3.7 Irrigation and Drainage System

3.7.1 Existing Irrigation System

In and around the study areas, three (3) kinds of existing irrigation systems are found consisting of (i) the national (river) irrigation system (RIS), (ii) the communal irrigation system (CIS) and (iii) private irrigation system. The national (river) irrigation systems are the 5 river irrigation systems, namely, Jalaur proper, Jalaur extension, Suague, Sta. Barbara and Aganan RISs. The communal irrigation systems are scattered at 8 sites in and around the study area. The pump irrigation system has been constructed at the 2 sites and being constructed at the one (1) site in the Jalaur RIS areas. The private irrigation systems are mainly expanded in numerous spots of the upper reach of the respective big rivers concerned with the RIS as shown in Figure A.3.28. The water resource of these private irrigation systems is river water, and the water is drawn up by brush dam, small potable pump and small permanent check structure.

(1) River irrigation system (RIS)

In accordance with the updated salient features of the 5 RISs, the irrigation service area of each RIS is estimated as shown below, and the total irrigation area reaches 21,760 ha.

RIS	Irrigation Services Area (ha)
Jalaur prooper	8,820
Jalaur extension	2,620
Suague	2,960
Sta. Barbara	3,000
Aganan	4,360
Total	21,760

Irrigation services areas of Aganan and Sta. Barbara RISs have drastically changed due to land conversion. Majority of the irrigation services areas of Aganan and Sta. Barbara RISs , particularly in the tail portion of RIS area near Iloilo city, are being converted into a built-up area for housing and industrial development (areas as view from administrative aspect). These areas are already bought and occupied by land developers from the private sector, and agriculture activities are not carried out at present.

In the Jalaur RIS area, the pump irrigation system has been constructed at the 2 sites by NIA to make supplemental water supply in the dry season. The management of the pump irrigation are conducted by NIA and IA, and scheduled to transfer to the IA within one (1) year.

In addition, the one (1) private pump irrigation system is being constructed in the Jalaur RIS under the NIA's technical assistance. The management will be conducted by the IA.

(2) Existing communal irrigation system (CIS)

The existing communal irrigation systems which are sustained with NIA' s technical support are found at 8 sites in and around the study area. These systems comprise 8 communal irrigation systems (CIS) in the upper stream from the diversion dams of the RISs. The 4 CIS are not operational due to the deterioration of irrigation facilities and institutional reasons such as lack of leadership of irrigator's associations (IA) and technical support services from the agencies concerned. In addition to the CISs, two (2) pump irrigation projects (PIPs) which are also sustained with NIA' s technical support are being constructed in the Jalaur proper RIS area. The PIPs are

implemented to conduct supplementary irrigation in the tail portion of the Jalaur proper RIS area. Table A.3.23 shows the status of the existing CISs.

(3) Private irrigation system

Majority of the private irrigation systems are located in the upper reach of the existing headwork of the respective RISs. The total irrigation area of the private irrigation system is estimated at approximately 3,000 ha in the 4 river basins as shown below.

River Basin cum RIS	Irr. Service area	Private Irrigation System in the Upper Reach						Ratio to Irrigation Area of the RISs
		Individual Irr. System		Group Irr. System		Total		
	(ha)	Nos.	Area (ha)	Nos.	Area (ha)	Nos.	Area (ha)	%
Jalaur RIS	11,440	346	876	11	544	357	1,420	12.4
Suague RIS	2,960	191	478	14	557	205	1,035	35.0
Sta. Barbara RIS	3,000	27	241	2	18	29	259	8.6
Aganan RIS	4,360	20	136	8	138	28	274	6.3
Total	21,760	584	1,731	35	1,257	619	2,988	13.7

The irrigation areas are concentrated in the upper reaches of the Jalaur and Suague rivers, and the ratio of private irrigation area against the RIS area concerned ranges from approximately 6 % in Aganan basin to 35 % in Suague basin.

The private irrigation systems are managed by the individual operation system and group operation system. The group irrigation systems are mainly constructed under the supervision of the Department of Agriculture (DA), and the systems are categorized as small water impounding project and / or small diversion dam project. Technical assistance for irrigation and paddy cultivation is provided by the municipal agriculture officer (MAO).

The water sources of these irrigation systems are surface water from the big rivers and their tributaries, the gravity irrigation system by using brush dam and / or permanent diversion dam, and the pumping irrigation system by using portable pumps and pipes conducted to sustain a year - round paddy cultivation. However, majority of the systems have not obtained water right for the irrigation use. In addition, shallow ground water is also exploited for irrigation use in some elevated agricultural land under the DA's supervision.

3.7.2 Irrigation Extension Area

The irrigation extension areas shown in Figure A.3.29 were originally identified in the Jalaur River Multipurpose Project (JRMP). In the feasibility study report on JRMP, it was planned that these extension areas except Extension Area No. 6 (2,830 ha) would be irrigated by using water to be delivered through a proposed transbasin diversion channel (so-called lowline canal). The lowline canal would have a length of 53.7 km extending from the Jalaur River to the Aganan River. Irrigation water would be delivered to the canal from the Jalaur River pumping plant. The first 39 km of the canal would extend to the Sta. Barbara relift pumping plant where water would be lifted for delivery through the terminal portion of the canal. The principal purpose of the lowline canal and pumping plants would be to convey supplement irrigation water from the Jalaur River to the existing Suague RIS, Sta. Barbara RIS and Aganan RIS and the extension areas. Although the implementation of JRMP was stopped due to a low economic viability, these extension areas were still proposed in the Study.

The possibility of irrigated agriculture development for the extension area was examined and the following were found:

(a) Supplementary irrigation to the extension areas (No.1 to No.5) even in the wet season would be limited because of the exclusion of small impounding dam construction for new water resources development which has been found to have low economic and technical viability,

(b) Gravity irrigation to the extension areas (No.1 to No5) would be difficult and/or limited due to the topographic conditions, which would result in low economic viability of the development plan, and

(c) As regards the extension area (No.6) located around the Jalaur extension RIS, most of the areas are occupied by large sugarcane fields which remained undistributed to small farmers due to slow progress of CARP implementation.

Considering the above findings, the proposed extension areas are excluded from the development plan.

3.7.3 Diversion Dam

Irrigation water is off-taken at each diversion dam of the RISs, and Jalaur proper and extension RISs own jointly the same diversion dam. All the diversion dams are Ogee type and have scouring sluice of the open channel type. The Jalaur diversion dam has scouring sluice of the under sluice type. Except for Sta. Barbara diversion dam, all the diversion dams have high and low water channel sections.

Off-taking method of irrigation water is of orifice type, providing slide gates of the intake structure, and discharge measuring facility is provided mainly in the downstream from intake gates. However, the operation record of off-taking discharge is not sustained due to improper water management. In addition, the trashrack is not provided in front of the intake gates, and communication system such as radio system is not provided at all diversion sites for water operation. The salient features of the respective headwork are summarized below.

Description	unit	Jalaur	Suague	Sta. Barbara	Aganan
Diversion Weir		Ogee type with check gates	Ogee type	Ogee type	Ogee type
Check gate nos./size		13 / H 3.5 X W 5 ~ 6			
Scouring sluice		Undersluice type and Open channel type	Open channel type	Open channel type	Open channel type
Gate nos./size		Under sluice 2 / H 1.82 x W 4.26 Open channel	Open channel 1 / H 2.6 x W 5.2	Open channel 1 / H 2.5 x W 4.0	Open channel 1 / H 2.5 x W 4.6
Design flood water level	EL. m	27.07	?	?	?
High water level	EL. m	24.76	?	?	?
Elevation of weir crest	EL. m	-	-	25.6	-
High water channel section	EL. m	23.52	40.9	-	36.37
Low water channel section	EL. m	20.22	40.7	-	36.17
Length of weir	m	174	150	150	217
High water channel section	m	78	134	-	136
Low water channel section	m	96	16	-	82
Height of weir	m	-	-	2.5	-
High water channel section	m	5.15	1.8	-	2.8
Low water channel section	m	3.42	1.6	-	2.6
Intake method / structure		Orifice type			
Type of intake		Box conduit	Box conduit	Box conduit	Box conduit
Intake gate nos./size		Both banks	2 / H 1.8 x W 1.45	6 / H 1.0 x W 1.95	2 / H 1.0 x W 2.1
Intake discharge	m^3/sec				
Right bank		13.5	4.5	-	7.3
Left bank		4.0	-	7.8	-
Water level at Sta. 0 of Head race					
Right bank	EL. m	23.22		-	35.38
Left bank	EL. m	23.27	-	25.03	-
Measuring devices		Staff guage	Staff guage	Staff guage	Staff guage
Settling basin		No installation	No installation	No installation	No installation

All the dams are still functional, but some portion of the dams have deteriorated and damaged. Damage condition and problem of the diversion dams are summarized below. The detailed are shown in Table A.3.24.

(a) Jalaur diversion dam

Scouring sluice and intake gates have the technical trouble of gate lifting system during gate operation, and rubber seal of all gates is deteriorated. The downstream apron is deteriorated, and the steel iron of the apron is exposed. Trashrack for intake gates and communication facilities for monitoring and emergency are not provided.

(b) Suague diversion dam

Scouring sluice gates and intake gates have the technical trouble of gate lifting system during gate operation. Rubber seal of scouring sluice gates is deteriorated. The downstream apron, bottom floor of scouring sluice, retaining wall at the right bank and riverbed protection in the downstream are damaged due to flood. Trashrack for intake gates and communication facilities for monitoring and emergency are not provided.

(c) Aganan diversion dam

Intake gates have the technical trouble of gate lifting system during gate operation. Rubber seal of scouring sluice gates is deteriorated. Bottom floor of

scouring sluice is abraded. Trashrack for intake gates and communication facilities for monitoring and emergency are not provided.

(d) Sta. Barbara

Intake structure has a small damages, and the one (1) intake gate is not functional. Trashrack for intake gates and communication facilities for monitoring and emergency are not provided.

According to the results of interview survey to the municipal planning and development officers (MPDO) concerned, intrusion of the river bed load is observed in sections of head race and main canal because of the huge sedimentation occurring in the just upper stream from the existing diversion dam and intake gates due to improper operation of scouring sluice of dams. As for the diversion dams of the Suague and Aganan RISs, much meandering of river course are observed in the just upper stream from the diversion dams, while the current river course is generally similar to the previous river courses which are traced in the topographic maps with a scale of 1/4,000 prepared based on the aerial photographs taken in 1966.

3.7.4 Irrigation and Drainage Canal System of RISs

Present RISs comprise mainly of main irrigation canal system and service road system. Drainage canal systems are entrusted to natural rivers and creeks system in the RIS areas. Main canal system of the RISs ordinarily consists of a main canal and the lateral canals. Except for the main canal in the Aganan RIS, majority of the main and lateral canals are earth canals, and maintained annually for 2 months from March to April.

However, proper hydraulic flow is not always sustained in canals due to the over excavation of canal sections and backwater caused by siltation and the accumulated debris at in - flow sections of related structures. No proper water management is found in the entire RIS areas because irrigation water is distributed without the metric volume measuring system of irrigation water discharge at head gate structure and turnout. Design water level of turn out is not sustained properly due to the deterioration of check structure and improper installation of gates at turnout structure. Siltation also occurred in the main canal system due to lack of settling basin at the head race section. Spill-out operation system of irrigation water in emergency case can not be expected to function in the canal networks due to the lack of spillway around siphon and aqueduct structure.

The inventory survey on the status of existing related structures to canals are carried out in the services areas of the Aganan, Sta. Barbara and Jalaur proper RIS, and the confirmed number of existing related structures are 443 consisting of head gate, check structure, drop, bridge, crossing structure (culvert), turnout, drainage inlet, siphon, cross drain, drainage culvert, etc.. The related structures are broadly divided into two (2) groups such as permanent structures constructed during the past construction and rehabilitation period of canal networks, and temporary structures constructed by farmers due to technical reasons of water management. The permanent structures consist of about 63 % of all structures confirmed during the survey.

The distinguished status of deterioration of the structures is summarized as follows :

(i) Slide gates are of installation and severely damaged at majority of head gates and turnouts, and the number of head gates and turnouts without gate is nearly 50 %.
(ii) Measuring devices are not prepared at majority of head gates and turnouts.

(iii) A lot of riprap protections provided in inlet and outlet of the structures such as head gate, check structure, bridge, turnout, siphon and culvert are severely damaged.

Main drainage canal systems are natural rivers and creeks in the RIS areas and linked with secondary drainage canals which are being maintained by IAs.

The Jalaur proper RIS has flood and inundation problem in the tail portion of the RIS area, and the Suague RIS has inundation problem in the tail portion of the area.

The flood occurs at the middle reach of the Jalaur river near Barotac Nuevo municipality and flows into the Jalaur proper and extension RIS areas during the big typhoon . The flood water gives the inundation in the tail portion of the Jalaur proper RIS area for 2 to 3 days , but does not give the deterioration of agriculture land.

Furthermore, in the low land of the tail portion of the Jalaur proper RIS, the inundation occurs during only heavy rainfall at the high tide in the rainy season. Main reason of the inundation is backwater caused by the high tide. However, the inundation period is 2 to 3 days, and the heavy inundation damage does not occurs in the paddy field. Another inundation also occurs in the irrigated paddy field along the highway Zarraga - Barotac Nuevo due to the lack of drainage culvert.

The inundation of the Suague RIS area is found in the topographic depression area along the highway Zarraga - Pototan. The inundation is caused due to the poor drainage system of the highway.

The service road is incidentally provided along main and lateral canals for inspection of canals and for transportation of agriculture inputs and outputs. All the service roads have gravel pavement, but the pavement is poor and impassable in the rainy season. Some service roads also have bottle neck for jeepny passing which are caused due to deterioration of canal embankment.

The services roads function as one of the rural road networks. The LGUs also expect the function of the farm - to - market road to the service road, but some service roads are not linked with rural roads. The function of the farm - to - market road are not realized at present. The salient features of the RISs are shown below.

Description	unit	Jalaur Proper	Jalaur Extension	Suague	Sta. Barbara	Aganan
Water resources		Jalaur	Jalaur	Suague	Tigum	Aganan
Proposed service area	ha	8,820	2,620	2,960	3,000	4,360
Approved water right	m^3/sec		29.5	6.0	7.5	8.0
Design discharge at intake	m^3/sec	13.5	4.0 (Max.12.3)	4.5	7.8	7.3
Length of headrace	km	2.1	6.3	1.5	4.9	2.8
No. of main and lateral canal	nos.	30	10	9	12	12
Total length of main and lateral canals	km	130.3	43.2	37.8	45.8	47.5
Total length of drainage canals	km	54.4	16.2	18.3	15.4	32.6
No. of turnout	nos.	261	93	76	136	271
Total length of services roads	km	47.4	32.4	20.5	42.7	45.0
No. of access roads	nos.	1	0	0	1	0
Total length of access roads	km	7.7	0.0	0.0	0.3	0.0
Average command area	ha	34.0	27.0	39.0	22.0	18.0
Municipalities served		Dingle	Barotac Nuevo	Mina	Pavia	Pavia
		Zarraga	Dumangas	Pototan	Sta. Barbara	Sta. Barbara
		Pototan	Dingle	New Lucena	Leganes	San Miguel
		New Lucena	Anilao		Iloilo city	Oton
		Barotac Nuevo				Iloilo city
		Dumangas				

3.7.5 On-Farm Irrigation System of RISs

Irrigation services area of each RIS is broadly divided into several number of irrigation division areas which are directly concerned with the activities on NIA's water management. On the other hand, the irrigators association area also overlaps with the irrigation division areas, and some irrigation divisions are divided into two irrigators association areas. Water management and maintenance works in each irrigators association area is directly managed by the irrigators association, subject to the status of its' O & M contract with NIA.

On-farm irrigation canal system consists of main farm ditches and supplementary farm ditches, and all the canals are earth canals which are seasonally maintained by the IAs.

According to the NIA's information on the layout of main and supplementary farm ditches and drains, the canal layout in which irrigation canal and drain networks are completely separated is announced to be established in the field. However, the canal system has never been established. At present, the farm ditches have usually double functions as irrigation canal in the upper stream of the canal, and drainage in the downstream of the canal.

The average command area of turnout in the Jalaur proper and extension and Suague RISs is a bigger area of more than 25 ha, and the ones of the Sta. Barbara and Aganan RISs are less than 22 ha. The average length of main farm ditches is estimated at approximately 700 m. Typical features of the on-farm irrigation system are shown below.

Description	unit	Jalaur Proper	Jalaur Extension	Suague	Sta. Barbara	Aganan
Service Area	ha	8,820	2,620	2,960	3,000	4,360
No. of Turnout	nos.	261	93	76	136	271
Average Command Area	ha	34.0	27.0	39.0	22.0	18.0
No. of Orrigation Division	nos.	11	4	4	4	6
No. of IA	nos.	14	6	5	3	6
Potential Member of IA	household	3,991	1,782	1,770	1,445	2,279
No. of IA for O & M Contract	nos.	12	5	5	3	3
Type 1		11	5	5	0	0
Type 1 & 2		1	0	0	3	3
Contracted Canal	km	73.6	27.8	32.9	26.4	18.5

3.7.6 Overall Irrigation Efficiency

Overall irrigation efficiency of each RIS is roughly estimated to make a simple water balance based on the benefited area of paddy cultivation, seasonal net irrigation water requirement and runoff at each diversion dam. The water balance is made based on the reliability of the 80 % chance of the drought year. Since the discharge data of the irrigation water absorbed at intake gate is not reliable due to the affection of backwater to the measuring staff of the intake gate, it give an assumption that all seasonal runoff at the diversion dam will be absorbed for irrigation, and then the overall irrigation efficiency in the dry season paddy is specially verified, based on the benefited area of the each RIS.

The overall irrigation efficiency in the dry season is respectively estimated at about 30 % for the Sta. Barbara and Aganan RISs, approximately 25 % for Suague RIS and about 20 % for Jalaur proper and extension RISs.

Taking into consideration present conditions of irrigation canal and related structures and on-farm irrigation system, main reasons of the low overall irrigation efficiency for the RISs are the improper water operation , the lack of the control structures in canals and the lack of the skillfulness on operation of the NIA staff Therefore, necessary amount of irrigation water can not be sufficiently delivered into the irrigation area to be programmed, and the some amount of the water is wasted into other canals and drains.

3.7.7 Constraints to Development

Constraints to irrigation and drainage development are generally summarized below.

(1) Irrigation

(a) Land conversion suffers to the tail portion of the Aganan and Sta. Barbara RISs due to the expansion of the urbanization of Iloilo city. The irrigated paddy field is converted to the residential and industrial areas. The Jalaur extension RIS has the complicate land use problem of the sugar cane farm areas which is directly connected with the slow progress of land reform program in the areas.

(b) Proper and timely operation of the scouring sluice gates can not conducted due to mechanical trouble of gates lifting system at the Jalaur and Suague diversion dams, and flushing out of sedimentation in upper stream from scouring sluice is not conducted well. Furthermore, the same mechanical trouble of gate lifting system occurs at intake gates of the 2 dams and the Aganan diversion dam. The mechanical trouble of the gates and the difficulty of the gate operation accelerates the silt intrusion to the each main canal.

(c) Sedimentation occurs in main and lateral canals due to the lack of settling basin and /or silt excluder and the insufficient and proper maintenance works. The present canal flow capacity is comparatively reduced to convey the design discharge due to the sedimentation.

(d) Low irrigation efficiency is pointed out as one of the biggest problem. The low irrigation efficiency is caused by the following components.

- deterioration of the head gate and turnout,
- deterioration and lack of measuring devices at head gate and turnout,
- non systematic and improper water operation by the NIA and IAs,
- insufficient maintenance works of canal and related structures by NIA and IAs,
- lack or shortage of the technical knowledge on water management of the NIA and IA

In connection with these problem, the necessary water discharge can not be sufficiently delivered to the irrigation area which need the irrigation water, and the some water discharge is wasted in the other canals and / or other irrigation areas.

(e) Lack of technical knowledge is found at the check structure and turnout in all the RIS areas. The maximum required water level to distribute irrigation water to the main farm ditches can not be realized at each turnout, because the lifting of water level at check structure is operated and controlled without the technical guidance. As the result of the operation, much water is absorbed to the specified main farm ditch only, and inefficient water use and disturbance of water operation system occurs.

(f) There is almost no provision of the spillway in main and lateral canals to flush out the excess water in case of the water operation. The lack of the spillway make the over-flow at some canal sections during the full water supply and give the damage to the canal embankment and related structures.

(g) Slow water run is found due to the long length of main and some lateral canals and the complicate water distribution system at the on-farm. The complicate water distribution is caused that some main farm ditches have the double function of water conveyance such as irrigation and drainage.

(2) Drainage

The Jalaur Proper and Suague RISs has flood and inundation problem in the tail portion of the RIS areas. The flood generally occurs at the middle reach of Jalaur river near the Barotac Nuevo municipality during the typhoon and heavy rain fall in the rainy season, and affects the tail portion of the Jalaur Proper RIS area. In addition, the area is also suffered from the inundation caused by the high tide during heavy rain in the rainy season. The other inundation which is caused by the poor drainage system of highway occurs in the Zarraga area. In the Suague RIS area, the inundation also occurs along the high way near the Pototan area due to the poor drainage system of highway.

(3) Service road and Farm road

(a) Maintenance work of the service road is poor. The narrow sections of the road for jeepny passing which are caused due to deterioration of canal embankment are found out along some service roads. Gravel pavement and foundation of road are generally deteriorated, and no passable road sections are found out along some services roads in the rainy season.

(b) The LGUs expect the function of the farm - to - market road to the service roads, but the all service roads are not linked with rural roads such as national, provincial and barangy roads in the study area. The function of the farm - to - market road are not realized at present.

The detailed constraints to the development and problem of the current irrigation and drainage system are shown in Table A.3.25.

3.8 Water Management and O & M Practices

3.8.1 Organization and Function

The national irrigation systems (NIS) are one of the main responsibility areas of the NIA where the available service areas are over 1,000 ha. All NIS are managed by Irrigation Superintendents (IS) with their respective staff, depending on the size of the areas being managed (IS II>4,000 ha and IS I<4,000 ha). These NIS are under the direct supervision of the Regional System Management Division. The organizational charts of NIA Region VI Office , Jalaur - Suague River Irrigation System (JSRIS) Office and Aganan - Sta. Barbara River Irrigation System (ASBRIS) Office are shown in Figures A.3.30, A.3.31 and A.3.32, respectively.

The RIS office has its administrative, technical and financial sections to function exclusively for the particular office. Individual RIS office has its own equipment. Its equipment or mechanical activities are maintained by the Regional Equipment Division personnel, who conduct regular inspections on equipment maintenance or upon request by the concerned offices since only few mechanics are available in the RIS office.

At the field level of the NIS, the areas are normally divided into divisions of approximately 750 ha which are managed by the Water Resources Facilities (WRF) Technicians (Water Masters) with two or three WRF Tenders (Ditch Tenders) to provide the basic functions of the office, depending on the size of the division and length of canals (WRF Tenders are normally assigned to a canal with 3.5 km length). The diversion dam area is managed by the WRF Operator (Gate Keeper). Presently, the WRF Technicians are responsible for system operation activities, maintenance of canals, and also act as collectors of Irrigation Service Fee (ISF) in their respective areas or division. The WRF Tenders are also deputized as assistant ISF bill collectors. In addition, the ISF collection is carried out by the irrigators' association through the Type II Contract between NIA and IA.

There are two main functional groups at the field level of the NIS. These are the operations group and the maintenance group. As a standard procedure, operations group takes care of the water delivery, gates operation and maintenance, and other functions related to water delivery. Discharge measurements are likewise the function of the operations group.

The maintenance group is tasked to clean and maintain the canal systems operated by the NIA. Other canals are being maintained by the IA whose remunerations are on a sharing basis, set and agreed by both IA and NIA (Type I Contract). The ISF collection function is handled by the respective collectors or assistant collectors duly designated by the RIS office and also undertaken by Type II Contract between IA and NIA.

Operation and maintenance activities are undertaken at the field level by Field Engineers backstaffed by WRF Technicians (Water Masters), WRF Operators (Gatekeepers) and WRF Tenders in coordination with the IA Board of Directors and Officers. In keeping tract with the current trend of operation and maintenance activities, a monthly meeting between NIA and IA Officers is held regularly and supplemented by seasonal NIA-IA Operation and Maintenance Conference.

3.8.2 Water Management Practices

(1) Water delivery schedule

The cropping calendar is prepared by the Irrigation Superintendent and staff of a system on the basis of the probable water supply and rainfall. This is discussed and presented to the IA for their guidance. In this manner, the farmers in the area will be

aware of the timing of planting as scheduled by the NIA office. However, in the present condition, the cropping calendar is not being followed by the farmers because water delivery is not sufficient and stable due to water management problem and shortage of water supply from the river, and water delivery is started regardless of farmers' preparedness to start their farming activities on time due to financial constraints.

It is the practice of the RIS Office to stop the water delivery after the dry crop and the farmers are given the cut-off date to stop planting during the dry crop to avoid shortage of water in case of water stoppage. This practice of water cut-off is a Standard Operating Procedure (SOP) of the RIS Office to give time for the repair and checkup of structures and gates when water is not flowing. This maintenance procedure is applied to all NIS, but due to the demands of some farmers and IAs, water delivery is sometimes extended.

The present schemes of water delivery and distribution schedule by system are as follows.

(a) Jalaur proper and Jalaur extension RIS

Continuous irrigation is adopted when water supply is available for all the system. However, rotation by laterals is implemented when intake discharge is very low and there is inadequate rainfall. This schedule, except for the whole water delivery period, is not officially informed to the farmers and beneficiaries.

- Starting : May 16, 1996 / Stopping : March 15, 1997 (Jalaur proper)
- Starting : March 16, 1996 / Stopping : February 15, 1997 (Jalaur extension)

(b) Suague RIS

There are 4 rotation areas equivalent to WRF Technician divisions with a duration of 3 days irrigation in one area, and an interval of 9 days water delivery and distribution scheme adopted at this RIS regardless of water availability. In effect, after a 3-day water application in a particular area, irrigation water resumption will be effected after 9 days. This schedule, except for the whole water delivery period, is not officially informed to the farmers and beneficiaries.

- Starting : May 15, 1996 / Stopping : March 1, 1997

(c) Aganan RIS

There are 3 rotation areas with duration of 7 or 8 days irrigation in one area and an interval of 15 or 16 days / twice a month water delivery and distribution scheme adopted at this RIS regardless of water availability. In effect, after a 7 or 8-day water application in a particular area, irrigation water resumption will be effected after 15 or 16 days. This schedule is officially informed to the farmers and beneficiaries.

- Starting : May 1, 1996 / Stopping : February 28, 1997

(d) Sta. Barbara RIS

There are 4 rotation areas equivalent to irrigation divisions with a duration of 3 or 4 days irrigation in one area and an interval of 11 or 12 days / twice a month water delivery and distribution scheme adopted at this RIS regardless of water availability. In effect, after a 3 or 4-day water application in a particular area, irrigation water resumption will be effected after 11 or 12 days. This schedule is officially informed to the farmers and beneficiaries.

- Starting : May 1, 1996 / Stopping : February 28, 1997

However, in some cases, such schedules are not followed due to insufficient water supply, and are not so accurate and effective due to the absence of proper measuring devices in the canals.

(2) Water management

Water discharge in the main canal and laterals is being recorded through the staff gauges. Normally an annual calibration of canal discharges must be done to come up with a reliable discharge in the canals. However, due to the shortage of technical staff and calibration equipment, most of the canals are not calibrated regularly. With the rapid siltation of the canals, erroneous readings are obtained. Thus, in the present condition, it is very difficult to conduct an accurate and effective water management of the particular system.

IAs are the backbone in the implementation phase of the irrigation program. Water delivery schedule, cropping calendar and pattern of planting are determined jointly by Operation and Maintenance personnel, Institutional Development group and by the representatives of the Board of Directors of IA during the NIA-IA O&M conferences.

The levels of conferences held every cropping season are as follows:

(i) NIA-IA O&M planning - held approximately one month before the start of wet cropping season. During this planning session, water delivery, cropping calendar and pattern of planting are determined.
(ii) NIA-IA mid season assessment - held after the area had been totally planted to evaluate the outcome of land soaking/land preparation activities, and implement program for crop maintenance.
(iii) NIA-IA post-harvest season evaluation - held after the area had been totally harvested to evaluate the outcome of the season's operation activities and prepare plans and programs for the succeeding cropping season.

The system adopts a sequential start for land soaking during the initial release of irrigation water (usually during the months of April and May) until the system-wide area is totally land soaked.

3.8.3 Operation and Maintenance Practices

(1) Current O&M method of existing facilities

Gates and structures are regularly checked by the maintenance crews by taking off floating debris and by applying lubricants to the mechanical parts of the gates. Major repairs are scheduled when the situation is urgent, but repairs are done simultaneously with water delivery by proper scheduling.

On the maintenance side, the IS is grouping the WRF Tenders from several WRF Technician Divisions to act as a maintenance crew, where each group is assigned to sections that need immediate cleaning.

Dam-site area and gates at the diversion dam are being maintained and operated by the WRF Operators assigned in the area. Additionally, their responsibility area also includes maintaining records of intake discharge, rainfall, water level elevation, and maximum and minimum flood elevations.

Control structures and gates along the main canal and laterals are being maintained and operated by the respective WRF Technicians and WRF Tenders assigned in the area. No such records as discharge and water elevations are being maintained.

Maintenance of main canal and laterals are being done by the existing WRF Tenders and the IA with Type I contracts. The WRF Tenders who are assigned to clean the canals are given 3.5 km as their section areas and likewise in charge of the water distribution in the area. Cutting of grasses along the main canal and laterals is governed by the Memorandum Circular of NIA and is to be done every 45 days. If there are no existing WRF Tenders in the area and no Type I contract, maintenance works are being done by the maintenance crew of the office.

Maintenance of on-farm facilities such as main farm ditch is being done by the farmers or beneficiaries of the concerned facilities in the area. However, the farmers or beneficiaries in some areas do not undertake such maintenance works because of the absence of a contract with NIA and no clear specification as to specific responsibilities among farmers. According to the inventory survey by the study team, 25% of main farm ditches are not maintained.

The NIA prepared "General Operation and Maintenance Manual" for all RISs and "Specific Operation and Maintenance Manual" for the Jalaur-Suague RIS as guidelines for the operation and maintenance in 1991 under IOSP I. However, this manual is not being utilized by the O&M staff in the concerned system because this is not practical and easily comprehensible and also is not widely known in the systems.

The desilting works and the rehabilitation and improvement works of existing facilities in the main canal and laterals are being done under several projects such as Irrigation Operations Support Project (IOSP), and Water Resources Development Project (WRDP), and also through the General Appropriation Act (GAA), etc. These maintenance costs are shown in Table A.3.26.

(2) Planning of budget and actual expenditures

Every year, the IS prepares a budget for the next fiscal year. Budget preparation is normally based on the actual personnel salaries and wages plus other incentives and the plans to hire additional personnel for the next fiscal year as the case maybe. This also includes Maintenance and Other Operating Expenses such as power, mails, supplies, gasoline and fuel, etc. which are the routine needs of the office as well as the personnel. The desilting works and the rehabilitation and improvement works of the existing facilities in the main canal and laterals are not included in such expenses. The budget prepared by the IS is reviewed by the Regional Manager for eventual submission to the Central Office for approval and funding.

If the projects are being undertaken during the current fiscal year, additional workers are hired based on their organizational chart duly approved by the Regional Office. Project personnel are directly or indirectly assigned to the project in which they are connected.

Any unexpected circumstances where damage to property of the agency occurs, the consequent Program of Work (POW) can be prepared, and the central Office has to take care of the funding for the said activities.

In the budget preparation, the estimated expenses and income for the year are included. In this manner, the NIA could determine if a certain unit is viable (with surplus) or on deficit status. The estimated income for the year includes collection of Irrigation Service Fee (ISF) and rental of equipment from NIA projects and/or from private lessees and other government agencies. ISF income is reckoned at the

programmed area from irrigation for the current agricultural year (wet and dry season) as reflected in the cropping calendar.

ISF collection and its efficiency are shown in Table A.3.27. The collection efficiency of all the systems is lower than the national average (48% in 1995 / refer to Table A.3.28) of all RISs in the Philippines. The present conditions and the proposed improvement plan on ISF collection are mentioned in Section 4.7.

The income and expenses of Jalaur - Suague River Irrigation System (JSRIS) Office and Aganan - Sta. Barbara River Irrigation System (ASBRIS) Office are shown in Table A.3.29.

3.8.4 Constraints to Water Management and O&M

Proper and effective water management and O&M in the systems are adversely affected by the following constraints:

(a) Water management

(i) Absence of proper measuring devices for canal and river discharge

No proper measuring devices are properly installed in the canals and rivers, making it very difficult for the RIS offices to prepare the cropping calendar on the basis of the probable water supply.

Water delivery and distribution schedules are not so accurate and effective due to the lack of measuring devices in the canals.

(ii) Insufficient water delivery and distribution schedule for the farmer-beneficiaries

Cropping calendar is not being followed by the farmers due to water delivery problems. In some systems, water delivery and distribution schedules are not officially informed to the farmer-beneficiaries.

(b) O&M

(i) Insufficient O&M works

O&M work is not properly done due to shortage of fund and technical staff, and no regular training program for O&M staff. As a result, it causes deterioration of irrigation and drainage facilities, and improper water management. Under such situation, irrigation water cannot be delivered and distributed properly.

(ii) Insufficient cost for O&M

Present ISF collection is lower than the actually required O&M cost, causing difficulty for the RIS offices to allocate enough funds for the operation and maintenance cost of the water control facilities

(iii) Absence of practical O&M manuals

There are no practical O&M manuals to be comprehended easily and utilized sufficiently by the field personnel in the systems. "General Operation and Maintenance Manual" and "Specific Operation and Maintenance Manual for Jalaur-Suague RIS" prepared by NIA are not utilized in the systems because these manual are not easy to comprehend.

3.9 Agricultural Support Services

3.9.1 Agricultural Research and Extension

The Department Agriculture (DA) is the responsible agency for agricultural extension and research at the national level. Provincial Agricultural Office (PAO) coordinates local level agricultural extension activities, and Municipal Agricultural Office (MAO) is in-charge of undertaking rural level extension activities. The PAO and MAO belong the local government unit (LGU), and finance for activities and personal expenses depend on the budget of the local government concerned. Extension work at the municipality level is coordinated by MAO, and extension workers are technically supported by PAO personnel concerning crop and livestock. The transfer of agricultural extension function from DA to the LGUs in 1992 has encountered problems resulting in low level of extension activities to farmers due to budgetary constraints of most of the LGUs concerned and the lack of technical capabilities of municipal extension workers and agricultural technicians especially in diversified crop farming. Current extension workers in each municipality concerned are shown in Table A.3.30.

In 1995 DA started in 1995 the Grain Production Enhancement Program (GPEP, Gintong Ani Program) under the Medium-Term Agricultural Development Plan (MTADP). GPEP aims at improving farm productivity by addressing the low utilization of certified seeds, and the inadequate irrigation systems and post-harvest equipment and facilities in the initial phase. DA also implements the Integrated Pest Management (IPM) program which aims to provide a scientific control of insects and diseases in farmers field. However, since village level activities of these programs depend on the agricultural technicians of MAO, the results of programs have not been obtained effectively due to the low financial background.

The Western Visayas Integrated Agricultural Research Center (WESVIARC) is a regional research center under DA, located in Iloilo city. The center performs basic research and experiment for Western Visayas Region with three (3) sections: namely crop and soil system section, fishery system section, and animal system section. This center has technically competent researchers, but its research activities could not be properly conducted due to limited budget support. The center has established as an annex rice seed processing facilities by Japanese grant aid.

3.9.2 Post-harvest Facilities

(1) Rice mill

In the study area, the existing rice mills have a rated capacity of about 3,000 cavans (150 tons)/hr. The province of Iloilo has a total rated capacity of 7,300 cavans (365 tons) /hr.

The municipalities covering the study area have an estimated excess capacity of 86,000 tons of paddy. There are municipalities that have deficit capacity. As a whole, however, the total excess capacity in Iloilo province is about 250,000 tons. This excess capacity is more than enough to absorb the additional production of 71,300 tons projected for the study area.

Unit: Metric ton

Current	Production	Milling Capacity	Excess Capacity
Iloilo	614,873	865,505	253,632
Study area	234,134	320,445	86,312
Future With Project			
Study area	71,300	86,312	15,012

* Incremental Production

(2) Warehouse

The existing capacity of warehouses in the Study area is about 55,000 tons. The province of Iloilo has an existing capacity of 154,000 tons. Necessary storage spaces were calculated assuming the turnover rate of a warehouse to be 2 and the results were given in the next table. As shown in the table, registered storage space is not enough to accommodate the production. Shortage in storage space is appeared to be filled with space in farm houses and bamboo bins because there is no observation of the open space storage of paddy. Additional storage space for the incremental production in the future is estimated at 35,650 ton.

(tons)

Area	Production	Storage Needs	Present Storage	Shortage
Iloilo province	614,873	307,000	154,000	153,000
Study area	71,300	35,650	-	35,650

* Incremental

Source: NFA, Iloilo

Enterprising rice millers in the study area are actually allowing farmers to use their warehouses for storage free of charge provided the farmers mill their palay in their rice mill. In so doing, the rice millers are assured of continuous supply of paddy. The minimum volume of paddy that a farmer can store is 50 cavans(2.5 tons).

(3) Dryers

The solar dryer is the common facility among the farmers. It is convenient and relatively trouble-free. Solar dryers are either concrete paved facility or improvised woven mat. It is also a common practice among farmers drying their palay along highways. While these facilities are convenient, they can hardly be used during rainy . There are also inherent disadvantages such as low recovery of milled rice, significant losses, broken grains, etc.

Mechanical dryers are normally owned by the rice millers. Some cooperatives have acquired this facility through the assistance of the Department of Agriculture (DA). The advantages of mechanical drying can normally compensate for its cost. The average cost of mechanical drying is about P0.40/kg. The available mechanical dryers in the Study area have an estimated capacity of 30,000 tons/yr.

3.9.3 Agricultural Credit

(1) Assessment on supply of agricultural credit

The sources of agricultural loans in the study area indicated an almost equal sharing between formal (51%) and non-formal institutions (49%). Among the formal sources were commercial and rural banks, credit cooperatives, and NGOs. Informal sources were input suppliers and traders and money lenders. Commercial bank was listed as a major source of agricultural loans. It is possible, however, that those who responded commercial bank were the big landowners who can provide adequate security and collateral to their loans. Among the non-formal sources, the moneylenders and input dealers and traders are the most preferred sources of the farmers in the study area.

(a) Formal sources

Land Bank of the Philippines

The LBP branch in Iloilo city has assisted a total of 137 agricultural cooperatives in the Study area. Over the past 4 years, the total agricultural loans granted by the LBP in Iloilo province stood from P58 million in 1993 to about P21 million in 1996. Of the 137 cooperative borrowers only 30% were

considered active. The sudden decrease in the amount of agricultural loans granted between the periods 1993 and 1996 can be attributed to the poor repayment of the agricultural cooperatives.

Rural bank

Rural bank is the second most important source of agricultural credit in the Study area. The studied rural bank provides an average interest rate of 5%/annum for savings. Its loans are mostly agricultural and commercial. Commercial loans are mostly availed of by vendors and small businessmen within and adjacent municipalities. The effective interest rate on agricultural and commercial loans is pegged at 25%/annum.

Lending investor

Lending investors are like the rural banks. The only difference is that they do not take deposits. Lending investors are also regulated by the Central Bank. A typical lending investor in the study area charges an average interest rate of 5 %/month or 60 %/annum. This investor can provide practically all kinds of loans subject, however, to the fulfillment of a collateral.

Non-Government Organizations(NGOs)

The NGOs have become active in providing partly agricultural credit in the study area. A prominent NGO based in Iloilo city reported to have a total loan exposure of about P585,000 in the municipality of Pototan in the study area. However, this NGO reported that its main borrowers are the women. About 95% of the total loan exposures are given to the women. Production loans have a ceiling of P4,000/ha and the average interest rate being charged is 30 %/annum. The most important criterion being considered by this NGO in granting loans is that the borrowers should belong to the poorest of the poor.

(b) Informal sources

Input suppliers and traders

The input suppliers and traders have become a dominant informal source of agricultural credit in the study area. The IA members have rated the input suppliers and traders as their first choice of credit mainly because of convenience and flexibility. They get the inputs on credit and in return a ready market for their produce. Traders and input dealers interviewed in the study area provide loans at an average interest rate of 30 % to 100 %/annum depending on the credit needs.

Moneylenders

The moneylenders are individuals who are by far the most readily accessible but also the most exploitative among the informal sources. Effective interest rates being charged by them range from 90% to 1000%/annum. The common practice among these lenders is the so-called "five-six." For every P5.00 being borrowed, the borrower has to return P6.00 regardless of maturity.

(2) Assessment on the end-users

Agricultural cooperatives

The agricultural cooperatives have been the retailer of agricultural credit coming largely from the LBP. There are about 176 cooperatives listed as active by the CDA in the Study area. The CDA records indicate about 60% of these cooperatives as credit and 40% as multi-purpose. The data provided by the LBP on active cooperatives in the study area showed that only 20% of the cooperatives registered with the CDA are active with the LBP. This concern resulted in a number of cooperatives that can no longer renew their production loans with the LBP.

Farmer-borrowers

As end-users of credit, the farmer-borrowers have several needs for credit. The foremost, however, is for purchasing the inputs (80% of credit needs). Because of the non-payment of their loans with their cooperatives, they have turned to the input suppliers and traders and money lenders as their source of credit. The arrearages of the farmer-borrowers with their cooperatives have been the main reason for their non-access to the LBP lending window. Unless these farmers settle their outstanding loans with their cooperatives, they will remain to be at the mercy of the informal sources of credit.

3.9.4 Marketing

(1) Paddy

(a) Production

The production of paddy in the study area is roughly 40% of the total production in Iloilo. Over the last 4 years, the annual average production stood at about 234,000 metric tons. Production increased by an average of 7%/annum between the periods 1992 and 1995. The production of paddy in the study area is indeed significant to the total paddy production of Iloilo. The paddy output in Iloilo stood at an average of 615,000 metric tons during the last 6 years.

(b) Current marketing practices

It is practically the private traders and millers(90%) that control the local trade of palay. They have agents, known as middlemen, stationed along major highways or right at the farms to purchase any available palay. The farmers in the study area have also considered these traders and millers as ready buyers of their palay. For one, the farmers get their credit from them and automatically their palay harvest serves as the payment. Second, the traders are so convenient. They buy the palay right at the farm regardless of the moisture content.

There are two compelling reasons why farmers sell their palay immediately after harvest. First is the very tight cash flow normally experienced by the farmers. With small farmholdings and low yields , the net reserves are simply not enough to satisfy even basic expenditures. Second, the farmers are heavily indebted due to virtual lack of savings. The cycle of borrowing during planting time and paying the loans during harvest time is the common practice.

(c) Farmgate prices

The monthly farmgate prices of special paddy in current terms have been relatively stable over the past 21 months between January 1996 and September 1997. In Iloilo, the mean farmgate price ranged from a low of P8.11/kg to a high of P9.58/kg. In Region VI the mean farmgate price stood at a low of P8.30/kg to a high of P9.29/kg. For both areas, the average farmgate prices have been over and above the current support price of P8.00/kg.

Farmgate prices in the study area are expected in wet paddy and are lower by 10% to 25% of the farmgate prices posted in Iloilo market. This is largely due to the high moisture content(about 20%) of paddy harvested in the area. In addition, the practice of selling the paddy right after treshing does not allow any room for anticipation of higher prices, especially during lean months.

(d) Wholesale and retail prices

Data on wholesale and retail prices of rice in Iloilo and Region VI have also been stable during the past 21 months. The mean wholesale price of rice in

Iloilo ranged from a low of P15.11/kg to a high of P16.51/kg. The mean retail price, on the other hand, stood at a low of P18.12/kg to a high of P20.28. There was a price differential of P3.00 to P3.80/kg between the retail and wholesale prices. The same set of prices in Region VI fluctuated moderately. Regional prices were slightly higher than the prices in Iloilo by about 1% to 3%.

(2) Mungbean and watermelon

(a) Production

Production of mungbean in Iloilo stood at an average of about 800 tons during the periods 1993 and 1997. The production represents about 34% of the regional production of about 2,200 tons. The production of mungbean in Iloilo grew by about 26% between 1993 and 1997 with the bulk of production occurring during the first semester.

Production of watermelon in Iloilo averaged about 21,000 tons during the periods 1993 and 1997. The production represents roughly 96% of the regional production. Practically the available supply in the region comes from Iloilo.

(b) Prices

Wholesale prices for mungbean at the Iloilo terminal vary for mongo yellow and mongo green. The former commands higher prices than the latter by about 30% to 50%. The wholesale prices of mongo yellow during the 12-month period in 1996 stood at P37.04/kg. In the 8-month period of 1997, the wholesale price dropped by about 4%. The wholesale price was registered at P35.65/kg.

Wholesale price for mongo green stood at P24.68/kg during the 12-month period of 1996. The 8-month period of 1997, however, showed a slight increase by about 7%.

For both varieties, the wholesale prices are largely influenced by the available production traded in the market.

(c) Marketing practices

Harvested mungbean in the study area are directly brought to the Iloilo market for sale. The traders practically buy all the volume brought to the market. It is observed that most of the mungbean stocks in Iloilo come from Manila. Such stocks are imported from China. This implies that the local mungbean produce is really insufficient to meet the local demand.

In the case of watermelon, the local traders bring them to the Iloilo terminal market for wholesale and/or retail.

3.10 Farmers' Organizations and Other Rural Institutions

3.10.1 General

The institutions which play important roles in agricultural and rural development in the study area can be categorized into farmers' organizations such as irrigators' associations (IAs) and farmers' cooperatives (FCs); non-government organizations (NGOs); education, training and extension service organizations; and the Local Government Units (LGUs) particularly the Municipal Governments and their Municipal Agricultural Offices (MAOs). This section describes the present conditions and

constraints of the first two types of rural institutions to identify the appropriate measures in the development of plan for strengthening farmers' organizations especially the IAs.

The organizational set-up and institutional development program of NIA are also reviewed to determine the institutional constraints that need immediate attention and support. Recognizing the interrelatedness of organizational, managerial and technical capability building activities, some major technical constraints are analyzed to establish the nature and degree of the institutional strengthening efforts required by the IAs and NIA.

3.10.2 Irrigators' Associations

Thirty-six IAs currently operate in the five river irrigation systems (RIS) covered by the study, with a total of 7,254 registered members as shown in Table A.3.31 and summarized below. This number of IA members represents about 67% of all the farmer-beneficiaries in the five RIS.

Geographical Distribution of IAs and Their Members by RIS

(Unit: Number)

	Jalaur proper	Jalaur exten.	Suague	Sta. Barbara	Aganan	Total
1. IAs	15	6	5	4	6	36
2. IA members	2,545	916	1,061	1,004	1,728	7,254

Source: Table A.3.31.

These IAs occupy 19,366 ha of irrigation service area, or 85 % of the total area served by the five RIS, which are distributed by RIS as follows:

Irrigation Service Area Occupied by the IAs

(Unit: Hectare)

	Total	Average Area/HH
Jalaur proper RIS	8,125	3.20
Jalaur extension RIS	2,615	2.85
Suague RIS	2,856	2.70
Sta. Barbara RIS	2,633	2.60
Aganan RIS	3,137	1.80
Total/Average	19,366	2.70

Source: Table A.3.31.

As shown in the table, average irrigated farm area of IA members (both actual and potential members) in the study area is 2.70 ha, ranging from 1.80 ha in Aganan RIS to 3.20 ha in Jalaur proper RIS.

(1) Major organizational characteristics of the irrigators' associations (IAs)

Based on the results of interview survey of IA presidents and other officers, the major organizational characteristics of the IAs are presented in Table A.3.32 and summarized below.

The average age of all IAs is 9 years, which would normally represent mature organizations. However, the retrenchment of IDOs in 1989 up to the early part of 1994 due to NIA's financial constraints and the different priorities of some field officers during the period have somehow affected the development of the IAs. As a result, the IAs have been largely inactive from 1993 to 1994, where none participated in any contract services (Type I or Type II) with NIA during the period.

The IA members are composed of farmers other than those stipulated in IA Constitution and By-Laws (i.e., agricultural lessee, amortizing owner, owner cultivator or tenant duly authorized by the owner). About 12% of them are absentee landowners

and owner-noncultivators. These types of farmers are large in numbers in Aganan, Jalaur extension and Jalaur proper RIS.

The gender composition and land tenure status of the IA presidents and committee chairpersons (Membership, Education and Training; Service; and Finance) are summarized in the table below.

Gender and Land Tenure Status of IA Officers by RIS

(Unit: Number)

	IA Presidents				Committee Chairpersons			
	Gender		Land tenure		Gender		Land tenure	
	M	F	OC	L/TF	M	F	OC	L/TF
Jalaur proper	12	3	14	1	34	11	27	18
Jalaur extension	6	0	6	0	18	0	17	1
Suague	5	0	4	1	13	2	15	0
Sta. Barbara	3	0	2	1	5	4	2	7
Aganan	5	0	2	3	13	2	10	5
Total	31	3	28	6	84	19	71	31

Note: Two IAs have not responded to the survey conducted. Initials in the column table mean: M=male, F=female, OC= owner-cultivator/owner-noncultivator, L/TF= leaseholder / tenant farmer (see Table A.3.32.)

These information imply that: (i) the traditional image and role of male population in farming operation remain strong in the study area, and (ii) the socio-economic status of members, measured by their possession or ownership of land, functions as a financial guarantee for IA members in selecting owner-cultivators as IA presidents and committee chairpersons.

Male members are highly favored to chair the Service Committee, while owner-cultivators are generally preferred to chair the Finance Committee. High numbers of female and tenant farmers occupying the position of chairperson are observed in the Membership, Training and Education Committee.

(2) IAs' organization and management structure

The IA organizational structure depicts the General Assembly consisting of all members as the highest management authority and final decision-maker. Regular organizational affairs and business operations of IAs are, however, managed by the Board of Directors (BOD) comprising the chairpersons of the turnout service area groups (TSAGs) concerned. The BOD members select among themselves the IA officers such as the president, vice president, secretary, treasurer and auditor.

Except for the IA president, the other officers become automatically the chairpersons of the four common working committees (i.e., Membership, Education and Training; Service; Finance; and Audit and Inventory) by virtue of the IA by-laws. These committees are replicated in the TSAGs, and their chairpersons also become automatic members of the pertinent IA committees.

Presently, the policy-making and plan-executing functions are performed by the same IA members who occupy the BOD and various positions (IA officers and committees) of the association. This arrangement, however, does not support the development of a management structure that ensures the greater participation of the association members. This is clearly evident in the existing decision-making processes gathered from the socio-economic survey result of the study team as shown below.

Decision-making processes	Jalaur proper		Jalaur exten.		Suague		Sta. Barbara		Aganan		Total	
	Case	%	Case	%	Case	%	Case	%	Case	%	Case	%
General assembly	26	18.3	19	29.2	8	15.7	9	18.0	10	13.0	72	18.7
Organization officers	95	66.9	35	53.9	36	70.6	36	72.0	47	61.0	249	64.7
Other Processes	21	14.8	11	16.9	7	13.7	5	10.0	20	26.0	64	16.6
TOTAL	142	100.0	65	100.0	51	100.0	50	100.0	77	100.0	385	100.0

Source: Table A.3.33

(3) IA policies and activities on irrigation management and organizational development

The policies and activities of the IAs in management and organizational development are briefly discussed below.

(a) Maintenance of irrigation canals

IA policies on O & M consist mainly of those specified in Type I (maintenance of irrigation canals) contract granted by NIA and those generated by individual associations. The latter type of policies consists of resolutions defining the kinds of human activities not allowed in irrigation canals such as dumping of garbage or debris, planting of trees 5 m from the embankment of lateral canals, and using them for bathing of carabao and other animals. Some LGUs have also passed municipal ordinances to re-enforce IA resolutions as reported in Suague RIS.

For the period 1991-1997, 32 of the 35 IAs have been engaged in Type I contract, as shown below. For the year 1997, 28 IAs are awarded this contract.

IAs which Participated in the Type I Contract Implementation, 1991-1997

(Unit: Number)

	Jalaur proper	Jalaur exten.	Suague	Sta. Barbara	Aganan	Total
IAs	14	6	5	3	4	32
% of total IAs	93	100	100	75	67	89

Source: Table A.3.34.

This contract makes the IAs responsible for grass cutting and clearing in the inside and outside slopes for the entire length of the supply canal contracted every 45 days when the height of vegetation along the canal slopes is more than 15 cm. at a contractual cost of 1,400 pesos/3.5 km. Other non-contracted IAs are reportedly facing serious organizational problems due to inactive IAs or TSAGs.

The major constraints of the IAs relative to O & M work are the following:

(i) Many turn-outs are already destroyed and have no steel gates,
(ii) Lack of maintenance of irrigation service roads especially with their frequent and uncontrolled use by private vehicles,
(iii) Low payment per meter of canal for cleaning, and
(iv) Inadequate dissemination of the uses of irrigation facilities/structures to the farmers.

Tables A.3.35 and A.3.36 present the farmers' perceptions about the best way to manage and improve the existing NIS and their perceived roles in the O&M work.

(b) ISF collection

Policy on ISF collection is largely defined by Type II (collection of ISF collection and system operation) contract of the NIA which obliges the contracted JA to promptly distribute ISF bills to each farmer-member, collect ISF

and remit the collection to the NIA every Fridays within the contracted period. In addition, the IA assists in the verification assessment of farm lots requested for exemption from payment of ISF. In its absence, the IA members pay ISF to NIA-hired ISF collectors.

Twelve IAs have been involved in Type II contract implementation from 1991 to 1997 as shown in the next table, but only 10 IAs are granted in 1997 which are distributed as follows: 3 each in Jalaur proper RIS, Aganan RIS and Sta. Barbara RIS, and 1 in Suague RIS.

IAs which Participated in the Type II Contract Implementation, 1991-1997

(Unit: Number)

	Jalaur proper	Jalaur exten.	Suague	Sta. Barbara	Aganan	Total
IAs	3	0	1	4	5	13
% of total IAs	20	0	20	100	83	36

Source: Table A.3.34.

Under Type II contract, the IAs are given incentives by the NIA based on five levels of collection which are as follows:

Percent ISF collection	Incentive to the IA (%)
Less 50	0
51 - 60	2
61 - 70	5
71 - 90	10
91 - 100	15

The IA incentive is given only when the IA collects more than 50% of current collection, and derived by multiplying current collections (exceeding 50% collection efficiency, CE) by the corresponding percentage share granted to the IA. This present level of incentives seems to be quite low to give the IA enough motivation to strive for higher CE, particularly when no incentive is granted for CE less than 50%.

(c) System operation

IA policies on system operation focus mostly on cropping schedule, and water delivery and distribution which are drafted by and agreed upon with NIA, and normally embodied in Type II contract. The IA is obliged to formulate operations plan with the NIA support one month before the start of the next cropping season, disseminate information on cropping pattern and water delivery schedules to the members, and manage water allocation from main/lateral canals to different turn-out service area effectively and equitably. Many IA members, however, do not observe the established policies for the following reasons identified by the IA presidents:

(i) Inconsistency of actual water delivery with original schedule prompting farmers to compete with each other for early preparation of their paddy fields;
(ii) Diversion of water flow by some farmers caused by the presence of illegal checking, pumping and turn-outs; and
(iii) Absence of auxiliary canal connecting the lateral canal to individual farmers' fields.

Other cited technical constraints that affect proper compliance to, or effective enforcement of, system operation policies include the lack of proper maintenance or rehabilitation of poor irrigation service roads and defective irrigation facilities, and the siltation of irrigation canals. According to the IA

presidents, the IA members could not be fully convinced to follow the system operation policies due to such constraints.

(d) Organizational development

The Constitution and By-Laws duly approved by the Securities and Exchange Commission (SEC) set forth inter alia the IA organizational objectives; membership admission criteria; duties, responsibilities and rights of every member including the officers and working committees; fund generation mechanisms; and sanctions for recalcitrant members. In addition, regular meeting schedules for BOD and working committees are established to discuss, approve and assess irrigation related activities. However, the General Assembly of each IA meets only once a year in general and organizational policies are apparently not strictly enforced.

Lack of discipline, unity and cooperation among members is identified as the most important organizational problem of IAs according to the result of the socio-economic survey:

	Cases	Distribution (%)
1. Lack of discipline/unity/cooperation	118	29
2. Nonpayment of membership fee	57	14
3. Leadership conflict/weak leader	53	13
4. Absenteeism	42	10
5. Decreasing membership	32	8
6. Nonfunctional IA	25	6
7. Corruption	21	5
8. Limited involvement in decision-making	12	3
9. Others	52	12
Total	412	100

Note: Double or multiple responses occurred in some cases.

These problems are addressed by the IAs through the conduct of meetings, sending referrals and reminders/notices, reorganization, offering incentives or financial contribution, and providing security assistance in the following degree of importance:

	Cases	Distribution (%)
1. Meetings	129	37
2. Referrals	68	19
3. Reminders/notices	38	11
4. Reorganization	35	10
5. Incentives	38	5
6. Financial contribution	12	3
7. Security assistance	8	2
8. Others	42	12
Total	350	100

(4) Relationships among government agencies, NGOs, and farmers' organizations

Since the operationalization of the NIA's Institutional Development Program (IDP), inter-organizational coordination has been conducted through trainings and conferences. Training programs are undertaken by the NIA with the participation of the DA, DAR, LGUs and other agencies which the farmers want to clarify issues concerning farming, land disputes, etc.

Inter-agency coordination and conferences are also provided by the respective municipalities (LGUs) through the Municipal Agriculture and Fisheries Council

(MAFC). In MAFC conferences, concerned agencies such as DA-NIA, DAR, LBP and NGOs are invited to come up with an agreed plan for agricultural development of the municipality. Problems and concerns of both farmers and support agencies are discussed and given solutions during conferences.

It is on this manner that the NIA RIS offices have to come up with an integrated plan for irrigation system operation and management since the RIS areas cover several municipalities and the fact that each municipality has its own planning service in terms of agricultural development and extension.

Integration of agricultural development planning at the provincial level is likewise carried out through the Provincial Agriculture and Fisheries Council (PAFC), which is chaired by the Provincial Governor.

(5) NIA organization and institutional development program for the IAs

The Institutional Development Division (IDD) of NIA Region VI Office assumes the overall responsibility for organizing, training and strengthening of the IAs in the study area, which is headed by a Division Manager. Its functions also include the formulation of policies and guidelines for planning and programming the provision of agricultural support services to the IAs, and the development of linkages with other government and non-government agencies for the delivery of such services.

It comprises two sections: the Irrigators Organization and Training Section (IOTS), and the Irrigators' Assistance Section (IAS), which are supervised by the Irrigation Development Chief and Supervising Irrigators' Development Officer, respectively. Each section, however, has only one other permanent position occupied to date based on positions approved by the Department of Budget and Management (DBM): the Senior Irrigators' Development Officer in IOTS and the Agriculturist in IAS.

Foreign-funded and priority national government projects implemented by NIA such as Irrigation Operations Support Project II (IOSP II) and Comprehensive Agrarian Reform Program-Irrigation Component (CARP-IC) have provided additional personal services funds for IDD to recruit IDOs and research assistants with casual employment status to augment or support its limited regular staff.

The temporary nature of their service contracts, however, could be a potential constraint to effective institutional development of the IAs because of the varying degrees of commitment normally associated with such job assignment.

(a) Staffing

In the study area, six casual daily-paid staff perform the functions of IDOs, four of whom are assigned in Jalaur-Suague RIS (JSRIS) Office and the other two are in Aganan-Sta. Barbara RIS (ASBRIS) Office. Each IDO is responsible for 5-6 IAs on an estimated average area of 3,630 ha. No permanent IDO position exists in both RIS offices, as can be gleaned below.

Staffing Pattern of NIA Region VI and RIS in the Study Area

(Units: Number/%)

Type of Positions	Region VI Office Proper	JSRIS Office	ASBRIS Office
Total	138	127	72
Technical/RIM/IS			
Approved by DBM	79	102	52
Filled-Up Positions	41	65	39
Finance/Administrative			
Approved by DBM	51	21	18
Filled-Up Positions	35	13	15
ID-IDO/CD			
Approved by DBM	8	0	0
Filled-Up Positions	3	0	0
Project-Based Casual Positions (IDOs)	9	4*	2

Source: NIA Region VI Office, Iloilo City. *One holds a utility worker position.

With the limited number of IDOs, the Water Masters (WRFTs) also assist to reactivate or reorganize 21 IAs (60 percent of total IAs) and strengthen the others in the study area. At present, there are 7 Water Masters in ABRIS and 10 in JSRIS, representing 70% and 64% respectively of the DBM-approved positions. Farmer Irrigators' Organizers (FIOs), who have been selected among local farmers and trained by NIA in organizing work, support the IDOs and Water Masters during the early development of the IAs. The FIOs are given casual position of Utility Worker.

(b) Institutional development program (IDP)

Based on the types of training offered by NIA to IAs from 1991 to 1996 which have been financed from IOSP, Agri-Industrial Development Funds and other project sources, the IDP has focused on leadership development and technical capability building of IAs for improved and cost-effective O & M work, water delivery and distribution, cropping schedule, and ISF collection. The result of interview survey with chairpersons of the IA Committee on Membership, Education and Training indicates that the IAs have attended an average of 2-3 trainings per year from 1991-1996.

Since 1995, this focus has gradually broadened with the introduction of value formation and entrepreneurial development seminars. This new IDP direction seems to recognize the importance of farmers' unity and ability to engage in income-generating activities to sustain the O&M work.

The NIA Regional Training Center situated in the JSRIS office compound in Pototan has served as an important venue for IA trainings (see Table A.3.37), although it was constructed during the Jalaur River Multi-Purpose Project (JRMP) principally for the training of NIA personnel. Presently, no budget has been allocated for its operation and improvement.

The Provincial Irrigation Office (PIO), which also houses the ASBRIS office, in Barangay Tacas in Jaro has enough space that is currently being used for live-out IA trainings, conferences and meetings. However, it requires additional investment to be converted into a functional training center.

Existing training modules, which already incorporated the experiences gathered to date, are found to be adequate for technical training as summarized below:

(Unit: Pesos)

Title	Cost per Course	Cost per Participant
Basic Leadership Development Course (BLDC)	8,000	170
Financial Management System (FMT)	6,000	120
System Management Training (SMT)	6,000	160
ISF Collection Strategy Training (ISF-CST)	3,000-3,500	170

Source: Table A.3.38.

Most of the IAs which sent their members to participate in the training had raised some contributions in kind (normally food) to complement the limited training budget.

3.10.3 Farmers' Cooperatives

According to the information from the Cooperative Development Authority (CDA), there are some 256 duly registered farmers' cooperatives to date with the general status of "multi-purpose agricultural cooperative." Their formations have been largely facilitated by DA and LBP, with a few assisted by DAR and NGOs such as Visayas Cooperative Development Center, Inc. (VICTO). The distribution of these cooperatives for JSRIS and ASBRIS is summarized below.

Farmers' Cooperatives in the Study Area By Type of Business and RIS

(Unit: Number)

Type of business	JSRIS	ASBRIS	Total
1. Consumer	21	48	69
2. Credit/relending	49	5	54
3. Marketing/trading*	7	13	20
4. Consumer, credit and marketing	13	5	18
5. Consumer and marketing	8	7	15
6. Producer	1	0	1
7. Others	55	12	67
TOTAL	166	90	256

Source: Cooperative Development Authority, Iloilo City (see Table A.3.39).
*Usually paddy rice.

(1) Distribution and type of business of farmers' cooperatives

About half (or 48%) of the total farmers' cooperatives are presently engaged in consumer (69) and credit (54) types of business. They are followed by those cooperatives involved in marketing/trading of paddy rice in general (20), consumer, credit and marketing (18), and consumer and marketing (15). Producer cooperative is quite insignificant.

In terms of the geographical distribution, 166 farmers' cooperatives (65%) are located in the municipalities in the JSRIS and the other 90 are in the municipalities covered by ASBRIS area. Most of the cooperatives in JSRIS are engaged in consumer and credit business, which together represent about 42% of the total cooperatives. The results of socio-economic survey show that credit cooperatives are the most preferred source of loans among institutional sources, followed only by rural and commercial banks in JSRIS. The other group of cooperatives (comprising nearly 41%) undertakes three or more types of business which include consumer, credit, marketing, transport and irrigation service.

In ASBRIS, 53% of all farmers' cooperatives are in the consumer business, followed by those engaged in marketing or trading of paddy rice (14%). Credit cooperatives are relatively few (about 6%) but they also rank as the most important institutional source of loans for farmers in the ASBRIS area.

(2) Institutional Problems

In both ASBRIS and JSRIS, cooperative development has generally been very slow. Based on interviews with farmers and NGO staff, farmers' cooperatives are faced with the following problems:

(i) Weak financial management (especially of borrowed money);
(ii) Insincere and unprepared officers for cooperative business;
(iii) Lack of orientation, training and discipline among their members; and
(iv) Lack of access to small, collateral-free credit for production inputs.

3.10.4 Comprehensive Agrarian Reform Program

(1) Program coverage and present situation

The coverage of the Comprehensive Agrarian Reform Program (CARP) in the 13 municipalities and Iloilo City covered by the study area is summarized below.

Scope and Accomplishment of CARP Implementation As of 31 December 1996

(Unit: Hectares)

Municipality	Total	Rice and Corn Lands			Other Agricultural Lands			Leasehold Operations		
	Scope	Scope	AD	%	Scope	AD	%	Scope	LH/A*	%
Anilao	4,796	171	130.4	76	4,625	1,329.0	29	211.8	30.9	15
Barotac Nuevo	4,839	410	201.3	49	4,429	229.7	5	495.0	131.5	27
Dingle	2,696	783	451.8	58	1,913	108.4	6	600.6	87.4	15
Dumangas	4,263	750	372.9	50	3,513	119.7	3	1,536.4	14.9	1
Leganes	554	300	173.2	58	254	1.7	1	419.9	12.2	3
Mina	782	577	428.9	74	205	29.4	14	437.7	17.3	4
New Lucena	378	294	185.8	63	84	35.3	42	482.9	28.6	6
Oton	850	796	400.3	50	88	3.9	4	2,029.2	44.9	2
Pavia	538	493	393.4	80	45	4.7	10	381.7	12.6	3
Pototan	2,244	1,680	940.2	56	564	16.4	3	725.2	7.7	1
San Miguel	290	190	148.8	78	100	30.2	30	823.6	15.0	2
Sta. Barbara	678	266	178.5	67	412	54.8	13	1,295.5	24.0	2
Zarraga	965	540	335.2	62	425	18.0	4	366.7	15.3	4
Iloilo City	1,390	945	24.2	3	445	9.0	2	177.4	10.4	6
TOTAL	25,258	8,161	4,365	54	17,097	1,990.2	12	9,983.6	452.7	5

Source: Iloilo Provincial Agrarian Reform Office, DAR

Notes: Scope represents the net area covered by CARP. Areas with slope 18% or more, and owner-cultivated land are not included. The initials in table columns mean as follows: AD = Area distributed; LH/A= Actual area covered by Leasehold Operations. *Data are accumulated accomplishment as of 31 December 1995.

CARP includes rice and corn lands under "Operation Land Transfer" launched in 1972 to implement the provisions of Presidential Decree No. 27 (PD 27). Areas used for the cultivation or production of other crops are covered by CARP pursuant to Republic Act No. 6657 (RA 6657). The area coverage under PD 27 is 8,161 ha, of which about 54% have been distributed as of 31 December 1996 with each farmer-beneficiary estimated to receive an average of 1.57 ha.

In other agricultural lands, RA 6657 covered 17,097 ha (excluding those under PD 27). Of this target, about 1,990 ha have been distributed to 1,938 farmer-beneficiaries during the same period. This would mean an average of 1.03 ha per farmer-beneficiary.

Of the total area covered by RA 6657, about 9,984 ha have been targeted for "Leasehold Operations," a non-land transfer component of CARP. By definition,

leasehold is a perpetual lease that stipulates fixed land rentals at no more than 25% of net production. By the end of December 1995, the area directly placed under this scheme has been estimated at 452.7 ha. This accomplishment represents only 5% of the total target.

(2) Institutional implications

The slow mode of ownership transfer of lands under rice and corn, including sugarcane, is more likely to affect the farming operations and development projects of the farmers especially the tenants because of tenurial uncertainty over the lands they cultivate. With this condition, the incentive and motivation among farmers are generally low to improve their farms through crop intensification, crop diversification and the use of improved farm inputs. Acceleration of land transfer for lands under rice and corn, and the implementation of the leasehold system is, therefore, imperative.

The small size of lands awarded to farmers under PD 27 and RA 6657 is also likely to affect efforts to improve farm productivity and generate income over the existing rural poverty threshold for an average family size of 5.2 members in the study area. As noted above, the average farm sizes under various modes of acquisition are as follows:

Mode of Acquisition	Unit: Hectares
Operation land transfer (Rice and corn land)	1.6
Voluntary offer to sell (Other agricultural lands)	1.0
Leasehold operation	1.7

3.10.5 Non-Government Organizations

A network of 26 development NGOs (called Iloilo CODE NGOs) exists in the province, of which 12 NGOS presently provide a range of institutional and community development projects and services to farmers, women and youth in the 13 towns covered by the study. The services offered by these NGOs are as follows.

NGOs With Projects in the Study Area and the Types of Major Services Offered

Name of NGO	Major Services Offered							RIS	
	CO	OD	PPM	CED	FM	AN	HFM	ASBRIS	JSRIS
CPU-Katin-Aran Center	X	X		X				X	X
Family Planning Organization of the Phils.							X	X	X
Hellen Keller International							X	X	X
Hubon sa Kauswagan, Inc.	X			X		X		X	X
Taytay sa Kauswagan, Inc.	X			X				X	X
Jaro Arcdiocesan Nutrition Progam	X	X		X			X	X	X
Kahublagan Sang Panimalay Foundation, Inc.	X	X		X	X			X	
PROCESS, Inc.	X	X	X	X		X	X		X
PEACE-Panay Development Center, Inc.	X	X				X	X	X	X
Save the Children	X			X			X		X
Teresa Magbanua People's Center, Inc.		X	X			X		X	
Visayas Cooperative Development Center				X				X	X

Source: Iloilo CODE NGO. The initials in table columns mean as follows:
CO = Community organizing PPM = Participatory planning and management FM = Financial management
CD = Community development CED = Cooperative and enterprise development AN = Advocacy and networking
HFM = Health care and family management X = Indicates the type/s of services offered by the NGOs

Credit assistance for income-generating projects or enterprise development is provided by VICTO, one of the oldest NGOs in the Visayas that seeks to contribute towards cooperative development in the region. At present, VICTO is supporting 9 farmers' cooperatives in the study area, seven of which have a combined asset of about 2.3 million pesos in 1995 and 3.2 million pesos by mid-1996.

Other 7 NGOs assist farmers in the study area in cooperative and enterprise development which are potential support groups for the farmers' credit needs and the establishment or strengthening of cooperatives in the Project being prepared.

Over the past five years, the members of Iloilo CODE NGO have begun to consolidate and refocus their program resources and thrusts in the province to better respond to the opportunities and challenges of the Local Government Code. This new institutional orientation has resulted in the (i) adoption of area development strategy, and (ii) development of collaboration with national and local government units. The federation members are presently in the process of formulating integrated plans.

3.10.6 Summary of Constraints to Development Plans

(1) Irrigators' associations and farmers' cooperatives

Weak financial, managerial and technical capability is the major constraint of both IAs and farmers' cooperatives in the study area. The magnitude of this problem is relatively serious in Jalaur-Suague RIS. Majority of the farmers' cooperatives are also believed to be inactive and are dependent on external support.

This constraint has been attributed to the following factors:

(i) Weak leadership, weak financial position and management, and low level of commitment among members;
(ii) Poor planning and management skills, particularly in the integration of O & M work, ISF collection, and the individual farmers' activities;
(iii) Lack of training on basic enterprise/cooperative development especially in management and control in the use of financial resources;
(iv) Inadequate extension services arising from weak coordination among the support agencies and the lack of ability of the farmers' organizations to establish linkage with those agencies;
(v) Lack of credit access to formal institutions to enable IA members to develop a well integrated production and marketing system;
(vi) Absence of permanent offices, resulting in generally loose operations and difficulty in maintaining documents and records;
(vii) Inadequate marketing system, particularly in post-harvest handling;
(viii) Weak policy on selection of officers to ensure mass-based decision-making; and
(ix) Heterogeneity of membership.

(2) National Irrigation Administration

NIA's capacity to support the IA development in the study area is presently constrained by the following factors:

(a) Inadequate IDO staff

The 6 IDOs are faced with 60-70% inactive IAs due to non-functionality of the BOD, TSAGs and/or IA committees. Reactivation of these IAs would involve re-organization and re-election of new officers who may need intensive leadership/management training and guidance that the present manpower could not handle effectively.

(b) Lack of training on integrated and participatory development

The kinds of trainings and orientations received by the IDOs have been largely focused on developing IAs' capabilities to become effective "partners" of NIA in O&M work, water distribution, and ISF collection. The integration of

these tasks with other existing and planned activities of the IAs such as crop diversification and operation of post-harvest facilities has not been successfully developed. Training of IDOs on methods and techniques of integrated and participatory planning and management would be very critical to enable them provide the IAs with broader development perspectives and skills.

(c) Poor database management system

The lack of systematic database management in the ASBRIS and JSRIS Offices hampers quick processing, retrieval and production of data in the desired format. The Institutional Development Section in these offices has no computer. The improvement of both the "hard" and "soft" aspects of database management is urgently needed in these offices.

(3) Comprehensive Agrarian Reform Program

The slow progress of CARP implementation poses a major constraint to the development of irrigated agriculture and improvement of farmers' socio-economic conditions due to the following factors:

(i) Non-completion of land transfer in rice and corn lands, with about 4,000 ha (45% of total scope) still to be distributed as of 31 December 1996, making the security of tenure of farmers in these lands very uncertain.
(ii) Small size of landholdings awarded, averaging only to about 1.6 ha in land transfer under rice and corn lands, 1.0 ha under other agricultural lands, and 1.7 ha in non-land transfer Leasehold Operation. This affects farmers' capability to improve land productivity.
(iii) High incidence of tenancy in small holder rice farms, with about 19% of farm households still operate on tenanted lands. This situation reduces farmers' incentive to invest for increased level and quality of production.
(iv) Slow documentation and valuation of acquired hacienda or sugarcane land under the Leasehold Operation, resulting in a low accomplishment of 5% as of 31 December 1995.

3.11 Present Condition of Watershed Area

3.11.1 National and Regional Background

Forests in the Philippines faced a crisis in the 1970s due to disordered logging activities. The reasons for the degradation and its degree varied in different periods as shown below.

1960's - 1970's	-	Disordered logging activities for timber exportation
1970's - 1990's	-	High intensity of slash and burn cultivation because of increasing population pressures
	-	Upland crop farming in the sloping land without soil conservation measures

However, the peak of degradation is the mid-70s and the situation of watershed has gradually improved within a period of 20 years by the governmental efforts. The situation in Iloilo province (the watershed areas) is mostly the same as in the national level.

3.11.2 Physical and Biological Condition

(1) Location and Administration

The area and administrative location of four (4) watershed areas are shown in the following table.

Watershed	Area (km^2)	Municipality (Area : km^2)
Aganan	104	Alimodian (144 km^2)
Tigum	193	Maasin (156 km^2), Cabatuan
Suague	181	Janiuay (179 km^2), Badiangan
Jalaur	1,065	Lambuano (247 km^2), Duenas, Calinog (233 km^2), San Enrique (88 km^2) ,Passi (251 km^2), Dingle

Note : Municipalities of thick letters are the dominant municipality in the watershed area.

The boundaries of each watershed in the hill side are basically the same as the boundary of the municipalities. The characteristics of dominant municipality such as population, land category, etc. were representative of the watershed area in this report.

(2) Land category

The land of the watershed areas are broadly classified into i) Alienable and Disposal land (A&D land) which has a slope of less than 18 % and can be used for any purposes and ii) Public Forest land which basically has a slope of 18 % and over, and is under the control of DENR. Further, the Public Forest land could be divided into three (3) types of forest such as thick forest (primary/massy forest/residual forest), sparse forest (secondary forest, brush land), and grassland (open / cultivated land).

Watershed	Municipality	Public Forest Land						Alienable and Disposable land		Total	
		Forest *1		Second. Forest		Grassland *2					
		(ha)	(%)	(ha)	(%)	(ha)	(%)	(ha)	(%)	(ha)	(%)
Aganan	Alimodian	190	1	220	2	2,130	15	11,940	82	14,480	100
Tigum	Maasin	90	1	6,740	43	150	1	8,680	55	15,660	100
Suague	Janiuay	0	0	1,500	8	3,950	22	12,460	70	17,910	100
Jalaur *3	4 municipalities	7,080	9	9,300	11	12,740	16	52,730	64	81,860	100

Source : Provincial Environment & Natural Resource Office (PENRO), Iloilo

Remarks : *1 consisting of primary forest, mossy forest and residual forest.

*2 including slash and burn fields.

*3 Data of Jalaur is represented by 4 municipalities of Lambuano, Calinog, San Enrique and Passi.

The differences of existing forest area among the watersheds are mainly results of the differences of activities at the government level for the rehabilitation and conservation of watershed. Furthermore, 70 - 80 % of the land in Alimodian (Aganan) and Janiuay (Suague) is classified into A&D land. This means that only 20 - 30 % of the land in the watershed area can be recovered for forest purposes by DENR.

(3) Soil

According to soil survey report entitled "Soil Survey of Iloilo Province" (1947), the following soil types can be found in the watershed areas.

(Unit : km²)

Soil types	Texture	Depth /1	Permeability	Aganan	Tigum	Suague	Jalaur
Alimodian clay loam	clay loam	+2	good	69	113	103	592
Alimodian silt loam	silt loam	+2	fair	-	4	9	-
Alimodian soils, undifferentiated	N.D.	+1 - +2	N.D.	22	17	17	241
Alimodian-Barotac complex	loam	+1 - +2	fair	-	-	-	86
Barotac clay loam and loam	loam	+1 - +2	fair	-	-	-	25
Faraon clay	clay	+1 - +2	poor	-	-	5	32
Luisiana loam	loam	+3	good	-	-	-	25
Sta. Rita clay	clay	+3	poor	2	19	23	4
Umingan fine sandy loam	sandy loam	+2 - +3	good	11	40	25	62
Total				104	193	181	1,065

Remarks : /1 +3:deep, +2:moderate, +1:shallow.

Source : Soil Survey of Iloilo Province, Bureau of Soil and Water Quality (1947).

(4) Present Land Use Condition

The present land use and vegetative condition in the watershed areas are classified according to the Land Cover maps prepared by NAMRIA. The extent of each land cover is shown in Table A.3.40, and summarized below :

(Unit : km²)

	Watershed							
	Aganan		Tigum		Suague		Jalaur	
Forest								
Open canopy, mature trees <50%	0	0%	4	2%	10	6%	76	7%
Extensive Land Use								
Cultivated area mixed with brush & grass	55	53%	140	73%	127	70%	644	60%
Grassland, glass covering >70%	0	0%	0	0%	0	0%	36	3%
Sub-total	55	53%	140	73%	127	70%	680	63%
Intensive Land Use								
Arable land, crops mainly paddy & sugar	17	16%	40	21%	44	24%	308	29%
Crop land mixed with plantations	32	31%	9	5%	0	0%	0	0%
Sub-total	49	47%	49	26%	44	24%	308	29%
Built-up Area	0	0%	0	0%	0	0%	100	0%
Total	104	100%	193	100%	181	100%	1,065	100%

Remark: Forest: cultivated land is less than 10% of the total area, Extensive land use: cultivated area is 10% to 70% of the total area, Intensive land use: cultivated land is more than 70% of the total area.

Source; Digital Data of Land Cover Maps (Iloilo City:2528, Roxas City:2523, Bogo:2524) NAMRIA.

The watershed areas are extensively or intensively utilized for cultivation, and the forest cover is limited in a small area. In the Aganan watershed, the proportion of intensive use for cultivation is higher than the other areas.

(5) Slope Condition

The slope condition of the watershed areas is as follows :

(Unit : km^2)

Slope Class	Aganan		Tigum		Suague		Jalaur	
0 - 3%: level to very gently sloping	8.3	8%	27.0	14%	32.6	18%	127.8	12%
3 - 8%: gently sloping to undulating	10.4	10%	29.0	15%	21.7	12%	63.9	6%
8 - 18%: moderately sloping to rolling	3.1	3%	40.5	21%	38.0	21%	298.2	28%
Sub-total	21.8	21%	96,5	50%	92.3	51%	489.9	46%
18 - 30%: rolling to moderately steep	35.4	34%	52.1	27%	30.8	17%	245.0	23%
> 30%: steep hills and mountains	46.8	45%	44.4	23%	57.9	32%	330.1	31%
Sub-total	82.2	79%	96.5	50%	88.7	49%	575.1	54%
Total	104.0	100%	193.0	100%	181.0	100%	1,065.0	100%

Source : Department of Environmental and Natural Resources (DENR), Region VI.

The steep slopes over 18% extends on more than half of the watershed. Taking into account the present land use condition mentioned in the above section, the steep slopes are extensively or intensively cultivated. In Aganan watershed, the proportion of the level to moderately sloping lands (0 to 18% slopes) is only 21%, and the intensively cultivated land is 47%. This indicates that more than half of the area utilized intensively are located in steep slopes over 19%.

(6) Soil Erosion

According to the field reconnaissance and interviews with farmers, it is speculated that the upland fields located on sloping land are the most susceptible to soil erosion because of the non-application of soil conservation measures. Especially, Aganan and Suague watershed areas are assumed to be susceptible to severe soil erosion. Apart from soil erosion in sloping area, river bank erosion was observed throughout the field reconnaissance survey especially in the Suague watershed area. The river bank has also suffered serious erosion at flood.

3.11.3 Socio-economic Condition

(1) Population intensity of the watershed areas

The population of the whole of province has been increasing at an annual rate of about 2% for the last three (3) decades. The population growth rates of the watershed areas for the last three decades ranged from 0. 2 to 2.4 %/annum. The data on population and number of households in 1995 in the watershed areas are shown below.

Watershed	Municipality	Population (1995)		Annual	Household (1995)	
		Number (1000person)	Density (P. /km2)	increase rate at '60 -'95	Number (1000H.H.)	Density (H.H./km2)
Aganan	Alimodian	29	201	1.4	5.4	37.1
Tigum	Maasin	29	187	0.9	5.0	31.8
Suague	Janiuay	50	280	0.2	9.4	52.3
Jalaur <1	4 municiparities	189	240	1.9	35.0	42.8

Source : Census on Population 1995, PPDO-Iloilo
Remark : <1 Data of Jalaur is represented by 4 municipalities of Lambuano, Calinog, San Enrique and Passi.

(2) Living condition

To grasp the present living condition and problems of the households, an interview survey was carried out in the Phase-I Study. The results of this survey are, however, not represented in the watershed areas since the survey was just sampling survey, therefore the data are to be considered as references. In Tigum watershed, the survey was not carried out since there were no settlers in the hill and mountainous area. The results are summarized as follows:

Items	results
Cash income :	23,600 - 50,000 pesos
Cash expenditures :	8,000 - 44,000 pesos
Land holding size :	0.5 - 4.0 ha
Drinking water source:	Tube well, Spring
Electricity :	Not available
Distance to p. school and/or clinic:	0.2 to 4.0 km
Energy source :	firewood

(3) Present problems and development needs

Present dominant problems of sampled households were roughly grasped through the interview survey. The dominant problems are summarized as follows :

Order	Aganan	Suague	Jalaur
1	- No electricity	- Poor road condition	- Shortage of food
2	- Poor road condition	- No electricity	- No irrigation water
3	- No school facility	- No school facility	- Poor drinking water
4	- No market facility	- Shortage of fertilizer	- Poor road condition
5	- No health facility	- No irrigation water	- No health facility

Remarks : The sampling number of each watershed is 3 H. H. in Aganan, 2 H. H. in Suague, and 1 H. H. in Jalaur, respectively.

The settlers are mainly concerned about the improvement of rural infrastructure such as electricity, road, school, etc. The ranking of forest rehabilitation was low in the list. It indicates that the settlers have no complaints on the present forest condition and less intention to improve the forest.

3.11.4 Existing Government Activities

(1) Demarcation of governmental forest management area

For the rehabilitation and proper management of forest area, DENR has designated several reserve areas and forest management programs in Public Forest land. The areas are presented in Table A.3.41 and summarized as follows :

Watershed	Municipality	Forest Management *1		Designated as Reserve Area *2		Non-classified Area		Total Timber Land	
		(ha)	(%)	(ha)	(%)	(ha)	(%)	(ha)	(%)
Aganan	Alimodian	180	7	0	0	2,356	93	2,536	100
Tigum	Maasin	215	3	5,800	83	965	14	6,980	100
Suague	Janiuay	646	12	0	0	4,803	88	5,449	100
Jalaur *3	3 municipalities	5,084	20	12,578	49	8,152	32	25,814	100

Source : Provincial Environment & Natural Resource Office (PENRO), Iloilo

Remarks : *1 Forest Management program includes 1) Regular reforestation, 2) Contract reforestation, 3) ISFP, 4) ITP

*2 Reserve area includes 1) National park, 2) Watershed area, 3) Civil reserve, 4) Military reserved forest, 5) Communal forest

*3 Data of Jalaur is represented by 3 municiparities of Lambuano, Calinog and San Enrique.

(2) Watershed rehabilitation sub-project

In the watershed areas, parts of Tigum and Jalaur watershed areas are designated as "Watershed Reservations" with 5,800 ha in Tigum (Maasin municipality) and 9,230 ha in Jalaur (Calinog municipality), respectively. In addition, DENR is presently proposing to implement the rehabilitation sub-projects in both watershed areas. The outlines of the sub-projects are summarized as follows :

Watershed	Name of project	Total area	Components
Tigum (Maasin Mun.)	Maasin Watershed Sub-project	2,685 ha	- Reforestation : 1,065 ha - Agro-forestry : 1,164 ha - River bank stabilization : 60 ha - Rattan plantation : 111 ha - Bamboo plantation : 300 ha
Jalaur (Calinog Mun.)	Jalaur Watershed Rehabilitation Sub-Project	2,500 ha	- Establishment of nursery - Check dam construction - Reforestation / erosion control - Protection of forest - Institutionalization in ISFP areas

In addition to the above sub-projects, several reforestation activities are conducted in the Maasin Watershed Sub-project area by LGUs, NGOs, private companies.

3.11.5 Evaluation of Watershed Condition

Based on the present land use condition, slope and elevation condition, land category and the present government activities, the degree of the degradation of the watershed area was evaluated, and the result of evaluation is summarized as follows :

Watershed	Land use	Slope	Land category	Erosion	Gov. activity	Overall
Aganan	3	3	3	3	3	**3**
Tigum	2	2	2	2	1	**2**
Suague	3	2	2	2-3	2 - 3	**2-3**
Jalaur	2	2	2	2	1 - 2	**2**

Note : Figures show the degree of condition of each aspect, i.e. 1=better, 2=moderate, 3=poor.

3.11.6 Development Constraints

The present constraints for watershed management are summarized in Figure A.3.33 and explained below.

(1) Physical Aspects

(a) Increase of population pressure and limited available land - Aganan, Suague

The rapid increase of population had accelerated the degradation of watershed area in the 1970s and 1980s. The population has been increasing or stabilized at high level in the watershed areas. Because the suitable land for crop cultivation is small parts in the watershed areas, most of them population been obliged to operate slash and burn cultivation or upland farming on the sloping area.

(b) Low accessibility of the watershed area - all watershed

Accessibility is particularly one of the factors to be considered for the success of the forest management project, specifically in terms of project supervision and monitoring phases. Due to low accessibility, the monitoring and supervising have often been insufficient, especially in the rainy season when the roads going to the area are impassable.

(2) Social Aspects

(a) Lack of settlers' intention for land conservation - Aganan, Suague, Jalaur

As the results of interview survey , land and forest conservation is far from the present settler's needs. Therefore, the normal reforestation approach and reservation program could not bring out their intention to conserve the land and forest. The approaches to be taken for watershed management should be incorporated in the integrated approach to fit their various needs.

(b) Shortage of income generating opportunities - all watershed

The settlers in and around the watershed areas have no opportunities to earn cash income except from forestry and agricultural activities. If there is an industry which can absorb people for supporting their lives, they will not depend on forest and upland agriculture for their income. As a result, it will reduce the inflow of new settlers into the watershed

In addition, the previous government activities lacked the following aspects.

(i) Lack of consideration of social aspect

In the past, watershed management has put too much emphasis on the assessment of what is happening rather than why it is happening. Hence, the past watershed management projects have tended to emphasize the engineering solutions and the planting of trees without attention to identify the ultimate cause of the degradation, the fundamental problems such as poverty, limited access to improved technology, etc.

(ii) Lack of participatory approach

This was also one of the main reasons for the failure to reach the beneficiaries' intention. The past approach was just like a " top-down" approach. Settlers in the hill and upland areas have had limited opportunity to be involved in the development and decision making processes of project design. It has frequently caused disappointing with the lack of intention from intended beneficiaries.

As regards the matters mentioned above, the government was trying to develop the alternative program including participatory approach with social consideration since 1991.

(3) Institutional Aspects

(a) Insufficient amount of fund and number of appropriate staff - all watershed

Presently, several kinds of watershed management programs are conducted by the government agencies concerned. However, the achieved area and size of the programs were assumed to be small as compared with the target area. The shortage of fund and proper technical staff is the main reason for this result.

(b) Inefficient coordination among the different agencies - all watershed

Several activities for watershed management by several agencies are found in and around the watershed area. These activities have been mainly coordinated on an area basis. Consequently, the activities were conducted just as under the independent responsibility of each agency in each area. Therefore, the efforts are sometimes assumed to have been diffused in a broad area.

3.12 Environmental Condition

3.12.1 Present Environmental Condition

(1) Reserved area and environmental sensitive area in and around the study area

The following reserved areas issued by the DENR are found around the study area.

Reserved area	Name	Location	Area (ha)
National Park	Bulabog-Puti-An National Park	Dingle, Pototan, Duenas, San Enrique	845
Watershed Reserved Area	Maasin Watershed Area	Maasin	5,800
	Jalaur Watershed Area	Calinog	9,228
Reserved Forest	Military Reserved Forest	Calinog	20
	Primary Forest	Lambuano	758
Coastal Area	Mangrove Forest	Dumangas	3,964

Source : Department of Environment & Natural Resources, Region VI

Apart from these, many fish ponds were observed in the downstream area of each RIS. The total area and number of fish ponds which exist downstream are shown below.

Irri. Scheme	No.	Area (ha)	Remarks
Aganan	2	3	undeveloped
Sta. Barbara	-	-	-
Suague	-	-	-
Jalaur Proper	12	76	Milk fish / Prawn
Jalaur Extension	160	1,304	Milk fish / Prawn

Source : Department of Agriculture (DA), Region VI

(2) Water quality of irrigation and drainage water

To evaluate the suitability for irrigation use and to assess drainage water quality, a water quality test which consists of 28 items was carried out in Phase-I Study. Total 30 samples were taken at dam sites and upstreams of each river, and these drainage. The results of analysis are presented in Table A.3.42. The following table shows the results of main parameters concerned with water use among 28 items.

River name	pH	TDS mg/l	DO mg/l	BOD mg/l	EC S/cm	TSS mg/l	Nitrogen mg/l	Or.- P mg/l	Cl mg/l	Boron mg/l	SAR
Irrigation water at Dam Site											
Aganan	8.0	180	2.6	2.0	0.8	173	0.0	NIL	20	<0.01	2.8
Sta. Barbara	7.5	210	2.7	1.3	0.5	520	0.2	2.7	14	<0.01	1.3
Suague	7.8	180	2.8	22.0	0.4	581	0.1	NIL	9	<0.01	1.1
Jalaur	7.0	190	1.5	128.0	0.3	39	0.0	NIL	12	<0.01	0.4
Irrigation water on Upstream											
Aganan	7.6	180	2.0	1.6	0.7	35	0.1	NIL	16	<0.01	1.9
Sta. Barbara	6.9	190	3.8	3.0	0.4	822	0.0	1.9	13	<0.01	1.0
Suague	7.7	170	3.0	17.5	0.3	3,084	0.3	2.9	11	<0.01	1.0
Jalaur	7.7	87	5.2	22.2	0.2	980	0.3	0.8	8	<0.01	0.4
Drainage water											
Aganan	7.5	180	1.1	4.8	0.7	86	0.6	2.2	22	<0.01	1.3
Sta. Barbara	7.2	410	3.7	5.3	0.9	41	0.3	NIL	10	<0.01	2.7
Suague	7.4	230	3.5	3.5	0.6	44	0.3	NIL	35	<0.01	1.0
Jalaur prop.	7.6	123	2.5	3.1	0.3	304	0.1	NIL	10	<0.01	0.8
Jalaur ext.	7.5	107	2.1	6.1	0.3	138	0.1	0.5	76	<0.01	0.6

Source : JICA Study Team (1997)

The following table shows the evaluation results based on the water quality criteria of Philippine ("Water Quality Criteria", DENR Order No. 34), FAO (I&D Paper

29) and Japan (Water quality criteria for irrigation, MAFF, 1970; Criteria for conservation of river surface water, Department of Environment, 1971).

Type		Comment
Irrigation water	1	The high BOD values at the intake dam sites of Suague and Jalaur RISs are caused by the waste water from the sugar mill factories in the upstream reaches, particularly in the late dry season. Those high BOD values result in low DO values by consumption of oxygen in water. No adverse effect is currently reported on rice cultivation caused by high BOD and low DO in irrigation water, and improvement of water quality is observed in the drainage from the RISs. It is also expected that no irrigation water will be applied in the most serious season of March to April due to canal maintenance. Therefore, the effect by high BOD and low DO at the intake dam sites are not serious in the future.
	2	The TSS (Total Suspended Solid) values are significantly high, although the values vary from 39 to 581 ppm at the dam sites. It indicates the high sedimentation loads at three (3) dam sites of Aganan, Sta. Barbara and Suague.
	3	Organic-phosphate was occasionally detected from the water sources. It should be analyzed to clarify the type of organic-phosphate. If its source is from agrochemical such as parathion, ENP, etc. and its contamination is stably continued, the water source may not be suitable for irrigation use.
Drainage Water	1	The quality is evaluated on the basis of the criteria of fishery water. Although DO in samples of all drainage is insufficient in comparison with the criteria, it will not occur a sever limitation for fish culture since the ponds are brackish type and the drainage water is therefore mixed with sea water by a tidal effect.
	2	Organic-phosphate was also detected from the drainage water. As mentioned above, it should be identified the type of organic-phosphate and its stability.

3.12.2 Present Environmental Issues

Several environmental issues in and around the study area were found in the Phase - I survey. These issues are summarized in Table A.3.43, and explained below.

(1) Siltation in scouring sluice and canals (in all schemes)

This is a major problem commonly observed not only in the study area but also in other national irrigation systems. Because of siltation, the scouring sluice and canals have substantially reduced their storage and flow capacities, and consequently resulted in unequal water distribution in the service area. Since the main cause of siltation in the service area is mass waste in the upstream area (watershed areas) due to land degradation, the watershed management such as reforestation and soil conservation is essential for avoiding it.

(2) Watershed degradation (in all schemes)

According to the settlers in the watershed areas, a thick forest had in the past covered the watershed area. Due to the disordered timber logging and fuelwood logging, the forest area had been destroyed since the 1970s. In addition to the logging activities, shifting cultivation and upland farming without conservation measures compounded by population increase had accelerated the degradation of land. It is considered that the watershed degradation has resulted in severe flood and lowering the base flow of river.

(3) Inequity of water distribution (in all schemes)

Inequitable water distribution is observed between water users upstream and downstream of canal systems, due to 1) deterioration of irrigation facilities, 2) overuse of water in the area upstream of canal systems, 3) out-of-schedule cropping in the upstream area, and 4) water use without obtaining water right for the irrigation areas in upper river basins. This, inequity of water distribution, causes social conflict among farmers. The following table shows distribution of benefited area in the service area of each RIS.

(Unit : %)

Cropping intensity	Aganan	Sta. Barbara	Suague	Jalaur prop.	Jalaur ext.
Over 150%	8	72	55	46	23
100 - 150%	56	0	45	9	48
less than 100%	36	28	0	45	29

Source : Aganan - Sta. Barbara and Jalaur - Suague Office, NIA

(4) Seasonal inundation of service area (in Jalaur proper and Suague RIS areas)

Water logging and/or flooding in the service area during the typhoon season is an issue, though it is not a major one. It impairs farming operation and often results in lower crop yields. The flooding of the Jalaur proper RIS occurs along the middle reach of the Jalaur river near Barotac Nuevo municipality, and it is affecting the tail portion of the RIS.

(5) Deterioration of water quality (in Jalaur proper and extension RIS)

According to the results of water quality analysis conducted in Phase-I survey and the monitoring data of water quality conducted by DENR on 1996, the figures of BOD indicate quite a high level at the samples of Jalaur and Suague dam sites. It is considered that the effluent from the sugarcane factories on the upstream influence the water quality. The environmental complaints, however, are not found in the field survey. It is required to promote the oxidation through proper drainage management at the cropping season, since it may affect the root growth of paddy by deoxidization.

(6) Urbanization in the RIS area (in Aganan and Sta. Barbara RIS)

As described before, the service areas of Aganan and Sta. Barbara RISs has decreased due to expansion of Iloilo city, and it is under progress. Considering the large amount of money to be spent to make the service area more productive by irrigation development, it is also assumed to be a serious issue. So far, about 1,200 ha of the area in Aganan and 1,500 ha in Sta. Barbara has been converted into houses or buildings. In order to reduce the progress of the urbanization, a certain incentives such as i) promoting of modern and suburban type farming, ii) strengthening of agricultural supporting system, iii) strengthening of marketing system, etc. shall be considered and incorporated into the development plan.

4. STUDY ON DEVELOPMENT PLAN

4.1 Basic Concepts for Project Formulation

4.1.1 Main Issues in the Study Area

The poor performance of irrigation services is generally common to most national irrigation systems (NIS) in the Philippines. As clarified in Chapter 3, existing five (5) NIS such as the Aganan, Sta. Barbara, Suague, Jalaur proper, and Jalaur extension RISs in the study area also are not properly maintained to ensure adequate, equitable and timely supply of water. This causes low agricultural productivity in the said RIS areas. The major issues related to the performance of these RISs are summarized as follows:

(1) Low agricultural productivity

Agricultural productivity is generally low as reflected by the low paddy yields of about 3.3 tons/ha to 3.9 tons/ha obtained in the study area The low yields of paddy can be attributed largely to insufficient supply of irrigation water, improper farming technology brought about by inadequate provision of agricultural extension services, and lack and improper use of certified seeds.

(2) Low irrigation efficiency

As clarified in Section 3.7.6, the present overall irrigation efficiencies of existing RISs in the study area are estimated at approximately 20 % to 30 %. The low irrigation efficiencies can be attributed to inadequate supply of water due to siltation in canal systems caused by the absence of silt excluders, low embankment, difficulty of operation by the absence of measuring devices and insufficient control structures due to deterioration, and poor water management and operation of facilities by NIA staff and IA members due to lack of proper skills.

(3) Poor water management and O&M practice and low collection of ISF

Water management and O&M practice in the systems of existing RISs in the study area are not being properly and effectively performed by NIA staff and IA members. The average ISF collection efficiencies of existing RISs for the past five (5) years from 1992 to 1996 are estimated at 28 % to 41 %. These rates are lower than the national average of 48 %.

The poor water management and O&M practice can be attributed mainly to insufficient O&M budget due to low collection of ISF, inadequate O&M competence on the part of NIA staff and the IAs, and insufficient water control structures and lack of measuring devices.

The low collection of ISF can be attributed mainly to low farm incomes received by farmers, low consciousness of farmers for ISF payment, improper evaluation of benefited areas and production by the NIA field staff. The latter has been tolerated by the NIA staff who have been assigned to the site for long years. Inaccurate collection of ISF is also due to poor database management particularly on ISF billing and collection records.

(4) Institutional and technical weakness of Irrigators' Association and NIA

After almost a decade of existence, most of the IAs are still dependent on NIA's field staff in the formulation and implementation of organizational policies and activities for effective and sustainable O&M of facilities, water delivery and distribution, cropping schedule, fund generation, and skills development of the general membership. This can

be attributed mainly to unclear organizational activities and benefits, inadequate organizing strategy, financial weakness, non-participation of farm workers, no functional IA/TSAG service committee for water management and O&M work, and absence of practical, easy-to-understand manual on water management, O&M practice and cropping calender preparation.

NIA's capacity to support the IA development is also presently constrained by institutional and technical weakness. This can be attributed to lack of training and experience of IDOs on community organizing, cooperative development and inter-agency coordination, absence of systematic management information system for quick and accurate generation of operational map and updated database for each IA, and unclear delineation of functions of IDO and WRFT/WRF ditch tender.

(5) Financial weakness of farmers

Most farmers in the study area have cash flow problem. This poor financial position of farmers can be attributed mainly to low agricultural productivity and small size of farm land. Compounding this is the limited access to government institutional credit program. They borrow money from the private traders for land preparation and purchase of farm inputs whose interest rates are normally above market rate. The farmers sell their paddy immediately after harvest without drying to repay their loans. Thus, the farmers are deprived of better farmgate price.

(6) Watershed degradation

Due to fuelwood gathering for sugarcane factory, the forest areas in the watershed areas of the water source rivers for existing RISs have been destroyed. This has resulted in severe flood during wet season, lowering the baseflow of river in dry season and increased sedimentation of river due to soil erosion.

In addition to the above issues, the following are also identified which are specific to the study area:

(7) Illegal water use in the upper river basin

There are 2,988 ha of total irrigation areas which utilize water by brush dams or pumps in the upper river basins of existing RISs without obtaining water right. This issue would greatly affect the sustainability of the Project if the river water would be disorderly used in the said irrigation areas.

(8) Conversion of agricultural land

Part of agricultural lands of both the Aganan RIS and Sta. Barbara RIS located near the Iloilo city has been converted into mainly residential or commercial lands due to urbanization, covering 500 ha and 400 ha, respectively. This has developed mainly due to abandonment of agricultural lands by farmers because of insufficient supply of irrigation water and its convenient location along the national road.

4.1.2 Development Policies for Basic Issues on Project Sustainability

Of the eight (8) main issues identified in the study area, the issues on land conversion, illegal water use and watershed degradation are considered to affect the sustainability of the Project. To address these basic issues on the project sustainability, certain development policies are taken into consideration as briefly discussed below.

(1) Land conversion

To protect the agricultural lands of both the Aganan and Sta. Barbara RIS areas from further reduction and sprawl due to disordered land conversion, the following development policies will be adopted:

(a) to ensure adequate, equitable and timely supply of irrigation water to all irrigation service areas of both the Aganan RIS and Sta. Barbara RIS through rehabilitation and improvement of existing irrigation facilities and strengthening of the skills of the NIA staff and IAs on water management and O&M practices, thereby revitalizing the irrigation system, and

(b) to introduce high value - added diversified crops in both the Aganan and Sta. Barbara RIS areas through the development of irrigated agriculture in order to improve the poor financial position of farmers and increase farmers' access to markets.

(2) Illegal water use in the upper river basin

Water users in the upper river basins utilize river water for irrigation without restraint by taking advantage of the location of their paddy fields. However, their irrigation facilities are inappropriate with low efficiencies, resulting in wasteful use of river water. Taking into consideration the importance of the basin - wide water management approach, the development policies to be adopted are as follows:

(a) to enhance the irrigation efficiencies through improvement of water users' facilities and thereby reduce the wasteful use of river water, and

(b) to give water rights to their irrigation areas for legal authorization.

It is recommended that the said improvement of facilities be done by developing new communal irrigation system projects under the guidance of the NIA and LGU in the future. Only the required amount of irrigation water under the communal irrigation system projects would be allocated and accounted in the water balance calculation for the study area.

(3) Watershed management

Generally, proper management and rehabilitation of watershed require a high investment and considerably long time to recover the stable river water flow, reduce sediment and sustain the project life and get significant effect. Taking this into account, the development policies for issues on the watershed degradation are as follows:

(a) as a short term plan, to provide a settling basin at each head of the main canal to protect canal systems from siltation by sediment intrusion to the systems, and

(b) as a long term plan, to disseminate the sustainable upland farming system on sloping land, promote the social forestry program (reforestration program) such as community forestry management agreement (CFMA) and to develop the alternative energy sources such as introduction of biogas, improved stove, and establishment of community forest.

The short term plan would be implemented as the first step under the Project, while the long term plan would be in the form of recommendations to NIA and DENR under the Project.

4.1.3 Necessity of the Project

To address the above common issues to NIS, the following projects financed by the World Bank have been, or are being implemented for the Aganan, Sta. Barbara, Suague, Jalaur proper, Jalaur extension RISs.

- The First Irrigation Operation Support Project (IOSP I)
- The Second Irrigation Operation Support Project (IOSP II)
- The Water Resources Development Project (WRDP)

These projects have aimed to improve and sustain the operational efficiency of the NIS to increase agricultural production (mainly rice), expand small farmer incomes and rural employment opportunities, and contribute to rural poverty alleviation. But, since the operations of these projects have been nationwide in scope and covered all the existing NIS, the project fund for each RIS has been limited. In fact, only minor repair and desilting works were executed under IOSP I & IOSP II. Most of the funds were used for desilting works of the irrigation canals. The system improvement and repair works under WRDP would be implemented from 1998 for the Jalaur proper RIS, but the planned budget would be limited to about 29,500 thousand pesos (US$ 1,032 thousand). Due to this condition, the projects are not effected to solve the fundamental issues on the low agricultural productivity and low irrigation efficiency in the project areas.

As stated in the subsequent sections of Chapter 4, the construction plan for the proposed small impounding dams and irrigation plan for the proposed extension areas would be excluded from the development plan mainly on technical consideration. Thus, the development of irrigated agriculture within the limited irrigation service areas of the existing RISs would be a main subject to increase agricultural productivity at the highest level, especially the yields of paddy. This would be achieved by enhancing irrigation efficiency for effective and maximum use of available water. To address the major issues in the areas and attain the above goal, the following plans are envisaged:

- Irrigated agriculture development plan anchored on increasing productivity, especially yield of paddy,
- Rehabilitation and improvement plan of existing irrigation facilities to enhance irrigation efficiency for maximum use of available water,
- Improvement and strengthening plan of present water management and O&M practice including improvement plan of ISF collection by NIA and IA to enhance irrigation efficiency for maximum use of available water and to protect the rehabilitated and improved facilities from deterioration,
- Institutional development plan of IA and NIA for sustainability of water management and O&M practice and implementation of Type III contract within 10-year period,
- Strengthening and improvement plan of agricultural support services such as extension, research, credit, post-harvest facilities and marketing, and rural infrastructures including farm-to-market road network for effective implementation of the irrigated agriculture development plan to improve the financial weakness of farmers, and
- Watershed management plan to stabilize river water flow, reduce sediment and sustain the Project operations.

The integration of those prospective plans is necessary to reactivate the existing RISs, maximize the agricultural productivity, improve the financial position of farmers, and thereby improve the regional economy.