	P/t	553	468	438	409
Retail price	P/t	8459	7161	6700	6255
Transport cost to farm	P/t	388	388	388	388
Farm gate price	P/t	8847	7549	7088	6643
Farm gate price of phophoric oxide	P/kg	19.7	16.8	15.8	14.8
Potassium chloride	Unit	1997	2000	2005	2010
WB price,1990 constant, FOB Indonesia	$/t	107	103	87	88
WB price,1997 constant, FOB Indonesia	$/t	117	112	95	96
Ocean freight & insurance	$/t	53	53	53	53
CIF, Iloilo	$/t	170	165	148	149
In peso	P/t	5967	5807	5203	5229
Marketing cost, 8% of CIF estimated by ADB	P/t	477	465	416	418
Retail price	P/t	6444	6272	5619	5648
Transport cost to farm	P/t	388	388	388	388
Farm gate price	P/t	6832	6660	6007	6036
Farm gate price of potash	P/kg	12.4	12.1	10.9	11.0

Table 7.1.3 Economic Production Cost in With-project Condition

Crop Category		1st Paddy Irrigated			2nd Paddy Irrigated			Mungbean Irrigated		
		Qty	Price peso	Value peso	Qty	Price peso	Value peso	Qty	Price peso	Value peso
Seeds	kg	100	7	707	100	7	707	25	25	623
Fertilizer										
N	kg	100	18	1,765	100	18	1,765	30	18	529
P2O5	kg	35	16	551	35	16	551	30	16	473
K2O	kg	35	11	382	35	11	382	30	11	328
Chemicals				1,370			1,951			664
Labor										
Hired	man-day	40	48	1,920	40	48	1,920	25	48	1,200
Family	man-day	40	48	1,920	40	48	1,920	24	48	1,152
Machine/Tool/Animal				2,075			2,075			1,660
Fuel/Oil				83			83			83
Irrigation Service Fe	peso			0			0			0
Harvesters Share	peso			4,451			4,451			2,594
Interest	Peso			0			0			0
Total	Peso			15,224			15,805			9,305

Crop Category		1st Trans. Paddy Irrigated			2nd Trans. Paddy Irrigated		
		Qty	Price peso	Value peso	Qty	Price peso	Value peso
Seed	kg	50	7	353	50	7	353
Fertilizer							
N	kg	100	18	1,765	100	18	1,765
P2O5	kg	35	16	551	35	16	551
K2O	kg	35	11	382	35	11	382
Chemicals				1,951			1,951
Labor							
Hired	man-day	52	48	2,496	52	48	2,496
Family	man-day	52	48	2,496	52	48	2,496
Machine/Tool/Animal				2,075			2,075
Fuel/Oil				83			83
Irrig. Service Fee	peso			0			0
Harvester's Share	peso			4,451			4,451
Interest	Peso			0			0
Total	Peso			16,603			16,603

Table 7.1.4 Economic Production Cost in Without-project Condition

Crop Category		1st Paddy Irrigated			2nd Paddy Irrigated			3rd Paddy			Paddy Rainfed		
		Qty	Price peso	Value peso	Qty	Price peso	Value peso	Qty	Price peso	Value peso	Qty	Price peso	Value peso
Seeds	kg	140	7	990	140	7	990	140	7	990	140	7	990
Fertilizer													
N	kg	93	18	1,641	93	18	1,641	60	18	1,059	60	18	1,059
P2O5	kg	28	16	441	28	16	441	14	16	221	14	16	221
K2O	kg	13	11	142	13	11	142	7	11	76	10	11	109
Chemicals				1,127			1,127			768			768
Labor													
Hired	man-day	35	48	1,680	36	48	1,728	28	48	1,344	28	48	1,344
Family	man-day	34	48	1,632	35	48	1,680	28	48	1,344	28	48	1,344
Machine/Tool/Animal				2,034			2,117			2,100			1,975
Fuel/Oil				42			125			125			83
Irrigation Service Fe	peso			0			0			0			0
Harvesters Share	peso			3,293			3,027			1,994			1,994
Interest	Peso			0			0			0			0
Total	Peso			13,021			13,017			10,019			9,886

Crop Category		Paddy Irrigated (transplanted)			Mungbean			Watermelon(Vegetables)		
		Qty	Price peso	Value peso	Qty	Price peso	Value peso	Qty	Price peso	Value peso
Seeds	kg	100	7	707	25	25	623	4	664	2,656
Fertilizer										
N	kg	93	18	1,641	30	18	529	50	18	882
P2O5	kg	28	16	441	0	16	0	14	16	221
K2O	kg	13	11	142	0	11	0	14	11	153
Chemicals				1,141						1,245
Labor										
Hired	man-day	50	48	2,400	9	48	432	40	48	1,920
Family	man-day	49	48	2,352	8	48	384	40	48	1,920
Machine/Tool/Animal				2,117			249			166
Fuel/Oil				125			83			166
Irrig. Service Fee	peso			0			0			0
Harvesters' Share	peso			3,027			1,038			3,320
Interest	Peso			0			0			0
Total	Peso			14,092			3,337			12,649

Table 7.1.5 Economic Crop Net Income per ha in the Future

	Without project					With-Project				
	Output			Production	Profit	Output			Production	Profit
	Qty	Price	Value	Cost		Qty	Price	Value	Cost	
	ton	peso/ton	peso	peso	peso	ton	peso/ton	peso	peso	peso
Jalaur Proper										
1st Paddy Irrigated, direct	3.40	7,070	24,040	13,021	11,019	5.00	7,070	35,350	15,224	20,126
2nd Paddy Irrigated, direct	3.30	7,070	23,330	13,017	10,313	5.00	7,070	35,350	15,805	19,545
1st Paddy Irrigated, trans.	-	-	-	-	-	5.00	7,070	35,350	16,603	18,747
2nd Paddy Irrigated,trans.	-	-	-	-	-	5.00	7,070	35,350	16,603	18,747
1st Paddy Rainfed	2.24	7,070	15,840	9,886	5,954	2.24	7,070	15,840	9,886	5,954
2nd Paddy Rainfed	2.24	7,070	15,840	9,886	5,954	2.24	7,070	15,840	9,886	5,954
3rd paddy	2.24	7,070	15,840	10,019	5,821	2.24	7,070	15,840	10,019	5,821
watermelon	4.00	6,640	26,560	12,649	13,911	4.00	6,640	26,560	12,649	13,911
mungbean rainfed	0.40	20,750	8,300	3,337	4,963	0.40	20,750	8,300	3,337	4,963
Suague										
1st Paddy Irrigated, direct	3.64	7,070	25,730	13,021	12,709	5.00	7,070	35,350	15,224	20,126
2nd Paddy Irrigated, direct	3.41	7,070	24,110	13,017	11,093	5.00	7,070	35,350	15,805	19,545
1st Paddy Irrigated, trans.	-	-	-	-	-	5.00	7,070	35,350	16,603	18,747
2nd Paddy Irrigated,trans.	-	-	-	-	-	5.00	7,070	35,350	16,603	18,747
1st Paddy Rainfed	2.24	7,070	15,840	9,886	5,954	2.24	7,070	15,840	9,886	5,954
2nd Paddy Rainfed	2.24	7,070	15,840	9,886	5,954	2.24	7,070	15,840	9,886	5,954
3rd paddy	2.24	7,070	15,840	10,019	5,821	2.24	7,070	15,840	10,019	5,821
watermelon	4.00	6,640	26,560	12,649	13,911	4.00	6,640	26,560	12,649	13,911
mungbean rainfed	0.40	20,750	8,300	3,337	4,963	0.40	20,750	44,820	3,337	41,483
mungbean irrigated	-					1.00	20,750	20,750	9,305	11,445

Table 7.1.6 Economic Rate of Return

(Unit : million peso)

Project	Jalaur proper				Suague				Total					Benefit	Initial cost	
Year	Benefit	Initial Cost	Replacement Cost	Annual Cost	Benefit	Initial Cost	Replacement Cost	Annual Cost	Benefit	Initial Cost	Replacement Cost	Annual Cost	Net Benefit	10% reduction	10% increase	Combination
1		80		11		14		3	0	94		14	-108	-108	-118	-118
2		23		11		11		3	0	34		14	-48	-48	-51	-51
3		249		11		88		3	0	337		14	-351	-351	-384	-384
4	44	270		11	8	155		3	52	425		14	-388	-393	-430	-435
5	88	210		8	16	8		3	103	218		11	-126	-136	-147	-158
6	132	7		8	24	4		3	155	11	11	11	123	107	122	106
7	175			8	31			3	207			11	195	175	195	175
8	219			8	39			3	258			11	247	221	247	221
9	219			6	39			2	258			8	250	224	250	224
10	219		1	6	39		0.5	2	258		2	8	248	222	248	222
11	219			6	39			2	258			8	250	224	250	224
12	219			6	39			2	258			8	250	224	250	224
13	219			6	39			2	258			8	250	224	250	224
14	219			6	39			2	258			8	250	224	250	224
15	219		23	6	39		7	2	258		30	8	220	194	220	194
16	219			6	39			2	258			8	250	224	250	224
17	219			6	39			2	258			8	250	224	250	224
18	219			6	39			2	258			8	250	224	250	224
19	219			6	39			2	258			8	250	224	250	224
20	219		30	6	39		8	2	258		39	8	211	185	211	185
21	219			6	39			2	258			8	250	224	250	224
22	219			6	39			2	258			8	250	224	250	224
23	219			6	39			2	258			8	250	224	250	224
24	219			6	39			2	258			8	250	224	250	224
25	219			6	39			2	258			8	250	224	250	224
26	219			6	39			2	258			8	250	224	250	224
27	219			6	39			2	258			8	250	224	250	224
28	219			6	39			2	258			8	250	224	250	224
29	219			6	39			2	258			8	250	224	250	224
30	219		24	6	39		8	2	258		32	8	218	192	218	192
	219				39				258							
IRR													16.4%	14.8%	15.1%	13.6%
Initial cost		839				279				1118						

Table 7.2.1 Increment of Job Opportunity

	Without-Project			With-Project			Incremental
	Cropped Area	Labor requirement per ha	Total	Cropped Area	Labor requirement per ha	Total	
	ha	men-day/ha	1000men-day	ha	men-day/ha	1000men-day	1000men-day
Jalaur Proper							
1st Paddy Irrigated, direct	6120	69	304	4,410	80	353	-1,710
2nd Paddy Irrigated, direct	4910	71	313	4,410	80	353	-500
1st Paddy Irrigated, trans.	0			4,410	104	459	4,410
2nd Paddy Irrigated,trans.	0			4,410	104	459	4,410
1st Paddy Rainfed	2600	56	146	0	0	0	-2,600
2nd Paddy Rainfed	1940	56	109	0	0	0	-1,940
3rd paddy	1200	56	67	1,200	56	67	0
watermelon	100	80	8	100	80	8	0
mungbean rainfed	600	17	10	600	17	10	0
Total	17,470		957	19,540		1,708	2,070
Suague							
1st Paddy Irrigated, direct	2540	69	175	1,450	80	116	-1,090
2nd Paddy Irrigated, direct	1870	71	133	550	80	44	-1,320
1st Paddy Irrigated, trans.	0		0	1,450	104	151	1,450
2nd Paddy Irrigated,trans.	0		0	550	104	57	550
1st Paddy Rainfed	360	56	20	0		0	-360
2nd Paddy Rainfed	610	56	34	0	0	0	-610
3rd paddy	50	56	3	50	56	3	0
watermelon	20	80	2	20	80	2	0
mungbean rainfed	150	17	3	150	17	3	0
mungbean irrigated	0	0	0	1,800	49	88	1,800
Total	5,600		369	6,020		463	420
Total							
1st Paddy Irrigated, direct	8,660		480	5,860		469	-2,800
2nd Paddy Irrigated, direct	6,780		446	4,960		397	-1,820
1st Paddy Irrigated, trans.	0		0	5,860		609	5,860
2nd Paddy Irrigated,trans.	0		0	4,960		516	4,960
1st Paddy Rainfed	2,960		166	0		0	-2,960
2nd Paddy Rainfed	2,550		143	0		0	-2,550
3rd paddy	1,250		70	1,250		70	0
watermelon	120		10	120		10	0
mungbean rainfed	750		13	750		13	0
mungbean irrigated	0		0	1,800		88	1,800
Total	23,070		1,326	25,560		2,171	2,490