3.05 Questionnaires

The questionnaires for the inventory survey are prepared by the Study Team and finalized through discussions with NIA counterpart personnel. Approximate number of questions for each questionnaire is 260 for existing sub-project, 210 for new sub-project and 130 for expansion program. All the questionnaires with sample answers are shown in Annex B.

3.06 The questionnaires were distributed to PIEs on August 14 to 16, 1990 with expection that the answered questionnaires would be returned by the end of September, 1990. The inventory survey was however finally completed on December 3, 1990 and the filled-out questionnaires were returned by 67 PIOs covering 74 provinces. The returned questionnaires were 4,192 in total (CISs: 2,561, CIPs: 1,631) or 87 % of the questionnaires distributed (for details, see Table 3-01):

Items	CISs	CIPs	Total
No. of Inventoried Sub-Projects for 74 Provinces (1)	2,838	1,973	4,811
No. of Sub-Projects with Returned Questionnaires for 74 Provinces (2)	2,561	1,631	4,192
Return Rate (3) = (2)/(1) x 100 (%)	90	83	87

3.07 Computerized Database for Analysis of Inventory Survey

In order to analyze the inventory survey data, computerized database has been prepared by the JICA Study Team using internal language of relational database software "d-Base III." All the data collected by the inventory survey of about one million in number, are encoded into the computerized database.

3.08 Cross-Checking of Encoded Data

Since many questionnaires had to be answered in a short time at every PIO, it was anticipated that there would be improper answers caused by a slip of pen, miscalculation and misreading of digits and units. Therefore, adequacy and accuracy of data in questionnaires were examined firstly by visual checking and secondly by application of check-use programs to the computerized database.

3.09 Screening of Candidate Sub-Projects for the Study

Screening of candidate sub-projects for the Study was made by computers. The requirements for screening the candidate sub-projects are (a) conformity with the

definition of SSIDP and (b) availability of data on irrigation area. As a result, the qualified candidate sub-projects were 2,423 for CISs and 1,466 for CIPs, totalling 3,889. A schematic work flow of the inventory survey is shown in the following page. Locations and lists of all CIS/CIPs are shown in Parts-I and II of Data Book, respectively.

General Features of Candidate Sub-Projects (CISs/CIPs)

3.10 Total Number of Candidate Sub-Projects

After the screening, 3,889 sub-projects were qualified as the candidate sub-projects for the master plan:

	CISs	CIPs	Total
Inventoried	2,838	1,973	4,811
Returned	2,561	1,631	4,192
Qualified	2,423	1,466	3,889

3.11 The general features of those candidate sub-projects is summarized hereinafter and the relevant details are compiled in Annex B. (It should be noted that otherwise specified, the following summary was based on the original data of the inventory survey which were neither cross-checked nor supplemented):

3.12 Types of CISs

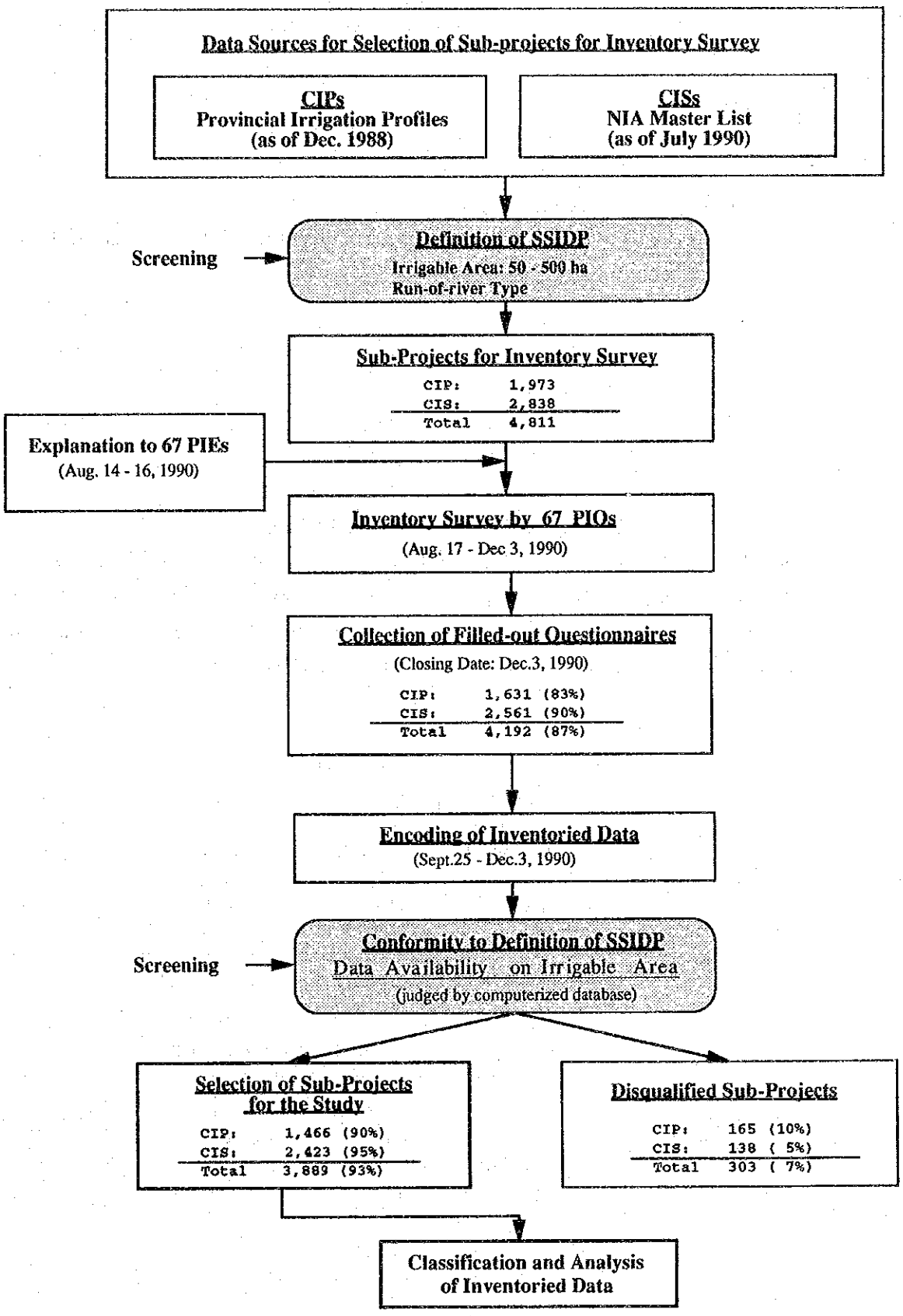
The candidate sub-projects of CISs are further classified into the following types and about 47 % of CISs are amortizing sub-projects:

Amortizing	Non-Amortizing	Private	Total
1,147 (47%)	720 (30%)	556 (23%)	2,423 (100%)

3.13 Necessity of Rehabilitation (CISs)

Average period after the completion of construction works to the present is 10 years. The CISs rehabilitated in the past are 489 in number. The CISs requiring rehabilitation works are 1,365 , and CISs requiring expansion works are 15 sub-projects. About 57% of the CISs need rehabilitation and/or expansion works.

Inventory Survey and Selection of Sub-Projects for the Study
(Outline of Study Process)



No. Rehab./Impro. Required	Rehab./Impro. Required	Expansion Required	Under Construction	Unknown	Total
493 (20%)	1,365 (56%)	15 (1%)	89 (4%)	461 (19%)	2,423 (100%)

3.14 Level of Project Preparation (CIPs)

Pre-engineering activities of CIPs such as feasibility study (F/S) and detailed design (D/D) have been finished only for 19 % of CIPs.

No Planning	F/S Finished	D/D Finished	Unknown	Total
998 (68%)	199 (13%)	81 (6%)	188 (13%)	1,466 (100%)

3.15 Catchment Area and Average Low Flow in the Dry Season

River discharge data are available for 53% of CISs and 60% of CIPs. Average catchment area at intake is 21 km^2 for CISs and 18 km^2 for CIPs. The catchment areas of about 90% of the CISs/CIPs are smaller than 100 km^2 and the average low flow in the dry season is about 190 lit/sec for both CISs/CIPs.

	Catchment Area at Intake (km^2)			
	0-100 km^2	100-1,000 km^2	Over 1,000 km^2	Total
CISs (no.)	1,100 (90%)	100 (8%)	29 (2%)	1,229
Average (km^2)	21	283	3,209	
CIPs (no.)	783 (93%)	56 (7%)	5 (0%)	844
Average (km^2)	18	238	6,819	

	Average Low Flow in Dry Season (lit./sec)			
	Less than 500	500 - 1,000	More than 1,000	Total
CISs (no.)	1,115 (68%)	256 (16%)	254 (16%)	1,625 (100%)
Average (lit./sec)	190	720	4,260	
CIPs (no.)	628 (69%)	106 (12%)	168 (19%)	902 (100%)
Average (lit./sec)	190	740	4,580	

3.16 Designed Irrigable Area

Average designed irrigable area in the wet season is 145 ha for CISs and 144 ha for CIPs, while that in the dry season is 135 ha for CISs and 128 ha for CIPs.

(Unit: ha)

Average Designed Irrigable Area			
CISs		CIPs	
Wet	Dry	Wet	Dry
145	135	144	128

3.17 About 70% of CISs/CIPs have the designed irrigable area of less than 150 ha.

	Designed Irrigable Area (Wet Season)			
	50 - 150 ha	150 - 300 ha	300 - 500 ha	Total
CISs (no.)	1,669 (69%)	554 (23%)	200 (8%)	2,423 (100%)
CIPs (no.)	1,024 (70%)	338 (23%)	104 (7%)	1,466 (100%)

3.18 Actually Irrigated Areas (CISs)

The actually irrigated areas of CISs are always smaller than the designed irrigable areas. A reduction ratio of the designed irrigable area is 75% for wet season and 59 % for dry season as shown below:

Wet Season			Dry Season			
Designed Irri. Area (1) (ha)	Actually Irri. Area (2) (ha)	Ratio (3)=(2)/(1)	Designed Irri. Area (4) (ha)	Actually Irri. Area (5) (ha)	Ratio (6)=(5)/(4)	Ratio (7)=(5)/(1)
351,769	263,554	0.75	299,107	207,681	0.69	0.59

3.19 Cropping Intensity

Average present cropping intensity is 171% for CISs and 128% for CIPs.

	Cropping Intensity %									Average
	0 | 50	50 | 100	100 | 130	130 | 150	150 | 170	170 | 200	Over 200	Unknown	Total	(ha)
CISs (no.)	0	213 (9%)	121 (5%)	230 (9%)	233 (10%)	1,191 (49%)	20 (1%)	415 (17%)	2,423 (100%)	171.3
CIPs (no.)	74 (5%)	221 (15%)	68 (5%)	111 (8%)	79 (5%)	170 (11%)	1 (0%)	742 (51%)	1,466 (100%)	128.2

(Definition of cropping intensity is shown in Glossary)

3.20 About 83% of the CISs have the cropping intensity of more than 130% under the irrigated condition, while about 90% of the CIPs have that of more than 130% .

	Cropping Intensity (%)		
	Less than 130%	More than 130%	Total
CISs (no.): Present	334 (17%)	1,674 (83%)	2,008 (100%)
CIPs (no.): Proposed	99 (10%)	898 (90%)	997 (100%)

3.21 Irrigation and Drainage Facilities

Average densities of the respective irrigation and drainage facilities per ha or sub-project are as follows:

	Facilities	Unit	Densities
1.	Diversion weir	m/sub-project	26.4
2.	Irrigation canals		
	2.1 Diversion channels		
	- Earth	m/ha	7.9
	- Concrete-lined	m/ha	6.1
	2.2 Main/lateral canals		
	- Earth	m/ha	28.6
	- Concrete-lined	m/ha	11.5
	2.3 Field ditches	m/ha	34.2
3.	Drainage canals		
	3.1 Project/farm drains	m/ha	9.4
	3.2 Drainage ditches	m/ha	9.5
4.	Service road	m/sub-project	1,400
5.	Access road	m/sub-project	1,600
6.	Flood protection dike	m/sub-project	878

(Based on the cross-checked and supplemented data)

3.22 CISs/CIPs are not always accompanied with all types of irrigation and drainage facilities. Percentage of CISs/CIPs having relevant facilities and all the CISs/CIPs (provision rate) are shown in the following table.

Facilities	Provision Rate (%)
Diversion weir (concrete) with intake	62
Diversion channel (Earth)	84
Diversion channel (Lined)	44
Main/lateral canals (Earth)	86
Main/lateral canals (Lined)	27
Field ditches	60
Project/farm drains	13
Drainage ditches	18
Service road	21
Flood protection dike	7
Access road	44

(Based on the cross-checked and supplemented data)

3.23 Project Costs for Irrigation Development

Project costs of CISs/CIPs are defined as a sum of the following chargeable and non-chargeable costs.

Chargeable Costs:

- Construction cost of diversion weir with intake
- Construction cost of diversion channel
- Construction cost of main/lateral canals
- Construction cost of field ditches
- Construction cost of project/farm drains
- Construction cost of drainage ditches
- Construction cost of service roads

Non-Chargeable Costs:

- Construction cost of flood protection dike
- Construction cost of access road
- Overhead (24% of direct cost)

3.24 Ceiling amount of chargeable costs in the minimum selection criteria is Peso 35,000 ha for CISs and Peso 70,000 ha for CIPs. About 92 % of CISs and 96 % of CIPs are below the ceiling amount. Average chargeable and non-chargeable costs per ha of CISs/CIPs are as follows:

(Unit: Peso/ha)

		CISs	CIPs
(1)	Chargeable cost	8,140	33,362
(2)	Non-chargeable cost	2,708	11,815
(3)	Project cost = (1) + (2)	10,848	43,994

(Based on the cross-checked and supplemented data)

3.25 Average farm size

Average farm size of CISs and CIPs is 1.5 ha and 1.7 ha, respectively and most of CISs and CIPs are less than 5 ha in average farm size.

	Average Farm Size (ha)								Average
CISs/CIPs	Less 1	1 - 2	2 - 3	3 - 4	4 - 5	Over 5	Unknown	Total	(ha)
CISs (no.)	681	652	220	93	39	2	736	2,423	1.5
	(28%)	(27%)	(9%)	(4%)	(2%)	(0%)	(30%)	(100%)	
CIPs (no.)	268	282	127	56	22	6	705	1,466	1.7
	(18%)	(19%)	(9%)	(4%)	(2%)	(0%)	(48%)	(100%)	

3.26 Crop Production

Main crop of CISs/CIPs is paddy. Non-paddy area occupies only 6% of the total areas. Main crops for the non-paddy area are corn, sugarcane, vegetable, legume and fruit. Average paddy yield for CISs is 3.6 ton/ha for wet and dry seasons, while that for CIPs is 2.7 ton/ha for wet season and 2.9 ton/ha for dry season. Minimum net incremental paddy yield is 1.6 ton/ha for double cropping of paddy in a year.

3.27 Agricultural Support Service

The agricultural support services are generally well provided both in CISs/CIPs areas although the quality and capacity of the services are not always sufficient. Availability of such services for CISs is generally higher than that for CIPs as shown below:

Services / Availability (%)	CISs	CIPs
Seed supply services	87	83
Fertilizer supply services	94	86
Chemical supply services	95	87
Farm machinery supply services	95	67
Rice mills	93	81
Storage facilities	54	65
Credit services	90	75

3.28 Status of Irrigators' Associations (IAs)

IA organization ratio is 74% for CISs and 9% for CIPs. Average IA members are 100 for CISs and 79 for CIPs. CISs with poor viability of IA is judged to be only 5% of the total.

(Unit: nos.)

	No Existence of IA (no.)	IA Organized (no.)	Unknown (no.)	Total (no.)	Average nos of IA Members
CISs	405 (17%)	1,804 (74%)	214 (9%)	2,423 (100%)	100
CIPs	1,152 (78%)	129 (9%)	185 (13%)	1,466 (100%)	79

(Unit: nos.)

	Viability of IA					
	Excellent	Good	Fair	Poor	Unknown	Total
CISs	47 (2%)	882 (36%)	618 (25%)	111 (5%)	765 (32%)	2,423 (100%)

3.29 Average loan amount of IAs is about Peso 13,600 per IA member as shown below:

Average loan amount of IA (1)	:	Peso 1,358,365
Average number of IA members (2)	:	100
Average loan amount per IA member (3) = (1)/(2)	:	Peso 13,584

3.30 O/M fee other than amortizing fee is collected by IA for 31% of CISs. Average O/M fee of CISs is about ₱ 300/ ha. O/M fee collection efficiency is about 60%.

3.31 Environmental Issues

Positive environmental impacts induced by implementation of CISs/CIPs are increase in rural income and employment opportunities coupled with acceleration of agro-industries. Although there are negative environmental impacts such as pollution of river water, deforestration in catchment area, sedimentation in river and quarrying in river, they are generally not so serious.

3.32 Economic Internal Rate of Return (EIRR)

Average EIRR is 29.5% for CISs and 25.8% for CIPs. Most of CISs/CIPs are more than 10% in EIRR.

	EIRR (%)									
	0 - 5	5 - 10	10 - 15	15 - 20	20 - 25	25 - 30	Over 30	Unknown	Total	Average (%)
CISs (no.)	0	4	77	155	141	71	209	1,766	2,423	29.5
	(0%)	(0%)	(3%)	(6%)	(6%)	(3%)	(9%)	(73%)	(100%)	
CIPs (no.)	0	7	43	60	51	44	56	1,205	1,466	25.8
	(0%)	(0%)	(3%)	(4%)	(4%)	(3%)	(4%)	(82%)	(100%)	

3.33 Distribution of CISs/CIPs by Region/Province

Candidate sub-projects of CISs/CIPs are distributed to 74 provinces and 12 regions as follows:

Items	CISs	CIPs
Total number (no.)	2,423	1,466
Total area (ha)	351,846	211,702
Average number per region (no.)	202	122
Average area per region (ha)	29,320	17,642
Average number per province (no.)	32	20
Average area per province (ha)	4,754	2,860

3.34 CARP Strategic Operation Provinces

A strategic and area-focused operations approach has been adopted to accelerate the Comprehensive Agrarian Reform Program (CARP) implementation by the Executive Order NO. 406 dated 14 June 1990. The following 25 provinces are officially announced as the Strategic Operation Provinces (SOPs).

Region	Province	Region	Province
I	Pangasinan	VII	Negros Oriental
II	Kalinga Apayao		Bohol
	Isabela	VIII	Samar
	Ifugao		Northern Leyte
III	Nueva Ecija		Southern Leyte
	Pampanga	IX	Zamboanga del Sur
IV	Quezon	X	Bukidnon
	Batangas		Agusan del Sur
	Mindoro Occidental	XI	Davao del Norte
V	Camarines Sur		South Cotabato
	Sorsogon	XII	North Cotabato
VI	Antique		Maguindanao
	Negros Occidental		

3.35 The areas and number of CISs/CIPs in the above SOPs are as follows:

	All Provinces		25 SOPs	
	CISs	CIPs	CISs	CIPs
Number of CISs/CIPs	2,423	1,466	1,149	607
(% for all Provinces)			(47.4)	(41.4)
Designed Irrigable Area (ha)	351,769	211,809	173,514	103,526
(% for all Provinces)			(49.3)	(48.9)
Average Area (ha)	145	144	151	171

3.36 The sub-projects having the data on area for re-distribution under CARP are 370 CISs and 255 CIPs. The average areas for re-distribution is 93 ha for CISs and 101 ha for CIPs. The sub-projects having the data on issuance of emancipation patents are 305 CISs and 157 CIPs, and average rate of issuance is 57% for CISs and 47% for CIPs.

3.37 Candidate Sub-projects of CAR and MAR

Administrative boundary of the Philippines was recently changed. Although the total number of provinces was unchanged, Cordillera Administrative Region (CAR) and Moslem Autonomous Region (MAR) were newly created in addition to

12 regions. (See attached location map of new administrative boundary.) The irrigation areas and number of the sub-projects by regions including newly created regions are shown below:

New Region	Number of Sub-project			Designed Irrigable Area (ha)		
	CISs	CIPs	Total	CISs	CIPs	Total
I	406	81	487	54,293	8,024	62,317
II	312	164	476	45,864	22,832	68,696
III	210	28	238	35,305	4,137	39,442
IV	298	187	485	43,466	27,102	70,568
V	254	157	411	33,623	20,614	54,237
VI	118	68	186	14,678	8,095	22,773
VII	76	23	99	11,397	3,980	15,377
VIII	146	118	264	21,063	15,268	36,331
IX	108	57	165	16,213	7,183	23,396
X	131	123	254	19689	20,221	39,910
XI	81	47	128	14,345	7,296	21,641
XII	77	126	203	15,710	26,855	42,565
CAR	153	192	345	15,678	22,321	37,999
MAR	53	95	148	10,445	17,881	28,326
Total	2,423	1,466	3,889	351,769	211,809	563,578

Post-Evaluation Studies on Sample Sub-Projects

3.38 Objectives

The objectives of the post-evaluation studies are to familiarize the members of the JICA Study Team with CISs/CIPs and to grasp general status and standard values and dimensions of CISs/CIPs for the data analysis.

3.39 Scope of Post-Evaluation Studies

The scope of the post-evaluation studies is as follows:

(1) To collect relevant F/S reports and data on sample sub-projects and study them at NIA central office.

(2) To visit PIOs and collect additional relevant data on the sample sub-projects.

(3) To inspect sample sub-project sites together with the technical staff of PIOs and conduct interview with the officers and members of IAs in order to collect additional institutional data through field inspection.

(4) To assess sample sub-projects at NIA central office from the technical, agricultural/agro-economic, institutional and environmental viewpoints on the basis of collected data from the studies .

3.40 Field Inspection

The field inspection for the post-evaluation studies was carried out by both NIA counterpart team and JICA Study Team from September 4 to October 12, 1990 for 38 sample sub-projects (CISs 32, CIPs: 6) covering 6,511 ha in total irrigable area. Location of these sub-projects is shown in Fig. 3-01, and the results are compiled in Annex F.

3.41 Application of Results

The results obtained from the studies are effectively used not only to grasp the present status of sample sub-projects but also to make the following works required for the data analysis by using the database:

(1) Preparation of computer program for automatic checking of raw data,
(2) Judgement of adequacy of the data repulsed by the above computer program,
(3) Determination of analysis items and methods for effective use of the database,
(4) Determination of frequency distribution range for data analysis, and
(5) Judgement of adequacy of the data obtained from the database analysis.

3.42 Selection of Sample Sub-Projects

In order to select sample sub-projects for the post-evaluation studies, the following criteria are established considering objectives and nature of the studies:

(1) Sample sub-projects should be conformable to the definition of SSIDP;

(2) Either the preliminary investigations or feasibility studies were already carried out for the sample sub-projects, and reports or data on them are available;

(3) Sample sub-projects should be selected from all the regions;

(4) There should be no problem on peace and order condition in the sample sub-project areas;

(5) There should be good accessibility to the sample sub-project areas;

(6) Sample sub-projects should be in the master list of SSIDP which are inventoried under the master plan study.

(7) Sample sub-projects (CISs) should not be the ones implemented under CIDP-I, and the sample sub-projects (CIPs) should not be listed as the candidate sub-projects to be implemented under CIDP-II or other foreign assisted sub-projects.

3.43 In accordance with the above criteria, 35 sample sub-projects (CISs: 25, CIPs: 10) with a total irrigable area of 6,444 ha were finally selected. During the field inspection, however, 10 out of 35 sub-projects were cancelled due to the poor peace and order conditions, and instead of the cancelled 10 sub-projects, 13 sub-projects were newly selected based on PIE's recommendation. The complete list of finally selected sample sub-projects is shown in Table 3-02:

Items	Scheduled Sub-Projects	Final Sub-Projects
Total nos. of CISs/CIPs	35	38
Nos. of CISs	25	32
Nos. of CIPs	10	6
Total irrigable area (ha)	6,444	6,511

3.44 Major Findings of Post-Evaluation Studies

In order to grasp present status of sample sub-projects, classification and frequency distribution study are made for 32 CISs and 6 CIPs. The results are shown in Table 3-03. Major findings obtained from the studies are summarized hereinafter:

3.45 General Aspect

(1) Feasibility study, design, construction and O/M guidance to farmers for sample CISs/CIPs are generally carried out in accordance with NIA's guidelines, manuals and criteria for CISs/CIPs

(2) Farmers' participatory approach is generally understood by PIOs and IAs, and such an approach is generally adopted in all the processes of sample CISs/CIPs; and

(3) There are two sample sub-projects which were undertaken under the World Bank-assisted CIDP-I. Development procedure of CIDP-I is the same as that of locally funded CISs/CIPs, and NIA's guidelines, manuals and criteria for CISs/CIPs are applied to CIDP-I.

3.46 Technical Aspect

(1) Average irrigable area of sample CISs/CIPs is about 170 ha and irrigable areas for 70% of the CISs/CIPs are less than 200 ha;

(2) Discharge measurement and soil surveys, of which results are most important in planning, are conducted for all the sample CISs/CIPs although there is room for improvements in discharge measurement method and analysis of the measured data;

(3) Design for diversion weir and irrigation and drainage facilities is mostly carried out by RIOs, and standardization of design drawings is made at RIOs to improve efficiency of design work;

(4) Diversion weir is not always provided with CISs. 30 of 32 CISs have diversion weir and 2 CISs have no diversion weir. Material of diversion weir is mostly concrete, and some are rubble-masonry made;

(5) Drainage facilities are provided for 21 CISs. The remaining 11 CISs have only natural drains;

(6) Construction work is carried out under NIA's force account base in combination with pacquiao contract. The pacquiao contract generally contributes to generate equity to IA or farmers;

(7) Quantity control is conducted by both NIA and IA. Quality control for earth and concrete works can still be improved;

(8) Private CISs are generally much inferior to amortizing CISs in quality of original facilities since the original facilities were constructed only by farmers according to their experience. Furthermore, technical data on F/S, design and construction of private CISs are not available at present;

(9) Average rehabilitation cost is Peso 14,700/ha, while average new construction cost is Peso 20,000/ha. Average costs of sample sub-projects are lower than ceiling costs mentioned in NIA's selection criteria, namely Peso 18,000/ha for rehabilitation and Peso 35,000/ha for new construction; and

(10) Average EIRR of the sample CISs/CIPs is 26.7%. There are no sample CISs/CIPs with EIRR of less than 10%.

3.47 Agricultural and Agro-Economic Aspect

(1) Suitability of soils and land slope for farming has little problem. Average farm size of all the sample sub-projects is less than 5 ha and average farm sizes for about 70% of the sample CISs/CIPs are less than 2 ha;

(2) Proposed cropping intensity of all the CISs/CIPs is more than 130% , and CISs/CIPs with proposed cropping intensity of 175-200% cover 71% of the total. However, 7 of 32 CISs suffer from water shortage in dry season and their cropping intensity is less than 130%; and

(3) Average present paddy yield of the sample CISs is 3.5 ton/ha, which is higher than that of the sample CIPs by 1-1.5 ton/ha. Irrigation effect on the increase in crop yield is observed.

3.48 Institutional Aspect

(1) Both PIOs and IAs exert an effort to strengthen IA's viability. As a result, about 70% of the IAs have shown satisfactory performance level. In particular, this is largely due to the contribution made by the (IDO) and IA officers such as president and board directors.

(2) Institution-related problems such as settlement of right-of-way (ROW), water stealing and existence of non-cooperative IA members are found in some IAs, but IAs try to resolve such problems by themselves.

(3) PIOs provide relevant training to IAs. In general, they are effective in strengthening IA viability. Nonetheless, IAs want to learn not only O/M activities but also improved farming practices to increase the land productivity.

(4) PIOs require the following equipment for smooth/satisfactory implementation of CISs/CIPs.

- Office equipment such as computers, photo copying machine and blue printing machine
- Survey equipment such as current meter, transit and level

3.49 Environmental Aspect

(1) Negative environmental issues observed in the sample CIPs are deforestration in the catchment areas, prevalence of schistosomiasis, water pollution by factory and city sewerage and quarrying in the rivers. Most of them were induced prior to implementation of CISs/CIPs. Since CISs/CIPs are generally small in development scale, they hardly induce serious negative environmental impacts.

(2) Positive environmental impacts induced by implementation of the sample CISs/CIPs such as increase in employment opportunity and farm income, are much greater than negative impacts.

Present Institutional Framework and Procedures

3.50 Organizational Set-up for Implementation of CISs/CIPs

At the NIA Central Office, the over-all planning, coordination and monitoring of activities pertaining to communal irrigation development program is being handled by CIDP/CIDIP group, informally called Communal Irrigation Department (CID). The CID although approved by the NIA Board has yet to be concurred by the Department of Budget and Management.

3.51 The NIA Central Office, through its various department/units, provides support to the CID Program through the conduct of trainings and workshops designed to

strengthen the capabilities of the regional and provincial irrigation offices. For instance, the Project Development Department in cooperation with CID staff endeavors for transfer of skills and knowledge pertaining to investigation of proposed projects and preparation of feasibility studies. In the same manner, the Institutional Development Department helps in the pursuance of the participatory approach to irrigation development.

3.52 Preparation of locally funded communal irrigation projects, whether new or for rehabilitation, is largely an effort of the RIOs and PIOs. In the case of sub-projects proposed for foreign funding, project investigation, preparation of feasibility study, detailed design and final proposal are coordinated efforts of the different departments in the Central Office like Project Development Department, Design and Specification Department, Institutional Development Department and to a large extent, the Project Management Office of CID (which acts as the over-all coordinating and monitoring office) as well as the field offices.

3.53 Regional Irrigation Offices (RIOs)

The RIOs are tasked with CID planning and programming at the regional level. They supervise the preparation of the annual and five-year communal irrigation development programs of the PIOs based on identified sub-projects. The annual programs of the PIOs are determined by the budgetary allocation set by the RIOs based on the allotment given by the Central Office. Under the provisions for delegated authority, the RIOs approve certain levels of program of works, prepare design of structures and enter into contract for project construction/rehabilitation. They also endorse proposed sub-projects to the Central Office for funding.

3.54 Provincial Irrigation Offices (PIOs)

The implementation of CID sub-projects is ultimately an activity of the PIOs. The latters' specific functions are divided into three phases:

(1) Pre-Construction Phase
Conduct all activities under F/S and D/D stages as well as form IAs and provide them with basic training and assistance on the organizational aspect.

(2) Construction Phase
Undertake and/or supervise construction works as well as conduct periodic cost reconciliation with IAs and training on irrigation system management

(3) Operation and Maintenance Phase
Only sustain the activities of the IAs as viable organizations since at this stage, the entire responsibility of system operation is left to the IAs.

3.55 During these Phases, the PIOs assign the Irrigation Development Officers (IDOs) at the sub-project sites. The IDOs play a key role in establishing the IAs, building up their capabilities and providing the vital link with NIA. Once the major role of the IDOs is completed, the PIOs then assign Irrigation Technicians (ITs) in the areas to sustain the efforts of the IDOs whose presence would then be minimized. Details of their functions are discussed hereunder (see Fig. 3-02 for the organizational structure for CIS/CIP implementation):

3.56 Implementing Procedures of CISs/CIPs

The communal irrigation systems/projects are generally implemented by the PIO under the direct supervision of the RIO. The NIA Central Office (C.O.) provides overall policy and operating guidelines, approves program-of-work (POW) which is outside field office authority, and allocates and releases project funds to the PIO through the RIO.

3.57 Project identification is conducted mainly on the basis of a petition of farmers or Irrigator's Association (IA) including the following :

(1) Irrigation development status of the barangay and municipality where the proposed project is located;

(2) Proper endorsement by the concerned barangay and municipal government units; and

(3) Viability of the IA.

3.58 The POW for investigation and data gathering is then prepared by the PIOs and submitted to NIA/C.O. Upon approval and/or notation of POW by the central office, field investigation and data gathering are conducted to prepare a feasibility study (F/S) of the project. The F/S provides an assessment of project viability in terms of engineering and technical, financial and economic, organizational (IA) and environmental considerations.

3.59 Based on the feasibility report of various projects, project evaluation, selection and prioritization are carried out at both the PIO and RIO levels. Only the project which passes the criteria for selection and prioritization is considered for design and construction phases.

3.60 The participatory approach is a basic requirement in the implementation of CIS/CIP. It enables the farmers to familiarize themselves with irrigation project, provide "ownership status" and corresponding responsibility, and prepare them for an effective operation and maintenance of the system. Therefore, farmers' participation is ensured at all phases of project implementation.

3.61 To guarantee the adoption of the farmers' participatory approach, NIA assigns two personnel to the project, namely, Irrigation Development Officer (IDO) and Irrigation Technician (IT). The IDO is assigned starting from the pre-construction phase up to the second cropping season after the project's turnover to the IA. The IT will take over afterwards.

3.62 The functions of an IDO are as follows:

(1) Assists farmers/irrigators in organizing IAs;

(2) Helps IAs in the preparation/securing of such legal requirements as by-laws, water permit, right-of-way and SEC registration;

(3) Facilitates the establishment or reactivation of working committees under pre-construction, construction and O&M phases;

(4) Facilitates the development, conduct and evaluation of capability development programs on IA leadership, financial management and irrigation system management;

(5) Monitors and evaluates the progress and status of the IAs;

(6) Assists in the collection of amortization payments through information dissemination/campaign;

(7) Monitors and evaluates the O&M performance of communal irrigation systems (for those with O&M radiation systems and/or assigned to rehabilitation projects); and

(8) Helps develop the capability of the IAs to secure assistance from other government agencies, PVOs and NGOs and foreign donors.

3.63 The duties and responsibilities of an IT are shown below:

(1) Conducts regular ocular inspection of CIS;

(2) Disseminates to farmers approved and tested agricultural practices applicable to their farms, like proper water management and cropping pattern; and

(3) Gives advice and assistance to farmers on the proper operation, maintenance and repair of canals, turnouts, gates and other structures of an irrigation system.

3.64 A 5-year period is generally required in the implementation of CIS/CIP. This consists of the following phases :

(1) Identification, investigation and selection phase (about 1 year);
(2) Pre-construction phase (about 1 year);
(3) Construction phase (about 1.5 years); and
(4) O&M phase (about 1.5 years).

The list of major activities and work flow for CID project implementation are shown in Table 3-04 and Fig. 3-03, respectively.

3.65 Budgetary Arrangement for Implementation of CISs/CIPs

NIA is an attached agency of DPWH. Hence, its regular budgetary allocation for CID program is included in the DPWH Rural Infrastructure Program. All papers and documents pertaining to the preparation, allocation and release of CID funds will have to be coursed through the DPWH.

3.66 A combined top-to-bottom and bottom-to-top approach is adopted in preparing the CID budget proposal. The NIA Central Office provides the guidelines to RIOs and PIOs on the basis of DBM's Notice of Allotment for CID. The PIOs prepare specific budgetary requests for various projects and submit these to the RIOs. Then, the RIOs consolidate various PIO's budgetary requests and make sure that these budgetary requests are consistent with regional priorities and budgetary limits before forwarding these to the Central Office for approval. The flowchart of CID budgetary preparation and allocation process is shown in Fig. 3-04.

3.67 Of the total CID budgetary funds, an average of 70% is utilized directly in the implementation of CISs/CIPs. The balance (30%) is retained as Budgetary Reserve Fund, management fees and General Overhead Charge including institutional development. The 10% Budgetary Reserve Fund retained by DBM however can be tapped by the concerned PIO in case an emergency fund requirement of the project arises due particularly to unforeseen events or circumstances.

3.68 In 1991, the CIDIP budget amounts to ₱213.1 million of which some 70% (₱149.2 million) is allocated for civil works. The rest is shared by

investigation/survey, engineering designs and institutional activities (see Figs. 3-05 and 3-06).

Current Constraints for Implementation of SSIDP

3.69 Efforts and eagerness of NIA and IAs extended for communal irrigation development are highly appreciated. However, in order to assure an attainment of targets of SSIDP and to produce and maintain the expected benefits, there is some room for improvements. The present main constraints are given below:

3.70 Engineering and Technical Constraints

Methods of the required survey and investigation are detailed in the existing guidelines, but are not always applied in the PIOs. As a result, the designed irrigable area is over-estimated and actually irrigated area is always smaller than the designed irrigable area, by 25-40% on an average. Main reasons for the over-estimation are as follows:

(1) River discharges are not actually measured at a frequency of once a month for one year due to shortage of fund, equipment and necessary staff.

(2) Discharge measurement is carried out in accordance with the guidelines, but mis-measurement or mis-analysis of the measured data is generally made due to lack of appropriate technical skill.

3.71 In order to prevent over-estimation of the designed irrigable area in planning, the following measures are suggested.

(1) Appropriate fund, equipment and technical staff for survey and investigation to a sufficient level mentioned in the existing guidelines should be provided;

(2) Survey and investigation for planning should be carried out in accordance with the existing guidelines, in particular, discharge measurement; and

(3) Technical capabilities of the PIOs should be strengthened in the field of planning, especially measurement and analysis of micro-catchment hydrology.

3.72 A diversion weir is most important facilities for communal irrigation development, but the weir is not always designed to be stable against flood. Many CISs need the rehabilitation or replacement of the diversion weirs since they have been damaged by floods. The following measures are suggested in this aspect.

(1) Flood study should carefully and sufficiently carried out at the planning stage for the estimation of design flood discharge and flood level;

(2) Foundation investigation by test-pitting is generally made at the weir site. In addition to this, investigation by core drilling should be introduced to clarify the deeper foundation condition; and

(3) Technical capabilities of design staff should be strengthened in respect to design methods against flood including foundation treatment.

3.73 Construction works are generally carried out under NIA's force account base including Pacquiao contract, and irrigation and drainage facilities are constructed mainly by manual labor. In the course of such construction, proper quality control is not generally difficult. Quality control, in particular, for material selection and compaction of earth work, such as diversion weir's afflux dike, flood dike, high embankment canal and road, are badly required for stability of the facilities.

3.74 Rehabilitation works of CISs include many minor repair works, such as desilting of canals and replacement of minor gates. These minor works should not be treated under rehabilitation works and they should be carried out under regular maintenance works of IAs with technical assistance of PIOs in order to save expenses and manpower of NIA and to encourage sense of IAs' self-reliance. For this purpose, strengthening of regular maintenance works of IAs and collection of annual O&M fees by IAs for preparation of fund should be promoted.

3.75 All the technical data and information such as topographic maps, F/S reports, design reports and design drawings are necessary for monitoring of benefits and future rehabilitation work. Systematic archives including the use of computerized database system are required at PIOs/RIOs.

3.76 Institutional Constraints

Various problems beset the PIOs/RIOs in the implementation of the CID program. These are:

Organizational/Operational

(1) Relatively substantial control of project bidding and packaging by the Central Office; bidding at the PIO level is still confined to unit cost determination and not the project contract as a whole; and corollarily, limited authority of PIEs in the procurement of spare parts often cause delay in project operation;

(2) In some cases, unsynchronized activities between Project-in-Charges and IDOs creating some confusion in project construction works specially those involving the IA members;

(3) Inadequate permanent plantilla positions which, in most cases, can absorb only the manpower demand of the regular CIDIP but not that of CARP-IC as well as CIDP I and II;

(4) Overloading of functions and responsibilities among PIO personnel such that a civil engineer, for example, assumes both the planning and design functions and sometimes even serves as Project-in-Charges;

(5) Relatively high turnover rate of non-permanent personnel like Project-in-Charges and Irrigation Development Officers because of lack of tenurial security and low salary/compensation package; and

(6) Absence of permanent position for agro-economist in the PIOs, hence depriving these offices of a staff personnel who is assigned the regular task of agro-economic analysis of sub-project.

Personnel

(7) Non-classification, under the government salary standardization plan, of the PIEs as chiefs of offices with province-wide duties and responsibilities instead of the staff level Principal Engineers or Supervising Engineers, hence giving them a compensation package lower than that of other provincial chiefs of government agencies like DAR, DA, etc.;

(8) Inadequate training opportunities for geodetic survey, construction methods/management for project-in-charges specially on quality control and safety measure of diversion weir and supervisory management;

(9) In general, heavy bias in favor of RIOs regarding allocation of training funds at the expense of PIOs which are at the vanguard of CIDP implementation;

(10) Ineffective coordination between the C.O. based-training development unit of NIA and the training development units of special projects;

Facilities and Logistics

(11) Unsatisfactory condition as well as poor maintenance of facilities and logistics support like service vehicles, construction, survey and hydraulic equipment including lack of office equipment like computer facilities for data processing and analysis as well as storage and retrieval;

3.77 Some relief to manpower problems as described in (3), (4), (5) and (6) could have been provided by the NIA Memorandum Circular No. 11, Series of 1990. However, the said relief may not be forthcoming at all in view of the massive lay-off of NIA's contractual personnel towards the end of the first semester of 1991 because of a substantial reduction in project funds in line with the economy measures of the government.

3.78 Problems at the Irrigators' Association level are shown below:

Services, Facilities and Logistics

(1) Inadequacy of basic support services like formal credit and training and extension services on modern farm technology as well as lack of good farm-to-market roads and inadequacy of post-harvest facilities/equipment;

Personnel/Organizational/Operational

(2) Difficulty in establishing Irrigators' Associations due to varied personal interests of farmers, lack of incentives for farmer-leaders, cultural differences among farmer-beneficiaries, and lack of /unclear understanding of the IA's policy directions, plans and strategies;

(3) Non-acceptance of some farmers of the project loan repayment scheme as a result of their experiences with some government agencies like the former Farms System Development Corporation (FSDC) which used to practice the dole-out project approach;

(4) In a few cases, inadequate and ineffective participation of farmers/IAs in the cost reconciliation meeting; and

(5) Difficulty in mobilizing farmers for IA's activities particularly during the planting and harvesting seasons.

3.79 Financial and Budgetary Constraints

At the PIO and RIO level, the funding problems are as follows:

(1) Delay in the quarterly release of project funds that runs towards the end of the second quarter, therefore depriving the PIOs of the opportunity to commence construction work during the relatively rain-free months of January to April;

(2) Limited budgetary allocation vis-a-vis actual project requirements, including the reduction of the available fund allotment by about 30% for budgetary reserve fund, management fees and general overhead surcharges;

(3) Adoption of a gradual instead of lump sum procurement of construction material supplies because of limited storage capacities of PIOs and/or IAs, hence depriving them of bigger price discounts and the opportunity to avoid risk of price escalation; and

(4) Non-consideration of the need for CIS rehabilitation in the NIA's formula for regional/provincial budget allocation and unupdated data on potential irrigable area, the most important factor in the formula.

3.80 The financial problem encountered by the IAs are shown below:

(1) Difficulty in generating the required 10% equity on the part of IA specially in a case where project construction is largely, if not totally, bidded-out to private contractors;

(2) Lack of capability to generate funds required in the ROW negotiation;

(3) Low and/or delay in the payment of salaries of IA's volunteers and proxies during project construction;

(4) Refusal to pay amortization fees due to a substantial reduction in farm production as a result of calamity-caused damages on irrigation facilities; and

(5) Poor collection of O&M fees.

CHAPTER IV PRE-FEASIBILITY STUDIES OF REPRESENTATIVE SAMPLE SUB-PROJECTS

Objectives and Work Procedures

4.01 Objectives

The pre-feasibility studies on 10 representative sample sub-projects were carried out with the following objectives:

(1) To supplement and/or improve the computerized database,

(2) To prepare the prospective development plans and preliminary designs as the models for the representative categories of sub-projects, and

(3) To collect the supplementary data for the institutional studies on strengthening of RIO/PIO and improvement of IAs' activities.

4.02 Selection of Representative Sample Sub-projects

Twenty (20) representative sample sub-projects listed in Table 4-01 were selected under Phase-I , considering the following conditions;

(1) The sample sub-projects should satisfy the following for CISs;
- Designed irrigable area is adequate,
- Amortizing system,
- Rehabilitation works of diversion weir and main canals are needed, and
- Construction works were completed before 1986.

(2) The sample sub-projects should satisfy the following for CIPs;
- Designed irrigable area is adequate, and
- Basic studies have been completed.

(3) The sample sub-projects should represent most of the categories classified by the development scales and topographic conditions.

(4) The sample sub-projects should not be included in the candidate sub-projects for implementation under CIDP-I and -II.

(5) The sample sub-projects should be located in the following provinces (considering the peace and order conditions and accessibility to the sites);

- Nueva Ecija	- Rizal	- Quezon
- Tarlac	- Cavite	- Cebu
- Zambales	- Batangas	- Northern Leyte
- Pampanga	- Palawan	
- Bulacan	- Iloilo	

4.03 The following 10 sub-projects were finally selected among the pre-selected 20 sub-projects through the discussion with NIA, and were investigated under Phase-II as

the representative sample sub-projects for the pre-feasibility studies. The locations are indicated on Fig. 4-01.

No.	Province	Name of Sub-projects	Designed Irrigable Area (ha)	Topography
CISs for Rehabilitation/Improvement				
1.	Quezon	Tumbaga CIS	121	Alluvial Plain
2.	Iloilo	Bayunan CIS	220	Hilly/Terrace
3.	Iloilo	De La Paz CIS*	89	Alluvial Plain
4.	Cebu	Tag-Amakan CIS	51	Valley
5.	Northern Leyte	Macupa CIS	448	Alluvial Plain
6.	Northern Leyte	Caray-Caray CIS*	130	Valley
CIPs for New Development				
7.	Quezon	Kinatihan CIP	100	Alluvial Plain
8.	Cavite	Pacheco CIP	172	Hilly/Terrace
9.	Iloilo	Bairan CIP	64	Alluvial Plain
10.	Northern Leyte	Maragondong CIP	320	Alluvial Plain

* : substituted from the originally listed sub-projects due to the current peace and order conditions

Field Inspections for Pre-feasibility Studies

4.04 The pre-feasibility studies are composed of the following major works :

(1) Data collection (topographic maps and available documents prepared by NIA),
(2) Preliminary studies on collected data,
(3) Additional data collection and field reconnaissance,
(4) Review and studies of the existing documents,
(5) Formulation of development plans,
(6) Institutional studies of IAs and RIOs/PIOs
(7) Preparation of preliminary design for project facilities,
(8) Cost and benefit analysis,
(9) Project evaluation, and
(10) Data arrangement to supplement and/or improve the database for master planning.

4.05 Topographic maps (scale: 1/4,000) and other existing available data were collected before the field reconnaissance. The basic data and development plans were preliminarily studied in order to check the lacking data for the studies and to prepare the check list for the field investigation. The results of the original inventory survey coupled with the additional inventory survey were fully utilized for the pre-feasibility studies.

4.06 The field inspections were made in a couple of days at each of the selected sub-project sites with an emphasis on the following:

(1) Topographic conditions and river systems,
(2) Existing irrigation facilities (for CISs),
(3) Proposed diversion damsites (for CIPs),
(4) Agricultural conditions (cropping pattern, farming practices and yields),
(5) Agricultural support services,
(6) Activities of PIOs and IAs,
(7) Socio-economic conditions (income level, progress of CARP), and
(8) Environmental issues.

4.07 Interviews were also conducted with the representative IA members as well as the PIO's staff to obtain the necessary data and information regarding agricultural and institutional aspects. The following data were also collected from the respective PIOs and other government agencies:

(1) Topographic maps scaled 1/4,000 (revised and/or updated),
(2) General layouts of irrigation systems,
(3) Meteo-hydrological data (rainfall and other climatic data, catchment area at intake, records of discharge measurement, etc.)
(4) Soil maps and land capability classification maps,
(5) Cropping pattern and crop production records,
(6) Agro-economic data (farm size, production costs, marketing and average farm budget),
(7) Institutional data (status of agricultural support services, activities of IA, collection rate of amortization fee, etc.),
(8) Availability of construction equipment in PIOs, and
(9) Construction materials and costs.

General Feature of Representative Sample Sub-projects

4.08 The representative sample sub-projects are outlined hereinafter (full details of each sub-project are given in Annex-G):

4.09 Tumbaga CIS : Quezon Province

Tumbaga CIS is irrigated by several water resources with the Sadaya river as the main source and the Binuang, Mamala and Tumbaga rivers as supplementary sources. A diversion weir across the Sadaya river was privately constructed by the IA in 1976 and improved by the NIA in 1986. The water resources of the Sadaya river are diverted to the Binuang river through the main canal and the water is again taken into the main canal by an intake structure and boulder dam. The system is well operated, but the IA of Tumbaga CIS has requested to rehabilitate the boulder

dam and a few canal structures for sustaining the proper water distribution and present cropping intensity.

4.10 Kinatihan CIP : Quezon Province

Kinatihan CIP area is located in Municipality of Candelaria in Quezon Province. The farmers plant paddy under rainfed condition. They are very much eager to have irrigation system using the water resources of the Massin river. Feasibility study on this project was completed in 1989. Since there is a right-of-way problem along the diversion works and the main canal route, implementation of the project has been postponed for review of the project plans.

4.11 Pacheco CIP : Cavite Province

Feasibility study on the Pacheco CIP was completed in 1990. This project was scheduled to be implemented from 1991 under CARP-IC program, but was dropped out from the 1991's program due to budgetary constraints. The farmers who are potential CARP beneficiaries plant upland paddy, corns, pineapples under rainfed condition. The irrigation development is the most important program to support the farmers.

4.12 Bayunan CIS : Iloilo Province

Bayunan CIS is divided to three sub-systems which are individually irrigated by three existing intake structures. Three intakes named I, II and III from upstream to the downstream were constructed with boulder dams in 1976. The boulder dams were improved to concrete ogee type weirs in 1986. The IA members in intake II and III service area requested NIA to rehabilitate the diversion works which were already deteriorated by natural disasters after 1986's improvement works in order to restore the irrigation area.

4.13 De La Paz CIS : Iloilo Province

De La Paz CIS was constructed in 1977 as a tie-up project between the NIA and FSDC. Though the system has a potential irrigable area of 89 ha in the wet season, the system can presently serve about 32 ha due to water shortage. To supply the additional irrigation water from the Managupaya creek, an augmentation dam of checkgate type together with a lateral canal is proposed.

4.14 Bairan CIP : Iloilo Province

Cultivation of rainfed paddy was a common practice in the project area. The farmers initiated irrigation agriculture of about 15 ha by constructing a brush dam in

the Malayo-an river. In order to develop the potential irrigable area of 64 ha, it is proposed in the feasibility report prepared in 1990, to construct a concrete diversion dam and irrigation canal system.

4.15 Tag-Amakan CIS : Cebu Province

Tag-Amakan CIS was completed and turned-over to the IA in 1982. The system was functional until it was heavily damaged by a typhoon in 1985. To restore the designed irrigable area of 51 ha, the diversion dam and conveyance facilities will require rehabilitation and improvement works.

4.16 Macupa CIS : Leyte Province

Macupa CIS was constructed in 1979. After the diversion dam was totally damaged by a typhoon in 1988, the irrigation system was rendered to be non-functional and hence, abandoned. The feasibility study for a complete rehabilitation work was undertaken and completed in 1989. The program of works for the construction (detailed designs) was also prepared in 1990, and the implementation work is expected whenever funding is available.

4.17 Caray-Caray CIS : Leyte Province

Caray-Caray CIS was constructed in 1974 as a tie-up project between NIA and FSDC. Separate intake structures were constructed for each service area on both side of the Caray-Caray river. However, the river bed at the intake sites was scoured by several seasonal floods and both intake structures were hanged and eventually damaged. Temporary brush dams were constructed for each intake site to raise the water surface elevation of the river. Diversion of irrigation water is direct without control structures. Damage to both brush dams and conveyance facilities result from unusual flooding. To solve these constraints, permanent diversion dam and intake structure are proposed to be constructed at the upper site integrating both brush dams.

4.18 Maragondong CIP : Leyte Province

In 1984, the farmers of the project area organized an IA to endorse the Maragondong CIP to the NIA. Feasibility study was undertaken and the project was included in the CIDP of NIA. Unfortunately the project was once deferred. However in response to farmers' strong request, the PIO again carried out the feasibility study in 1990. The Sawahan river has enough water resources to irrigate the proposed area of 320 ha. The project is expected to largely contribute to the effective utilization of the endowed land and water resources.

Analysis of Pre-feasibility Studies

4.19 The existing plans were reviewed in terms of the following aspects:

(1) Assessment of proposed cropping pattern,
(2) Analysis of available water resources and irrigation water requirements,
(3) Study on designed irrigable area in the wet and dry seasons,
(4) Study on irrigation and drainage canal networks,
(5) Preliminary designs of major facilities,
(6) Cost estimates,
(7) Study on agricultural development plan,
(8) Estimates of the expected project benefits,
(9) Study on institutional activities of PIOs and IAs, and
(10) Project evaluation.

4.20 Irrigable Area and Cropping Intensity

Double cropping of paddy is proposed as the future cropping pattern for all of the sample sub-projects. Based on this pattern, diversion water requirements were estimated on a monthly basis. The designed irrigable areas were assessed on the basis of the estimated river discharges and water requirements.

Sub-projects	Presently Irrigated Area (ha)		Designed Irrigable Area (ha)		Proposed Cropping Intensity
	Wet	Dry	Wet	Dry	
1. Tumbaga CIS	121	121	121	121	200%
2. Kinatihan CIP	0	0	100	100	200%
3. Pacheco CIP	0	0	172	77	145%
4. Bayunan CIS	38	38	220	110	150%
5. De La Paz CIS	38	30	89	59	166%
6. Bairan CIP	15	15	64	64	200%
7. Tag-Amakan CIS	13	13	51	51	200%
8. Macupa CIS	0	0	448	448	200%
9. Caray-Caray CIS	55	55	130	130	200%
10. Maragondong CIP	0	0	320	320	200%

The studies on water resources show that all CISs and CIPs have large potential for irrigation development. The present constraints are deterioration and/or lack of proper irrigation facilities.

4.21 Facility Plan and Designs

The following irrigation and drainage facilities are constructed in CISs and/or proposed to be constructed in CIPs:

Facilities	Nos. of Sub-projects with Facility		
	CISs	CIPs	Total
1. Diversion Works	6	4	10
Ogee type	6	3	9
Checkgate Type	1	1	2
2. Diversion Canal	3	3	6
3. Main Canal	6	4	10
4. Lateral	5	4	9
5. Farm ditches	6	4	10
6. Drainage Canals	0	1	1
7. Access Road	4	3	7

4.22 Dimension of Diversion Dams

Ogee and checkgate types of the diversion works are designed in due consideration of flood water level and the required intake water level. Major dimensions of the diversion works are shown below:

Sub-Projects	Designed Irrigable Area (ha)	Diversion Works		
		Length (m)	Height (m)	Type
1. Tumbaga CIS	121	10.0	0.8	Ogee (Main)
		16.0	0.55	Ogee (Supplement)
2. Kinatihan CIP	100	30.5	2.5	Ogee
3. Pacheco CIP	172	3.3	1.9	Checkgate
4. Bayunan CIS	90	26.0	0.95	Ogee (Intake II)
	130	19.0	1.0	Ogee (Intake IV)
5. De La Paz CIS	89	13.0	1.5	Ogee (Main)
		8.7	1.5	Checkgate (Supplement)
6. Bairan CIP	64	15.0	1.2	Ogee
7. Tag-Amakan CIS	51	80.0	0.8	Ogee
8. Macupa CIS	448	60.0	1.0	Ogee
9. Caray-Caray CIS	130	20.0	0.8	Ogee
10. Maragondong CIP	320	10.0	1.0	Ogee

4.23 Irrigation and Drainage Canals

The irrigation canals are classified into diversion channel (DC), main canal (MC), lateral (LAT) and farm ditch. Average densities of irrigation canals are 37 m/ha for the major canals and 33 m/ha for the farm ditches. The drainage canals are not always provided in CISs for the reasons that (1) natural streams in the project area are utilized as drainage canals, and (2) farmers in the project area are not willing to lose the farmland for the construction of the drainage canals. Lengths of such categorized irrigation/drainage canals are summarized as follows:

Sub-Projects	Designed Irrigable Area (ha)	Major Canals Length (m) DC	MC	LAT	Total	Density (m/ha)	Field Ditches Length(m)	Density (m/ha)
1. Tumbaga CIS	121	25,80	2,170	1,480	6,230	51	1,780	15
2. Kinatihan CIP	100	2,078	2,102	1,360	5,540	55	2,360	24
3. Pacheco CIP	172	3,420	2,080	4,400	9,900	58	4,340	25
4. Bayunan CIS	220	0	4,910	0	4,910	22	3,400	15
5. De La Paz CIS	51	240	1,540	1,760	3,540	69	2,050	40
6. Bairan CIP	64	0	2,200	900	3,100	48	2,900	45
7. Tag-Amakan CIS	89	0	3,720	2,720	6,640	75	1,020	11
8. Macupa CIS	448	865	2,135	7,680	10,680	24	24,510	55
9. Caray-Caray CIS	130	0	2,500	800	3,300	25	3,000	23
10. Maragondong CIP	320	700	6,800	2,400	9,900	31	11,300	35

4.24 Project Costs

The direct construction costs were re-estimated based on the work quantities and the unit costs which were obtained from the following data; (1) current prices of basic materials and labor wages, and (2) sample unit prices of major construction works in each province. These data were collected from all PIOs at the time of additional inventory survey. Other indirect costs were estimated in accordance with NIA's standard.

4.25 The project costs of the representative sample sub-projects are estimated as follows:

Sub-Projects	Chargeable Costs Amount (₱1,000)	Per ha (₱)	Non-Chargeable Costs Amount (₱1,000)	Per ha (₱)	Project Cost Amount (₱1,000)	Per ha (₱)
1. Tumbaga CIS	335	2,770	80	660	415	3,430
2. Kinatihan CIP	5,786	57,860	1,420	14,200	7,206	72,060
3. Pacheco CIP	11,349	67,140	2,451	14,250	14,000	81,390
4. Bayunan CIS	2,928	13,310	827	3,760	3,755	17,070
5. De La Paz CIS	689	7,740	165	1,850	854	9,590
6. Bairan CIP	4,066	63,530	1,071	16,740	5,137	80,270
7. Tag-Amakan CIS	1,564	30,670	1,024	20,080	2,588	50,750
8. Macupa CIS	7,012	15,650	1,031	2,300	8,043	17,950
9. Caray-Caray CIS	2,084	16,030	797	6,130	2,881	22,160
10. Maragondong CIP	4,939	15,430	1,200	3,750	6,139	19,200

In all the cases, the chargeable costs are less than the ceiling amounts stipulated in the minimum selection criteria, which are ₱ 70,000/ha for CIPs and ₱ 35,000/ha for

CISs. The non-chargeable costs account for about 22% of the total project costs on an average.

4.26 Project Benefit and EIRR

The project benefits of the representative sample sub-projects are calculated as follows:

Sub-Projects	Net Production Value Without Project (₱ 1,000)	Net Production Value With Project (₱ 1,000)	Incremental Benefit (₱ 1,000)	Annual Benefit per ha (pesos/ha)
1. Tumbaga CIS	4,104	4,238	134	1,107
2. Kinatihan CIP	515	2,400	1,925	19,250
3. Pacheco CIP	791	2,219	1,428	8,302
4. Bayunan CIS	2,569	4,402	1,833	8,332
5. De La Paz CIS	1,227	1,716	489	5,494
6. Bairan CIP	791	1,425	634	9,906
7. Tag-Amakan CIS	286	893	607	11,902
8. Macupa CIS	6,242	10,623	4,381	9,779
9. Caray-Caray CIS	2,335	3,624	1,289	9,915
10. Maragondong CIP	3,408	7,604	4,196	13,113

4.27 The re-calculated EIRRs of the representative sample sub-projects are as follows:

Sub-Projects	EIRR (%)	Sample Projects	EIRR(%)
1. Tumbaga CIS	26	6. Bairan CIP	11
2. Kinatihan CIP	23	7. Tag-Amakan CIS	20
3. Pacheco CIP	10	8. Macupa CIS	40
4. Bayunan CIS	36	9. Caray-Caray CIS	34
5. De La Paz CIS	41	10. Maragondong CIP	47

The EIRR values widely vary between 10% and 47% with an average of 33% for CISs and 23% for CIPs, respectively. The representative sample sub-projects are judged economically feasible.

4.28 Institutional Activities of IAs

The following IAs correspond to the representative sample sub-projects for the pre-feasibility studies:

Sub-Projects	Name of IAs	Year Established	Present Numbers of IAS
1. Tumbaga CIS	Tumbaga I	-	111
2. Kinatihan CIP	Kinatihan-Cabay	1985	49
3. Pacheco CIP	Pacheco Communal	1990	93
4. Bayunan CIS	Bayunan Valley	1976	76
5. De La Paz CIS	Malakas	1977	26
6. Bairan CIP	Malayuan-Barrido Integrated	(Under-preparation)	(32*)
7. Tag-Amakan CIS	Tag-Amakan	1981	23
8. Macupa CIS	Macupa	1978	187
9. Caray-Caray CIS	Caray-Caray (Dam I & II)	1977	67
10. Maragondong CIP	Maragondong	1984	67

*: Potential numbers

4.29 There are already official requests from IAs to NIA for the rehabilitation of the CIS complemented by proper endorsement from the local government units. Likewise, the IAs have expressed their willingness to pay for the project equity and O&M expenses. All the IAs in the CIPs have indicated their willingness to pay for the project equity and assume operation and maintenance costs. Likewise, farmers' petition and proper endorsement of the project by the local government unit were already done.

4.30 Environmental Impacts

Since the sub-projects are small in size, no serious environmental impacts are generally expected. On the contrary, improved rural welfare with higher living standard will be visible with the irrigation development as the favorable environmental impacts.

CHAPTER V CROSS-CHECKING OF INVENTORIED DATA

Necessity of Cross-Checking

5.01 The inventory survey was carried out from August 14 to December 3, 1990, and the analysis was made in December 1990 and January 1991. As a result, the candidate sub-projects for the Study became 3,889 in total (CISs: 2,423, CIPs: 1,466). The following were observed through the analyses:

(1) All the sub-projects are not always supported by the basic studies;

(2) In most cases, the answered questionnaires involve a lot of questionable data or are completely lacking in such basic data as designed irrigable area, development costs, irrigation benefits and EIRR, which the "minimum selection criteria" require for qualification of sub-projects for implementation; and

(3) It is very difficult to formulate a 10-year development plan without such fundamental data.

5.02 In order to solve the above situation and to formulate the 10 year development plan, the cross-checking and supplement were required; in particular, basic and most important data of the designed irrigable areas, development costs, irrigation benefits and Economic Internal Rates of Returns (EIRRs) were cross-checked and supplemented.

Data Collection for Cross-Checking

5.03 For the cross-checking of the basic data, the necessary data and information for it were collected as follows:

(1) Meteoro-hydrological data for cross-checking of designed irrigable areas were collected by data collection carried out under Phase I (all the data are compiled in Part-III of Data Book);

(2) Costs and engineering data for cross-checking of development costs were collected by additional inventory survey carried out under Phase II (refer to Para.5.04); and

(3) Actual procedures for and outputs of investigation, design, cost estimate, benefit estimate and EIRR calculation for cross-checking of costs, benefits

and EIRRs were collected by pre-feasibility study for 10 sample sub-projects carried out under Phase II (refer to Chapter IV).

Additional Inventory Survey

5.04 The additional inventory survey was conducted from March to June, 1991 in accordance with the agreement between NIA and the JICA Study Team made on February 25, 1991 (see Attachment-5). The objectives of additional inventory survey are as follows (the questionnaires for additional inventory survey are given in Annex-C):

(1) To collect cost and engineering data,

(2) To study relationship between cost and engineering data by topography (alluvial flat plain, valley with undulating topography, terrace/hill with steep slope) and development scale (50-150ha, 150-300ha, 300-500ha), and

(3) To prepare cost data necessary for cross-checking and formulation of 10-year development plan.

5.05 The sub-projects for the additional inventory survey were selected from 3,889 inventoried sub-projects for the master plan study (CISs:2,423, CIPs:1,466) according to the following conditions since those satisfying such conditions were likely to have cost and engineering data:

(1) CIS : Rehabilitation has been required.
(2) CIP : Basic studies have been completed.

The number of sub-projects selected for the additional inventory survey was 967 (CISs: 763, CIPs: 204) in total or about 25% of all the inventoried CISs/CIPs:

5.06 The filled-out questionnaires were returned by June 15, 1991. The returned questionnaires were 854 in total (CISs: 675, CIPs: 179), or 88% of the initially listed sub-projects as shown below (for details, see Table 5-01):

Items	CISs	CIPs	Total
(1) Sub-Projects for the Survey	763	204	967
(2) Returned Questionnaires	675	179	854
(3) Return Rate : (2)/(1) x 100(%)	88	88	88

Cross-Checking of Designed Irrigable Areas

5.07 The cross-checking of designed irrigable areas was made by balancing estimated available river discharge and diversion water requirement of each sub-project. Since the estimate of available river discharge needed catchment area data, cross-checking of designed areas was made only for sub-projects with catchment area data (CISs: 1,229, CIPs: 845). The designed irrigable areas of sub-projects without catchment area data were not cross-checked (CISs: 1,194, CIPs: 621).

5.08 General procedures for estimation of river discharge and diversion water requirement are as follows and a work flow for the cross-checking is shown in Fig. 5.01 (details are described in Annex-B).

Estimation of river discharge

(1) Determination of climate type for each province
(2) Determination of representative annual rainfall for each province
(3) Calculation of specific discharge for each climate type
(4) Calculation of specific discharge for each province
(5) Calculation of specific discharge for each sub-project

Estimation of diversion water requirement

(1) Determination of cropping pattern for each province
(2) Determination of pan-evaporation for each province
(3) Calculation of unit diversion water requirement for each province
(4) Calculation of diversion water requirement for each sub-project

5.09 Estimation of River Discharge

Estimation of river discharge was made as follows:

(1) To determine climate type of each province using the Philippines general climate types, i.e. Types I, II, III and IV which are classified according to rainfall distribution pattern;

(2) To determine representative annual rainfall for each province from rainfall data of 75 rainfall stations, considering the above climate type, isohyetal map and topography;

(3) To calculate monthly specific discharge for each climate type using discharge data of 198 gauging stations and the representative rainfall for each province on an assumption that river discharge is proportional to catchment area and rainfall;

(4) To calculate monthly specific discharge for each province from the representative annual rainfall of each province, and relationship between river discharge and catchment area by climate type; and

(5) To estimate monthly river discharge for each sub-project as a product of monthly specific discharge for each climate type, catchment area at diversion site for each sub-project and monthly rainfall for each province.

5.10 Estimation of Diversion Water Requirement

Estimation of diversion water requirement was made as follows:

(1) To prepare a proposed cropping pattern of a double cropping of paddy for each province on the basis of provincial cropping patterns recommended by NIA (PDD);

(2) To determine the representative pan-evaporation for each province from pan-evaporation data of 30 meteorological observation stations;

(3) To calculate consumptive water use for wet/dry season paddy for each province on a monthly basis from pan-evaporation data;

(4) To calculate unit diversion water requirement for each province from the consumptive water use, considering land soaking and land preparation irrigation requirements, percolation, effective rainfall and overall irrigation efficiency; and

(5) To estimate diversion water requirement for each sub-project by multiplying the unit diversion water requirement for each province by designed irrigable areas of each sub-project.

5.11 Water Balance

In order to check adequacy of designed irrigable areas (wet and dry seasons), replace inadequate areas by adequate areas and fill unknown designed irrigable areas of dry season by adequate areas, a water balance between the estimated river discharge and diversion water requirement was made on a monthly basis for each sub-project.

5.12 In case that the diversion water requirement was equal to or less than the river discharge, designed irrigable area (wet season) of the sub-project was judged adequate. In case that the diversion water requirement was more than the river discharge, designed irrigable area (wet season) of the sub-project was judged inadequate. In case that the designed irrigable area (wet season) was adequate and that designed irrigable area (dry season) was unknown, unanswered area was supplemented by the calculated designed irrigable area (dry season).

5.13 Adequacy of Designed Irrigable Areas

As a result of the water balance, designed irrigable areas (wet season) of 1,153 CISs and 762 CIPs were judged adequate. The designed irrigable areas of 76 CISs and 80 CIPs were judged inadequate. These sub-projects were deemed as sub-projects requiring re-study or investigation. The remaining sub-projects of 1,194 CISs and 621 CIPs were deemed as sub-projects without catchment area (designed irrigable area of which can not be cross-checked) as shown in the following table:

(Unit: No. of Sub-Projects)

Sub-Projects	CISs	CIPs	Total
(1) With Adequate Designed Irri. Area	1,153	762	1,915
(2) With Inadequate Designed Irri. Area Requiring Re-Study or Investigation	76	83	159
(3) Without Catchment Area Data	1,194	621	1,815
Total	2,423	1,466	3,889

Cross-Checking of Development Costs

5.14 The development costs and the engineering dimensions of irrigation and drainage facilities were studied in order to find out the relationship required for cross-checking and supplement of development costs on the basis of the additional inventory survey. Applying the results of this study, all the cost data were cross-checked and unanswered blanks were filled out with appropriate data as much possible to the extent that such supplement was technically justifiable.

5.15 Analysis of Development Costs and Engineering Data

The additionally inventoried sub-projects were classified into the following nine (9) categories in terms of topographic conditions and development scales:

(Unit : nos.)

CIS	Alluvial	Valley Plain	Hilly /	Unknown Terrace	Total
50 - 150 ha	140	225	92	4	461
150 - 300 ha	63	81	17	2	163
300 - 500 ha	22	23	6	0	51
Total	225	329	115	6	675

(Unit : nos.)

CIP	Alluvial	Valley Plain	Hilly /	Unknown Terrace	Total
50 - 150 ha	38	56	33	1	128
150 - 300 ha	13	15	5	-	33
300 - 500 ha	7	8	3	-	18
Total	58	79	41	1	179

5.16 Most of the inventoried sub-projects have the direct cost data for the following facilities (costs for rehabilitation or new construction) with specific technical dimensions (length, width and height):

(1) Diversion weir with intake
(2) Diversion channel (earth)
(3) Diversion channel (lined)
(4) Main/lateral canals (earth)
(5) Main/lateral canals (lined)
(6) Field ditches
(7) Project/farm drains
(8) Drainage ditches
(9) Service road
(10) Flood protection dike
(11) Access road

Note:
Diversion channel is an irrigation canal provided from diversion point to entrance of irrigation area.

5.17 In order to examine general relationship between costs and technical dimensions and to find the standard cost ranges and standard costs of the facilities, the following frequency distribution analyses were made by facilities and by sub-projects for each category of SSIDP mentioned above.

(1) Number and ratio of sub-projects having each one of the relevant facilities,
(2) Length of each facility per ha,
(3) Cost of each facility per m,
(4) Cost of each facility per ha, and
(5) Chargeable cost and total cost per ha

5.18 Construction Costs of CIPs

As a result of the above analyses for CIPs, no relationship was observed between development costs and topographic conditions. Some relationships were observed only between costs and scale of development.

5.19 Construction costs of diversion weir (concrete), flood protection dike, service road and access road were not related with development scales, and had clear

proportional relation to their lengths (Fig. 5.02 to be referred). The standard cost per m and lengths of such facilities are as follows:

	Works	Standard Cost (₱/m)	Standard Length (m)
(1)	Diversion weir with intake	89,220	26.4
(2)	Flood protection dike	737	878
(3)	Service road	142	1,440
(4)	Access road	122	1,600

5.20 Construction costs per meter of irrigation and drainage canals have proportional relation with development scales (see Fig. 5-03 and Fig. 5-04). The standard construction cost per meter of canals and drains are as follows:

(Unit : ₱/m)

	Works / Standard cost per m	50 - 150 ha	150 - 300 ha	300 - 500 ha	Average
(1)	Diversion channel (Earth)	312	473	481	372
(2)	Diversion channel (Lined)	894	894	894	894
(3)	Main/lateral canals (Earth)	234	370	465	317
(4)	Main/lateral canals (Lined)	890	890	890	890
(5)	Field ditches	46	46	46	46
(6)	Project/farm drains	84	84	84	84
(7)	Drainage ditches	94	94	94	94

5.21 Lengths per ha of canals and drains were proportionally related with development scales. The standard per-ha lengths of canals and drains are as follows:

(Unit: m/ha)

	Works / Standard cost per m	50 - 150 ha	150 - 300 ha	300 - 500 ha	Average
(1)	Diversion channel (Earth)	11.2	46.6	3.6	7.9
(2)	Diversion channel (Lined)	12.7	4.8	1.5	6.1
(3)	Main/lateral canals (Earth)	35.8	27.2	19.1	28.6
(4)	Main/lateral canals (Lined)	18.6	9.6	8.1	11.5
(5)	Field ditches	34.2	34.2	34.2	34.2
(6)	Project/farm drains	9.4	9.4	9.4	9.4
(7)	Drainage ditches	9.5	9.5	9.5	9.5

5.22 Provision rates of irrigation and drainage facilities were independent of development scales. The provision rates are as follows :

(Unit : %)

	Works	Provision Rate
(1)	Diversion weir (concrete) with intake	62
(2)	Diversion channel (Earth)	84
(3)	Diversion channel (Lined)	44
(4)	Main/lateral canals (Earth)	86
(5)	Main/lateral canals (Lined)	27
(6)	Field ditches	60
(7)	Project/farm drains	13
(8)	Drainage ditches	18
(9)	Service road	21
(10)	Flood protection dike	7
(11)	Access road	44

5.23 Based on the above results, the standard construction costs of irrigation and drainage facilities for three different scales of development were estimated by the following equation, and the results are shown in Table 5-02.

Construction cost = Construction cost/m x Length/ha x Area (ha) x Provision rate (%)

5.24 The standard cost ranges of irrigation and drainage facilities were determined, judging from the distribution of costs and technical dimensions of facilities. The standard cost ranges of diversion weir, diversion cannel and main/lateral canals are shown on Figs. 5-02, 03 and 04.

5.25 Rehabilitation Costs of CISs

Through the classifications and analyses of rehabilitation costs, it has been found out that rehabilitation works widely vary in scale from minor repair woks to significant rehabilitation works. The minor repair works are replacement of intake gates, repair of small canal structures and desilting of canals, which are generally treated under regular maintenance work. Significant rehabilitation works include a total replacement of the diversion weirs which are totally damaged by natural disasters, improvement of the existing temporary weirs to concrete weirs, and construction of new canals for extension areas. There are other rehabilitation works such as concrete-lining of the existing earth canals, and improvement or extension of flood protection dikes.

5.26 Because of such a wide variety of rehabilitation works, the rehabilitation costs vary widely without any relationship with development scale and topographic conditions

(see Figs. 5-02 to 5-04). Therefore, for cross-checking and supplement of cost data of inventoried CISs, the following principles were concluded.

(1) Basically, rehabilitation costs answered in the questionnaires should be judged appropriate if they are within the reasonable range which would be determined on the basis of the standard range for CIP.

(2) Cost data should not be supplemented to those CISs without any estimates of rehabilitation costs.

5.27 Prevailing Prices of Materials and Unit Prices of Major works

Prices of materials and labour wages, and unit prices of major works in the questionnaires, which are used for implementation of CISs/CIPs on NIA's force account base with pacquiao contract, scarcely fluctuates province by province. Therefore, only averages of those data were calculated as shown in Tables 5-03 and 04. These data were fully utilized in the preliminary designs and cost estimates for the pre-feasibility studies on 10 representative sample sub-projects.

5.28 Cross-Checking and Supplement of Development Costs

The cross-checking and supplement of development costs were made, making reference to the standard cost per m and standard length per ha mentioned above. The cross-checking and supplement process of the development costs are illustrated in Fig. 5-05. The explanation on this process is given below:

5.29 Supplement of Development Cost Data for CIPs

The CIP sub-projects were classified into the following four categories according to availability of data for (1) cost, (2) designed irrigable area and (3) dimension of irrigation and drainage facilities:

Category of Sub-Projects	Availability of Data		
	Area	Cost	Dimension (length)
I	O	O	O
II	O	O	-
III	O	-	O
IV	O	-	-

O: available - : not available

5.30 The procedures of cross-checking and supplement are as follows:

(1) Category-I
Firstly, existence of abnormal cost data caused by misplacement of figures and decimal point was checked and corrected by upper/lower limits of standard cost range. Secondly, it was checked whether the original cost of irrigation and drainage facilities was within standard range in terms of cost/m. If within the range, the original cost was judged appropriate. If out of the range, the original cost was replaced by a product of standard cost/m and original length of irrigation/drainage facilities (m).

(2) Category-II
Firstly, existence of abnormal cost data caused by misplacement of figures and decimal point was checked and corrected by upper/lower limits of standard cost range. Secondly, it was checked whether the original cost was within standard range in terms of cost/ha. If within the range, the original cost was judged appropriate. If out of the range, the original cost was replaced by a product of the standard cost/ha and the designed irrigable area.

(3) Category-III
No cross-checking was made since there was no original cost data. Supplement of the cost data was made by a product of the standard cost/m and the original length of irrigation drainage facilities (m).

(4) Category-IV
No cross-checking was made since there was no original cost data. Supplement of the cost data was made by a product of the standard cost/ha and the designed irrigable area.

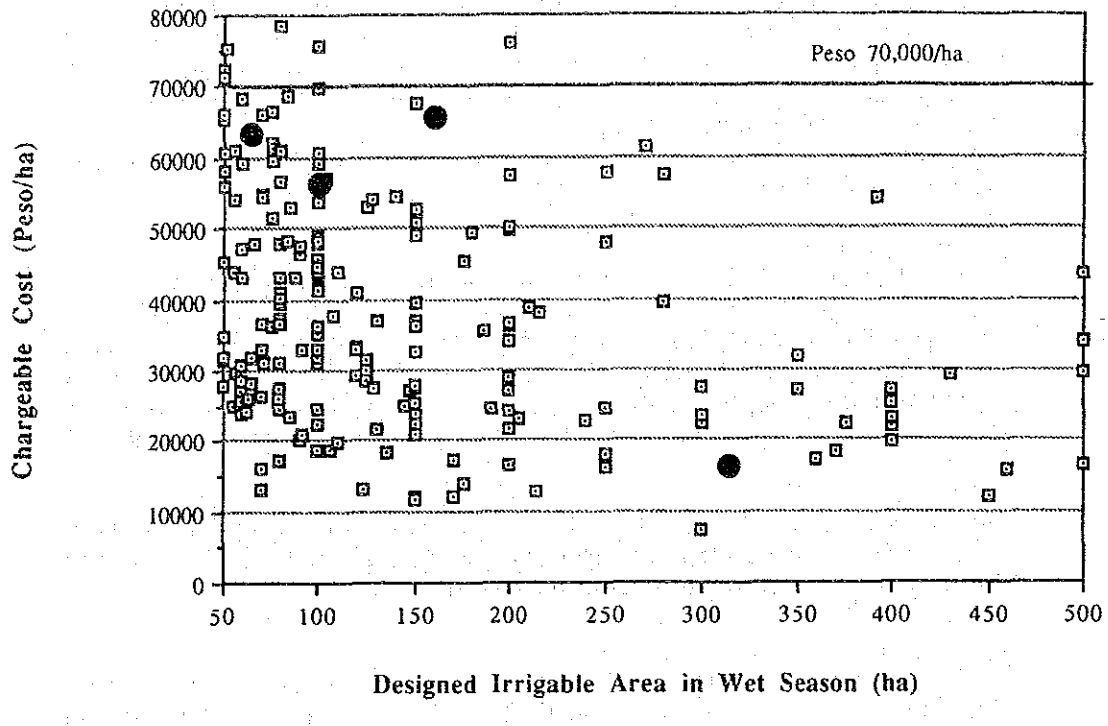
5.31 Supplement of Rehabilitation Cost Data for CISs

Scales and types of rehabilitation works vary from minor repair to significant rehabilitation work, sub-project by sub-project. Some CISs need only minor repair such as repair of small structures and replacement of small gate, and some need complete replacement of diversion weir and intake. Considering such a wide variation of the rehabilitation works, supplement of rehabilitation cost data was not made and only the original data for rehabilitation costs was cross-checked to find out the abnormal data exceeding the upper limit of standard cost range for new development and to correct them. The abnormal costs data were replaced with the uppermost figures of the standard cost range.

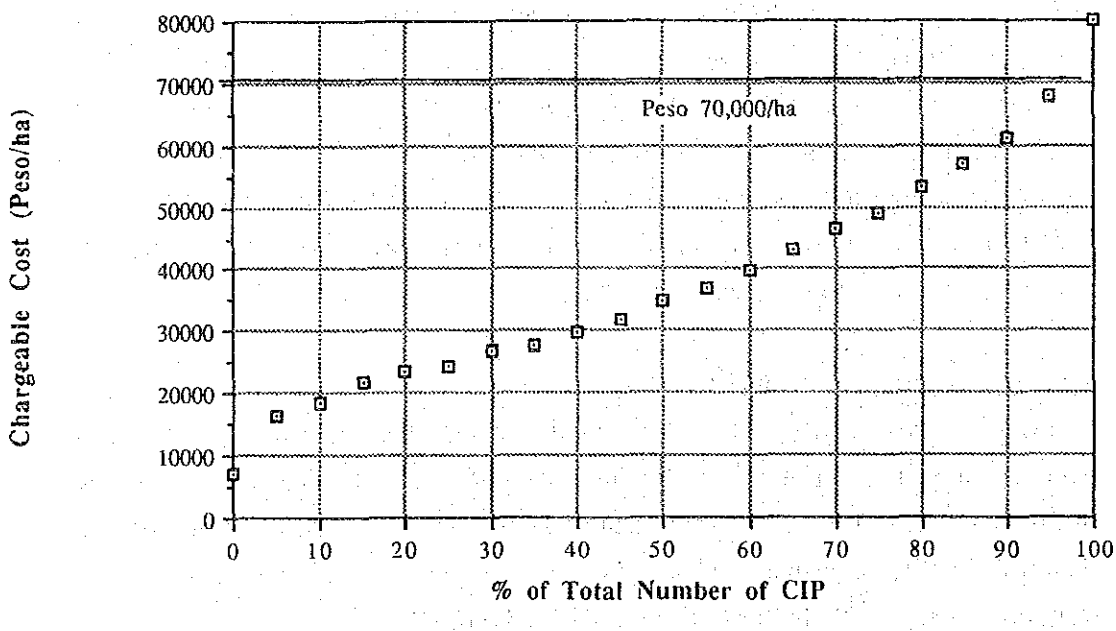
5.32 Chargeable Cost per Ha for CIPs/CISs

Using the cross-checked and supplemented cost data, the per-ha chargeable costs were calculated for all of the additionally inventoried sub-projects as shown in the following pages. The figures show that about 92 % of CISs and 96 % of CIPs are below the ceiling of the per-ha chargeable cost mentioned in the "minimum selection criteria", i.e. ₱ 70,000/ha for CIPs and ₱ 35,000/ha for CISs.

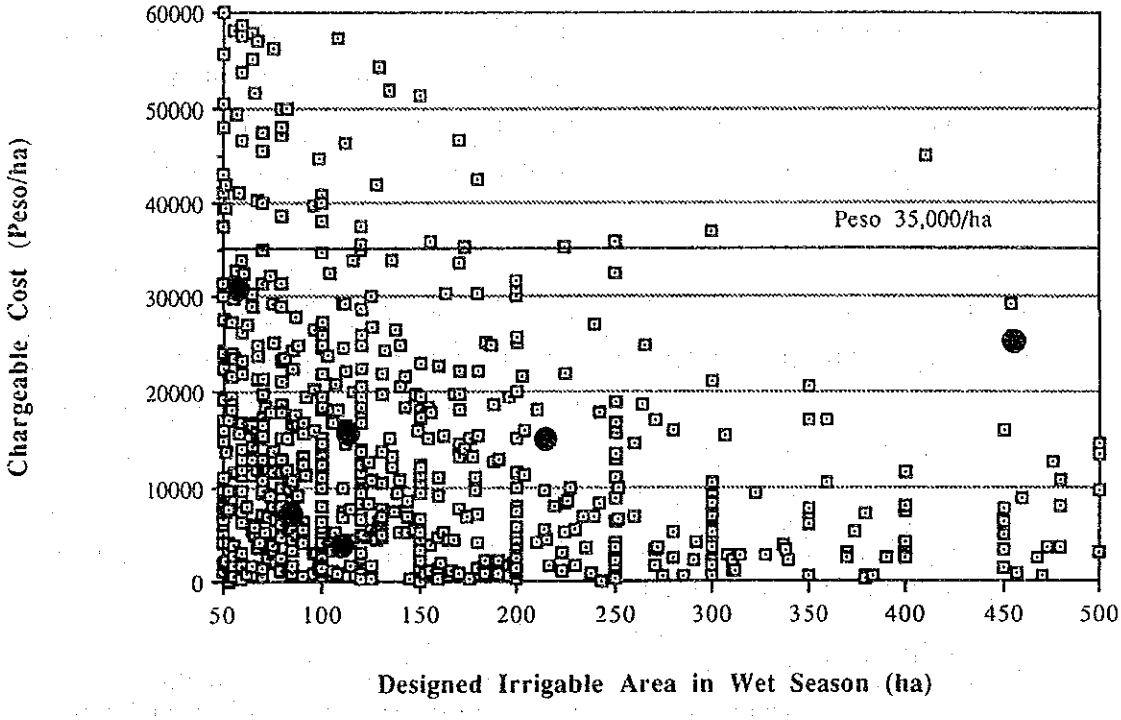
Chargeable Cost : CIP



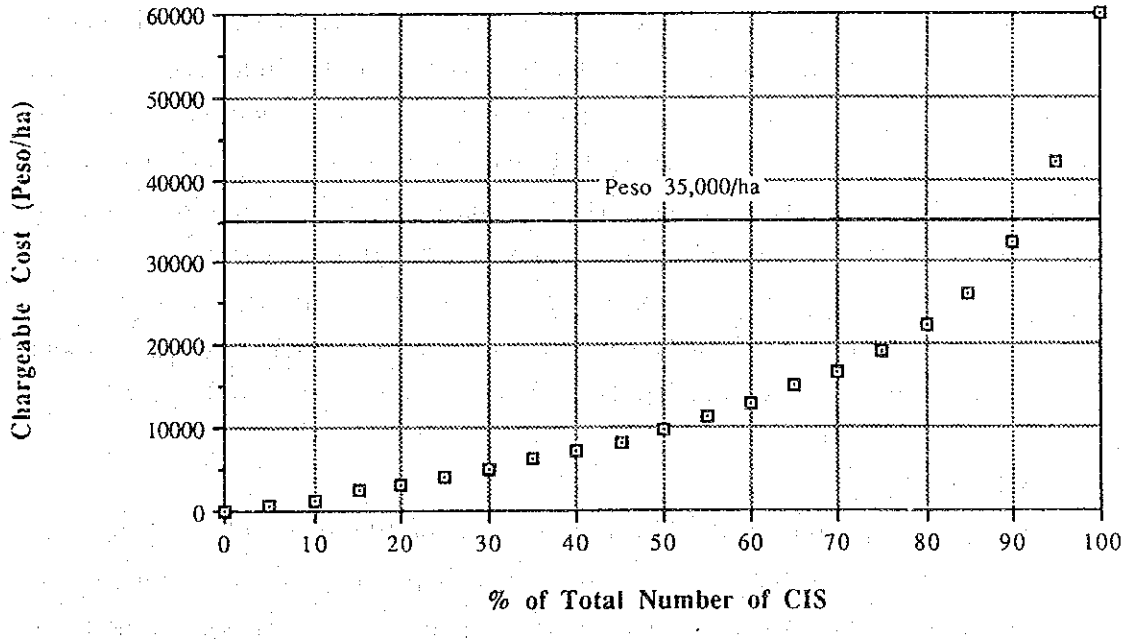
● : Representative Sample Sub-project for Pre-F/S



Chargeable Cost : CIS



● : Representative Sample Sub-project for Pre-F/S



Re-Estimation of Irrigation Benefits

5.33 The "irrigation benefits" answered in the questionnaires were estimated under different assumptions of farmgate prices and production costs, and in most cases, had no reliable breakdowns of the estimates. The cross-checking of the estimated irrigation benefits, therefore, could not be made, and all the irrigation benefits were re-estimated by the JICA Study Team, applying the uniform criteria for all CISs and CIPs.

5.34 The irrigation benefits were defined as the differences of net crop production values between future with and without project conditions, and were calculated according to the following equation (A work flow of the irrigation benefit estimates is illustrated in Fig. 5-06):

Net crop production values
= {(paddy unit yield x economic farm gate prices) - production cost /ha }
x annual cultivated area

Irrigation benefit
= net crop production values (under future with-project conditions)
- net crop production values (under future without-project conditions)

Basic assumption adopted for the above calculation are described hereunder:

5.35 Cropping Pattern and Land Use

The cross-checked designed irrigable areas were assumed to be the future irrigation areas under with-project condition both for CISs and CIPs. The present irrigation areas (actually irrigated areas) in CISs were assumed to be the future irrigation areas under without-project condition for CISs. The balance in area between the designed irrigable areas and the actually irrigated areas was assumed to be the incremental irrigation area by the CIS sub-projects. The balance between the designed irrigable areas and the present rainfed areas was assumed to be the incremental irrigation area by the CIP sub-projects. It was assumed that double cropping of paddy would be practiced under proper irrigated conditions for all of the inventoried CISs/CIPs sub-projects. The above concept of land use categories are illustrated on Fig.5-07.

5.36 Paddy Unit Yield

Regional average unit yields of paddy per ha under the irrigated condition were assumed to be those under future with-project condition. On the contrary, the regional average crop yields under present condition were assumed to be those

under future without-project condition. Therefore, no incremental unit yield per ha was expected for CISs; only the incremental irrigation areas to be restored were assumed to generate the irrigation benefits. The results are shown in Table 5-05.

5.37 Economic Farm Gate Prices

Economic farm gate prices of the traded farm inputs and products (paddy and corn) were estimated at 1990 price level on the basis of the prospective economic prices forecasted by the World Bank as given in the "Price Prospects for Major Primary Commodities, 1988-2000" (see Table 5-06). Non-traded production costs were up-dated by use of the latest local price data which additionally collected under Phase-II. The economic farm gate prices of paddy and corn were ₱ 6,037 per ton and ₱ 5,267 per ton, respectively.

5.38 Production Costs

Crop production costs were estimated to be 40% of the gross production values both for CIPs and CISs (see Table 5-07).

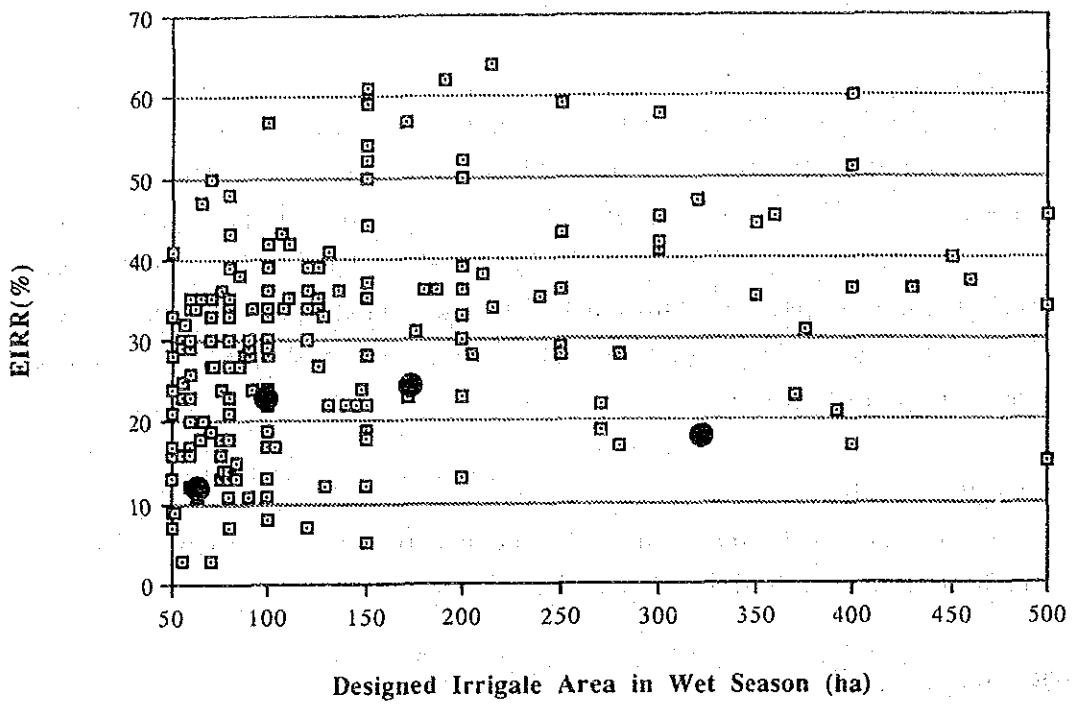
Re-Calculation of EIRRs

5.39 The economic internal rates of returns (EIRRs) were entirely re-calculated on the basis of cross-checked and supplemented costs and re-estimated benefits under the following basic assumptions:

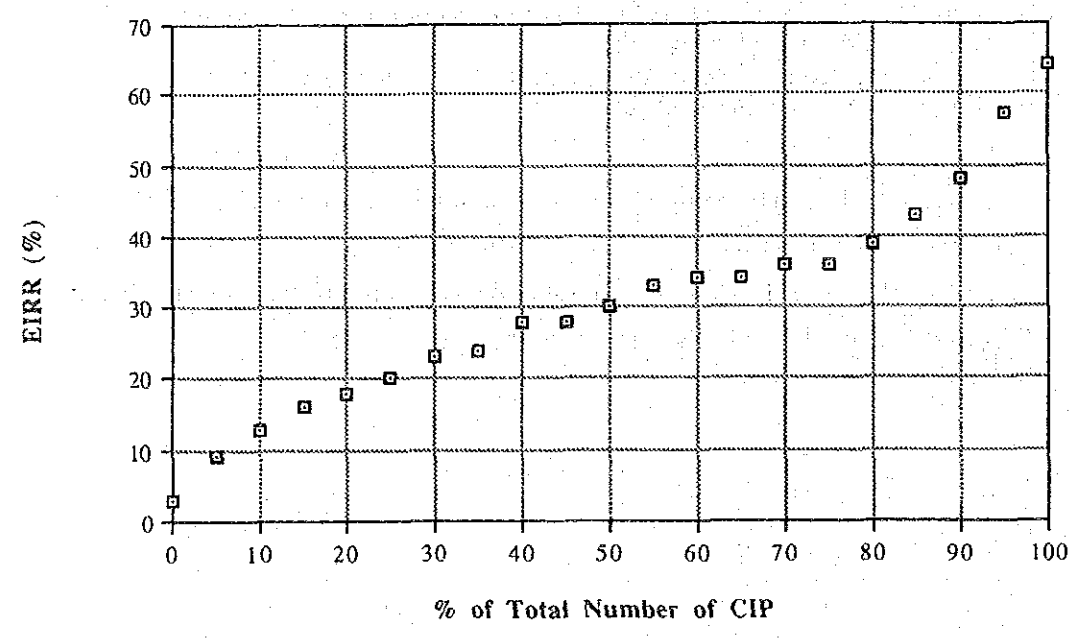
(1) Conversion factor to economic construction cost is 0.8.
(2) Economic annual O&M cost is 2% of the economic construction cost.
(3) Construction period is 2 years
(4) Build-up period is 3 years after completion of construction works
(5) Project economic life is 50 years

5.40 The cross-checked and supplemented financial cost data (CISs/CIPs) were converted to economic costs by applying a conversion factor of 0.8. The re-calculated EIRRs are shown in the following pages. The figures indicate that about 73% of CISs and 94% of CIPs were more than 10% in EIRR.

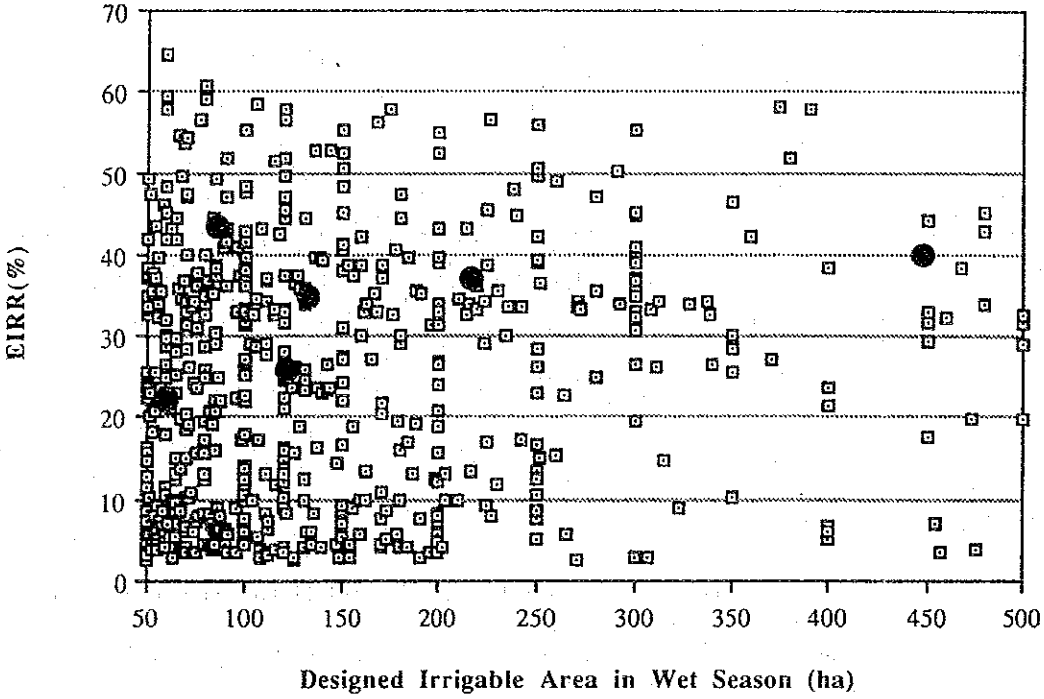
Economic Internal Rate of Return (EIRR): CIP



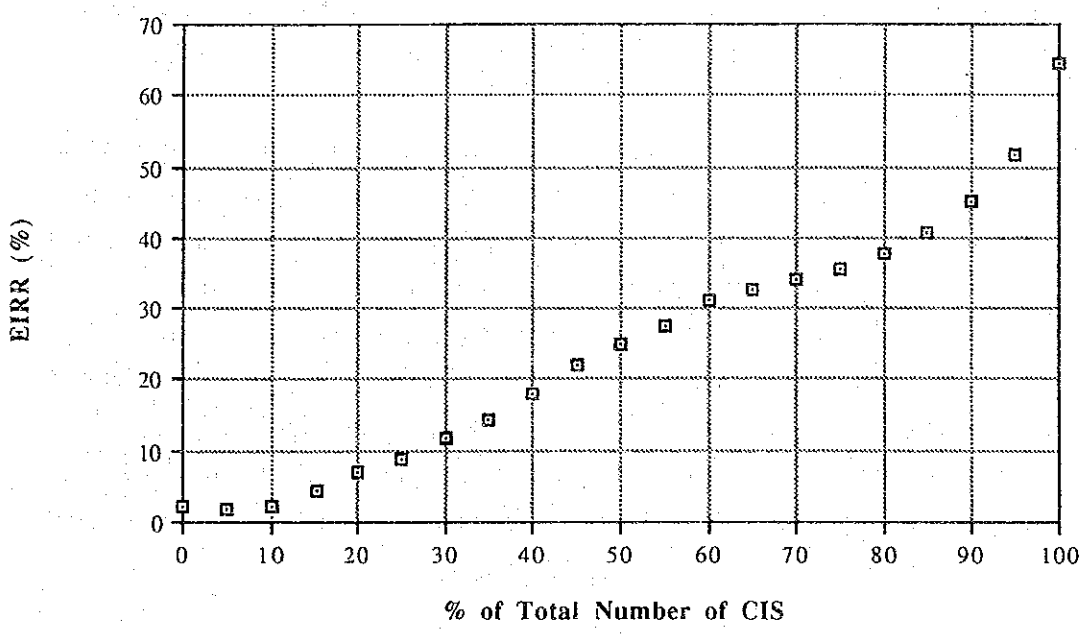
● : Representative Sample Sub-project for Pre-F/S



Economic Internal Rate of Return (EIRR) : CIS



● : Representative Sample Sub-project for Pre-F/S



CHAPTER VI CRITERIA AND GUIDELINES FOR FORMULATION OF MASTER PLAN

Existing Criteria and Guidelines for Implementation of SSIDP

6.01 Concept and Definition of SSIDP

The small-scale irrigation development project (SSIDP) is a kind of communal irrigation systems/projects (CISs/CIPs) and defined as those having irrigation area of 50 - 500 ha in net. The SSIDP shall therefore be implemented under present framework of CISs/CIPs and the existing guidelines and criteria for CISs/CIPs shall also be applied for implementation of SSIDP.

6.02 Guidelines /Criteria for SSIDP

Two kinds of guidelines and criteria have been discussed:

(1) Guidelines/criteria for implementation of SSIDP (those for NIA to use during the implementation of master plan), and
(2) Guidelines/criteria for formulation of master plan (those for the JICA Study Team to prepare the master plan).

6.03 Guidelines /Criteria for Implementation of SSIDP

Technical and administrative manuals for implementation of CISs/CIPs have been prepared by NIA. The manuals contain 34 specific guidelines with many standard forms which deal with almost all aspects of the required works for communal irrigation development (see Table 6-01). Major engineering standard and requirements for implementation of CIS/CIP are summarized in Table 6-02.

6.04 The existing guidelines give a clear methodology for the required survey and investigation which primarily cover soil survey, agro-economic survey, institutional survey and discharge measurement at the prospective diversion point at an interval of once a month for 12 months. The guidelines are generally well-prepared. However, simple errors and mistakes are observed in the estimation of designed irrigable areas and development costs which are decisive factors in qualification of the proposed sub-projects (as evidenced by the inventory survey). This is not caused by the inadequacy of the existing guidelines, but mainly ascribed to general difficulties of observance induced by shortage of the fund, equipment and technical staff required for these survey, investigation and studies.

Guidelines and Criteria for Formulation of Master Plan

6.05 Only the guidelines/criteria for formulation of master plan were examined under the Study, because the existing NIA's guidelines for implementation of SSIDP were considered adequate. The guidelines/criteria for the Study (formulation of the master plan) comprised those for the following specific survey and studies:

(1) Selection of candidate sub-projects for inventory survey,
(2) Selection of candidate sub-projects for master plan,
(3) Analysis of inventory survey,
(4) Classification of inventoried sub-projects,
(5) Selection of representative sample sub-projects for pre-F/S,
(6) Selection of the priority sub-projects for implementation,
(7) Prioritization of sub-projects for implementation,
(8) Preparation of 10 year development plan.

The guidelines/criteria for the above were discussed and decided during the course of the Study with mutual agreement between NIA and the JICA Study Team.

6.06 In this Chapter, the following two guidelines/criteria are discussed (other guidelines and criteria are discussed in respective chapters of the Report):

(1) Selection of priority sub-projects (Minimum Selection Criteria), and
(2) Priority ranking of such qualified sub-projects.

Minimum Selection Criteria

6.07 Existing "Minimum Selection Criteria"

The "minimum selection criteria" are established by NIA to examine the minimum qualification of the proposed sub-projects for implementation. NIA will allow PIOs to implement any sub-projects which will meet the "minimum selection criteria". The criteria have been applied for all the types of communal irrigation development both for CISs and CIPs, irrespective of funding sources. The proposed sub-projects should have the feasibility studies and are sufficiently supported with basic data to examine their qualification in the light of the "minimum selection criteria. Only qualified sub-projects will be entitled to proceed for further prioritization and implementation. The existing "minimum selection criteria" are shown in next page.

MINIMUM SELECTION CRITERIA (MUSTS)
(BOTH NEW AND REHABILITATION PROJECTS)

(Memorandum Circular No.63 of 1990 dated September 6, 1990)

(a) The expected cropping intensity should be at least 130% based on the net irrigable area as estimated during feasibility level.

(b) The proposed irrigation system area should have soils and slopes suitable for irrigated crop production.

(c) There should be no conversion of land use from productive permanent crops like coconuts and orchards.

(d) The smallest scheme should serve at least 20 farmers and the largest farmer-managed scheme would be not more than 700 ha. IAs with systems larger than 700 ha will be required to engage full-time professional management. No scheme would be larger than 1,000 ha.

(e) The average farm size in a scheme should be not more than 5 ha.

(f) Farmers should be actively involved in preparing their irrigation project, and should concur with its initial feasibility design.

(g) Average irrigation development cost for each package of schemes considered at any time (say, one year program for each PIO) should not exceed ₱ 18,000/ha for rehabilitation work and ₱ 35,000/ha for new construction. Subject to this average per ha cost, ceilings of ₱ 35,000/ha for rehabilitation work and ₱ 70,000/ha for new construction may be considered. Exceptions to this criterion would be systems in areas suitable for high value crops, for which ceilings of ₱ 55,000/ha for rehabilitation work and ₱ 100,000/ha for new construction would apply, provided the average costs are maintained as stipulated earlier (all at 1990 prices).

(h) The average economic internal rate of return (EIRR) of each of the above mentioned packages of scheme should be not less than 10%.

6.08 In the existing minimum selection criteria, the following factors are considered:

(1) Cropping intensity (more than 130%),
(2) Irrigation suitability of soils,
(3) Limitation of conversion in land use from coconuts and orchard,
(4) Scale of development (less than 1,000 ha, more than 20 farmers to benefit),
(5) Average farm size (more than 5 ha),
(6) Farmers' participation,
(7) Development costs per ha, and
₱18,000 for CISs, ₱35,000 for CIPs (average as a package)
₱35,000 for CISs, ₱70,000 for CIPs (maximum in package)
₱50,000 for CISs, ₱100,000 for CIPs (exceptional maximum in package)
(8) Average EIRR (more than 10% as a package)

6.09 The existing criteria are basically developed under the World Bank financed CIDP-I and -II. The criteria contain almost all of the important items which must be confirmed by NIA prior to the implementation. The JICA Study Team was requested by NIA to review the adequacy of the guidelines.

6.10 Review of the existing "Minimum Selection Criteria"

The following are pointed out for improvement of the "minimum selection criteria":

(1) Separate criteria for CISs and CIPs

It is reported that in some CIPs, only a part of the scheduled works are constructed due to the limitation in development cost per ha, and the remaining works are taken up as a rehabilitation works in the following years. In these case, the rehabilitation works are purposely misled, and the ceiling of the development cost per ha become meaningless. The "minimum selection criteria" should be established separately for CISs and CIPs in order to avoid further misunderstanding on the criteria. The following factors shall be considered in the "minimum selection criteria" for the CISs:

1) Time after implementation and rehabilitation works,
2) Status of land re-distribution under CARP,
3) Willingness of IAs to pay amortization,
4) Present status of IAs for amortization of existing loan,
5) Necessity of rehabilitation works, and
6) Economic internal rate of return for rehabilitation works.

(2) Additional guidelines for CARP

The candidate sub-projects will be constructed by NIA with framers' participatory approaches under the present system of amortization; therefore, before the implementation will start, the prospective IA members (land owners) are to be clarified and confirmed. Although, in some cases, the sub-projects have a considerable land still eligible for re-distribution under CARP, emancipation patents have not been issued yet. Implementation of such sub-projects should be delayed until the emancipation patents would be issued and the prospective member of the IAs is confirmed.

(3) Additional guidelines for minimum requirement of facilities

Sub-standard level of irrigation/drainage facilities were constructed in a considerable number of the inventoried sub-projects due to shortage of funds and/or the ceiling of development cost per ha in the "minimum selection criteria". In order to assure the expected benefits, the required minimum facilities are to be constructed in all the proposed sub-projects; otherwise, comparison of the development costs and EIRR among the proposed sub-projects for qualification is meaningless. In this sense, additional guidelines for minimum requirement of irrigation/drainage facilities shall be included.

(4) Evaluation of individual sub-project

In the existing minimum selection criteria, evaluation as a package of sub-projects is allowed in terms of development cost per ha and EIRR. The evaluation should however be made for individual sub-projects, because (1) there are a number of possible alternatives for packaging, (2) no guideline for packaging is available, and (3) proper evaluation is hardly possible by computers. It is therefore suggested that the packaging shall be made by PIOs at the provincial level, only after the selection and prioritization of the proposed sub-projects are made considering the available provincial budget.

(5) Development cost per ha

The existing guidelines gives the ceiling of development cost per ha; ₱35,000 for CISs and ₱70,000 for CIPs at 1990 price. As discussed in Chapter V, 92% of the inventoried CIP and 96% of the CISs are below this ceiling. The ceiling amount seems to be adequate.

The development cost per ha defined in the existing criteria should read as "chargeable cost per ha" instead of "total project cost per ha". Two kinds of facilities are constructed under CISs/CIPs; (1) diversion dams, canals and other facilities which directly benefit the IAs (chargeable facilities), and (2) flood protection dikes and access roads which are generally of public nature (non-chargeable facilities). Construction costs of the chargeable facilities are borne by the IAs, and those of the non-chargeable facilities by the Government. If the development cost means the "total project costs" instead of the "chargeable cost", those high cost sub-projects having larger non-chargeable facilities are likely to exceed the ceiling and to disqualify in the light of the "minimum selection criteria. It is against the NIA's basic policies which are directed to support the small farmers and to promote equitable distribution of rural income through the communal irrigation development.

Although the Republic Act No. 6978 dated July 23, 1990 gives new policies that the beneficiaries of CISs/CIPs shall pay only 50% of the project cost without interest for a period of 50 years, the present concept of the chargeable cost shall not necessarily be modified, because it is set out only for qualification of the proposed sub-projects and dose not mean the actual amount that the beneficiaries shall pay.

6.11 Proposed "Minimum Selection Criteria"

Considering the above, the revised "minimum selection criteria" are prepared, as shown in the following pages:

MINIMUM SELECTION CRITERIA FOR NEW DEVELOPMENT PROJECTS (CIP)

Proposed by the JICA Study Team

(a) The sub-project with more than 20% land still eligible for re-distribution under the CARP should be included only after emancipation patents had been issued for more than 80% of the eligible land.

(b) The expected cropping intensity should be at least 130% based on the net irrigable area estimated during the pre-engineering phase.

(c) The proposed irrigation area should have soils and slopes suitable for irrigated crop production.

(d) There should be no conversion of land use from productive permanent crops like coconuts and orchards.

(e) The smallest sub-project should serve at least 20 farmers. (The largest farmer-managed system would be not more than 700 ha. IAs with systems larger than 700 ha will be required to engage full-time professional management. No scheme would be larger than 1,000 ha.)

(f) The average farm size in the proposed irrigable area should be not more than 5 ha.

(g) Farmers should be actively involved in preparing their scheme, and should concur with its initial feasibility design (at least 80% of the representative sample respondents are willing to amortize chargeable cost of the sub-project).

(h) The designed irrigation and drainage facilities should be conformable to the minimum requirement of facilities which is specified in separate guideline.

(i) The irrigation development cost (chargeable cost) for each sub-project should not exceed ₱ 70,000/ha. Subject to this ceiling of per ha cost, average chargeable cost for a package of sub-projects should not exceed ₱ 35,000/ha. Exceptions to this criterion would be sub-project in areas suitable for high value crops, for which ceilings of ₱ 100,000/ha may apply, provided the average costs are maintained as stipulated earlier (all at 1990 prices).

(j) The economic internal rate of return (EIRR) of the proposed sub-project should be not less than 10%.

Note: The items (a) and (h) are newly added to the existing NIA's minimum selection criteria. The guideline for irrigation area in the item (e) is not applicable to SSIDP.

MINIMUM REQUIREMENTS OF IRRIGATION AND DRAINAGE FACILITIES

Proposed by the JICA Study Team

(a) A diversion weir shall be accompanied with an appropriately gated intake for the project. In case that designed water level and river discharge can be maintained at a diversion point throughout a year, no provision of the weir is allowed.

(b) Main and/or lateral irrigation canals and their related structures shall be provided to irrigate the terminal irrigation blocks not more than 50 ha.

(c) The irrigation and drainage canals should be separately provided. No canals with dual purpose shall be provided.

(d) The existing natural rivers/streams shall be fully utilized for effective drainage. Where the artificial drainage canals are required, the canals and their related structures shall be provided to drain out the excess water from the terminal irrigation blocks not more than 50 ha.

(e) The irrigation and drainage canals shall be of earth materials in principle. However, concrete-lined canal or concrete-flume shall be provided (in part or whole) instead of earth canal to the projects/systems where the earth canals are not adequate in view of topography and soil mechanics.

(f) The required irrigation/drainage facilities shall be planned, designed and constructed in accordance with the existing NIA's guidelines.

Note: The above guidelines will be applied only to the proposed sub-projects for new development (CIPs). The existing NIA's guidelines for irrigation/drainage facilities are summarized in Table 6-3.

MINIMUM SELECTION CRITERIA FOR REHABILITATION PROJECTS (CIS)

Proposed by the JICA Study Team

(a) The sub-projects have not undergone any construction and/or rehabilitation works during the past 5 years; however, the amortizing sub-projects damaged by typhoon, floods and all other calamities shall be rehabilitated, irrespective of the years after construction and/or rehabilitation.

(b) Rehabilitation and/or improvement works have been requested by the Irrigator's Association and at least 80% of the IA members are willing to amortize chargeable cost of the sub-project.

(c) The irrigator's association (IA) is amortizing the existing loan or has fully paid the required equity (in case of amortizing system).

(d) In case of the sub-projects with more than 20% land still eligible for re-distribution under the CARP, the emancipation patents have been issued for more than 80% of eligible land.

(e) The irrigation development cost (chargeable cost) for each sub-project should not exceed ₱ 35,000/ha. Subject to this ceiling of per ha cost, average chargeable cost for each package of sub-projects should not exceed ₱ 18,000/ha. Exceptions to this criterion would be sub-project in areas suitable for high value crops, for which ceilings of ₱ 55,000/ha may apply, provided the average costs are maintained as stipulated earlier (all at 1990 prices).

(f) At least one of the following should be applicable:

(1) The actual cropping intensity has continuously been less than 130% during the past 5 years.

(2) Actually irrigated area has decreased by more than 25% in the past 5 years.

(3) Operation and maintenance (O&M) costs are charged by the irrigator's association (IA); however, actual expenses have increased in the past 5 years due to deterioration of the irrigation and drainage facilities.

(4) The existing irrigation and drainage facilities are not conformable to the minimum requirement of facilities which is specified in separate guideline.

(5) The existing facilities are damaged by disaster such as typhoon, floods and earthquakes and rehabilitation is urgently required.

(g) The economic internal rate of return (EIRR) of the proposed sub-project should be not less than 10%.

Note: The above criteria are newly established for evaluation of the proposed sub-projects for rehabilitation (CISs).

General Guidelines for Prioritization

6.12 Prioritization of Qualified Sub-Projects

NIA will allow PIOs to implement any sub-projects which will meet the "minimum selection criteria" and will basically leave PIOs to prioritize such qualified sub-projects. The guidelines for prioritization should be location-specific at the provincial level, reflecting relative importance of the factors which should be indicated in the general guidelines for prioritization.

6.13 Basic Concept of the proposed " General Guidelines for Prioritization"

(1) Factors for prioritization

Since only qualified sub-projects are prioritized, prioritization shall be made only by using the simple factors such as:

1) Economic viability factor,
2) Institutional Factor (readiness for implementation), and
3) Socio-economic factor (conformity to objectives of SSIDP).

(2) Economic Viability Factors

The level of economic viability can be represented by economic internal rate of return (EIRR). The cropping intensity, soil type, development cost and accessibility of site considered in the existing guideline, are directly or indirectly related with EIRR. The EIRR may be supplemented by incremental cropping intensity for CIPs, and by % of area to be restored for CISs.

(3) Institutional Factor (readiness for implementation)

The readiness for implementation shall be directly related to the institutional aspects such as organization of IAs, willingness to render the equity and right of way problems, because these factors are fundamental requirement for commencement of the construction works.

(4) Socio-economic Factors (conformity to administrative objectives of SSIDP)

The administrative objectives of SSIDP are (a) support to the small size farmers, (b) support to the rural poor and (c) support to CARP. These factors may be assessed in the criteria by using the average farm size for factor (a), average farm income for (b), and percentage of area eligible for re-distribution under the CARP for (c). Peace and order condition may be considered under this factor.

6.14 Proposed "General Guidelines for Prioritization"

Considering the above, the "general guideline for prioritization" are prepared, as shown in the following pages:

GENERAL GUIDELINES FOR PRIORITIZATION : CIP

Proposed by the JICA Study Team

FACTORS FOR EVALUATION	MERIT POINT
A. ECONOMIC VIABILITY FACTOR (50 points)	
1. Economic Internal Rate of Return (EIRR)	
(a) More than 25%	30
(b) 10% - 25%	5 + (EIRR-10) x 1.5
2. Cropping Intensity (CR)	
(a) more than 170%	20
(b) 130% - 170%	5 + (CR-130) x 0.35
B. INSTITUTIONAL FACTOR (30 points)	
1. Organization of Irrigator's Association	
(a) IA already formed	10
(b) More than 90% of sample farmers are willing to form IA	5
(c) 80 - 90% of sample farmers are willing to form IA	3
2. Willingness to render equity/amortization	
(a) More than 80% of sample farmers are willing to render both equity/amortizatior	10
(b) More than 80% of sample farmers are willing to render equity	7
(c) More than 80% of sample farmers are willing to render amortization	3
3. Right of Way (ROW)	
(a) No expected ROW problems	5
(b) With ROW problem involving minimum cost	3
(c) With ROW problem involving substantial cost	1
4. Local Government Endorsement	
(a) With farmers' request and endorsement from both barangay and municipal government units	5
(b) With farmers' request and endorsement from either of the two	3
(c) With farmers' request but no endorsement	1
C. SOCIO-ECONOMIC FACTOR (20 points)	
1. Average Farm Size	
(a) Less than 1.0 ha	5
(b) 1.0 - 3.0 ha	3
(c) More than 3.0	1
2. Average Farm Income	
(a) 20% les than the regional average threshold income	5
(b) Around the regional average threshold income	3
(c) 20% more than the regional average threshold income	1
3. Land eligible for re-distribution under CARP	
(a) More than 50% of irrigable area	5
(b) 20 - 50% of irrigable area	3
(c) less than 20% of irrigable area	1
4. Peace and order condition	
(a) No risk	5
(b) Low risk	3
(c) High risk	1

GENERAL GUIDELINES FOR PRIORITIZATION : CIS

Proposed by the JICA Study Team

	FACTORS FOR EVALUATION	MERIT POINT
A.	**ECONOMIC VIABILITY FACTOR (50 points)**	
	1. Economic Internal Rate of Return (EIRR)	
	(a) more than 25%	30
	(b) 10% - 25%	5 + (EIRR-10) x 1.5
	2. % of Area Restoration (AR)	
	(a) More than 60%	20
	(b) 30% - 60%	5 + (AR-30) x 0.5
	(c) Less than 30%	5
B.	**INSTITUTIONAL FACTOR (30 points)**	
	1. Organization of Irrigator's Association	
	(a) More than 90% IA's officers and members are active	10
	(b) 80 to 90% of IA officers and members are active	5
	(c) Less than 80 % of IA officers and members are active.	3
	2. Willingness to render equity/amortization	
	(a) More than 80% of IA members are willing to render both equity/amortization	10
	(b) More than 80% of IA members are willing to render equity	7
	(c) More than 80% of IA members are willing to render amortization.	3
	3. Right of Way (ROW)	
	(a) No expected ROW problems	5
	(b) With ROW problem involving minimum cost	3
	(c) With ROW problem involving substantial cost	1
	4. Farmers' Request and Local Government Endorsement	
	(a) With farmers' request and endorsement from both barangay and municipal government units	5
	(b) With farmers' request and endorsement from either of the two	3
	(c) With farmers' request but no endorsement from the two	1
C.	**SOCIO-ECONOMIC FACTORS (20 points)**	
	1. Average Farm Size	
	(a) Less than 1.0 ha	5
	(b) 1.0 - 3.0 ha	3
	(c) More than 3.0	1
	2. Average Farm Income	
	(a) 20% les than the regional average threshold income	5
	(b) Around the regional average threshold income	3
	(c) 20% more than the regional average threshold income	1
	3. Land eligible for re-distribution under CARP	
	(a) More than 50% of irrigable area	5
	(b) 20 - 50% of irrigable area	3
	(c) less than 20% of irrigable area	1
	4. Peace and order condition	
	(a) No risk	5
	(b) Low risk	3
	(c) High risk	1

CHAPTER VII PRIORITY GROUPING OF CANDIDATE SUB-PROJECTS

Objectives

7.01 Priority grouping of the inventoried sub-projects aims to facilitate the formulation of 10 year development program for SSIDP. In order to utilize the nation's endowed land and water resources effectively for rural and irrigation development, the proposed sub-projects should be investigated, planned and designed in proper manner in accordance with the existing NIA's guidelines and criteria, and only those sub-projects that will pass the "minimum selection criteria" should be allowed to proceed for implementation.

7.02 The implementation schedule of the master plan should therefore be based on the priority grouping which will classify the inventoried sub-projects into (1) those to be implemented ("A" group), (2) those to be re-studied ("B" group) and (3) those to be newly investigated ("C" group), through overall assessment of the inventoried sub-projects on (1) readiness for implementation (level of project preparation) and (2) conformity to the "minimum selection criteria". Only the qualified sub-projects ("A" group) will be prioritized in accordance with the agreed general guidelines for prioritization.

Method and Process of Priority Grouping

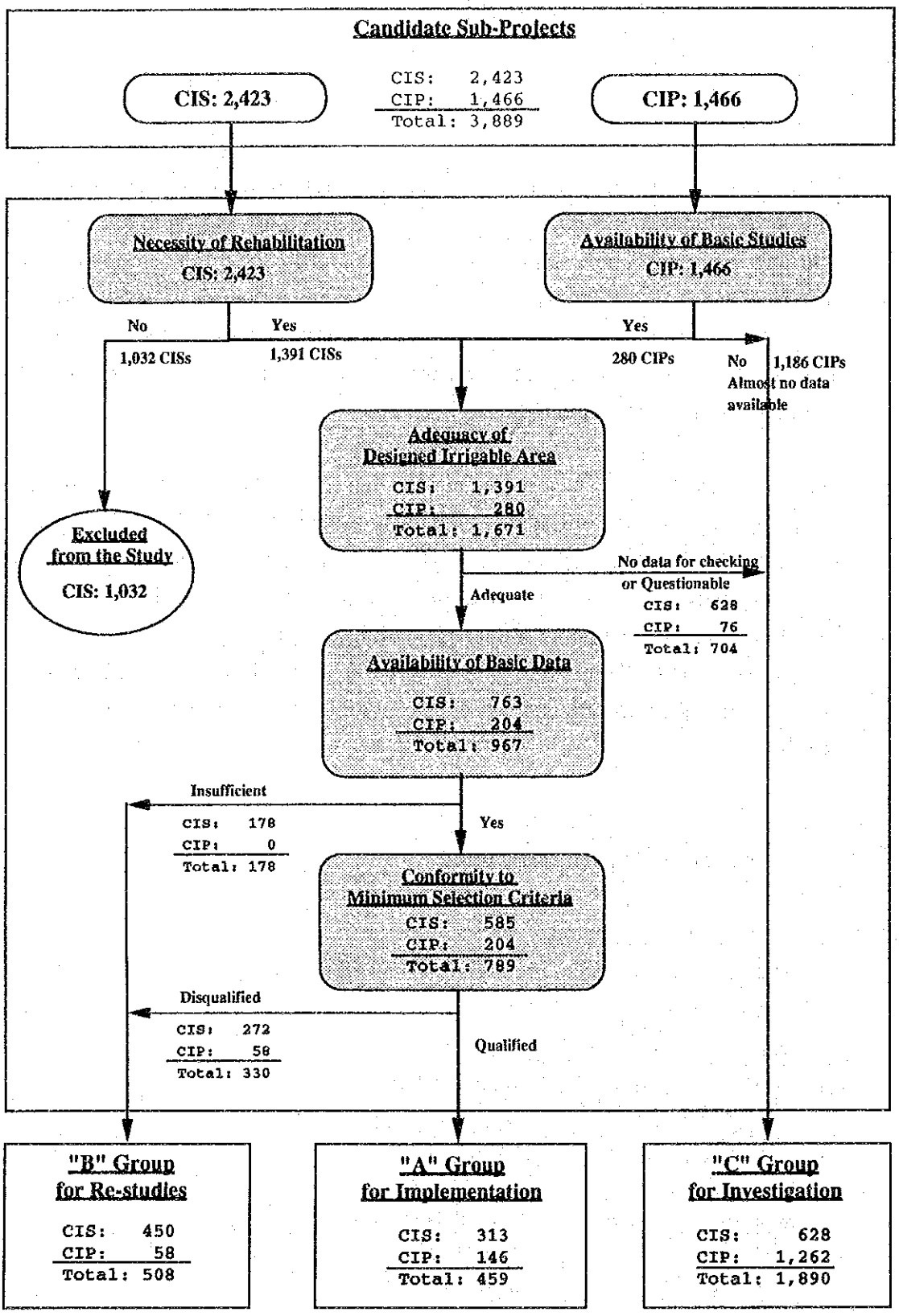
7.03 Method of Priority Grouping

The candidate sub-projects are classified into three priority groups through the assessments of the following factors :

(1) Necessity of rehabilitation for CISs,
(2) Availability of feasibility study for CIPs,
(3) Adequacy of designed irrigable area,
(4) Availability of basic data, and
(5) Conformity to minimum selection criteria.

The work flow of the priority grouping is shown in the next page.

PRIORITY GROUPING OF CANDIDATE SUB-PROJECTS



7.04 Necessity of Rehabilitation for CISs

Those CISs that are recently constructed or rehabilitated, or well-maintained and do not require rehabilitation works, are to be excluded from the list of sub-projects for implementation under the master plan. The CISs requiring rehabilitation works are further examined for the priority grouping.

- CISs requiring rehabilitation works : 1,391 (57%)
- CISs not requiring rehabilitation works : 1,032 (43%)

7.05 Availability of Feasibility Study for CIPs

Those CIPs that are not supported by the basic studies are classified as "C" Group (those to be investigated), having been retained as potential projects for future implementation. Those CIPs supported by the basic studies are further examined for the priority grouping.

- CIPs having feasibility study : 280 (19%)
- CIPs not having feasibility study : 1,186 (81%)

7.06 Adequacy of Designed Irrigable Area

The designed irrigable area should be one of the key factors for the priority grouping, because it will generally indicate technical adequacy of the proposed irrigation development plan. The designed irrigable areas of those CISs requiring rehabilitation and CIPs having the basic studies are cross-checked and the adequacy of their estimates is examined as mentioned in Chapter V. Those CISs/CIPs with the questionable designed irrigable areas are classified as "C" Group (those to be investigated), having been retained as potential projects for future implementation. The results are summarized as follows:

Sub-Projects	Adequate	Questionable
CISs requiring rehabilitation	763	628
CIPs having basic studies	204	76
Total	967	704

7.07 Availability of Basic Data

Availability of the basic data should be checked before qualification of the sub-projects are examined in the light of the "minimum selection criteria". Checking of

data availability is made for the above 967 sub-projects (CISs: 763, CIP: 204). The data required by the "minimum selection criteria" are as follows:

(1) status of land re-distribution under CARP,
(2) cropping intensity,
(3) land suitability for irrigation (soils and land slopes),
(4) designed irrigable area and number of farmers beneficiaries,
(5) average farm size,
(6) willingness to organize IA and pay for amortization,
(7) development cost, and
(8) economic internal rate of return (EIRR).

7.08 There are 154 CISs that have no rehabilitation cost estimates, and 24 CISs that show very minor rehabilitation costs which are lower than the annual O&M costs (less than ₱ 700 per ha), totalling 178 CISs. The rehabilitation costs can not be supplemented, because of very wide variety of rehabilitation works with varying costs as discussed in Chapter V. The CISs that may be requiring minor repairs, should be excluded from the list of sub-projects for implementation if the costs are correctly estimated. These CISs were judged insufficient in availability of the basic data. Other CISs and all of CIPs are considered having the required basic data.

Sub-Projects	Available	Insufficient
CISs	585	178
CIPs	204	0
Total	789	178

7.09 Conformity to Minimum Selection Criteria

Qualification for implementation is examined, for these 789 sub-projects (CISs: 585, CIPs: 204), in the light of the "minimum selection criteria" which comprise the following guidelines (the criteria are discussed in Chapter VI):

CISs

(1) Years after construction
(2) IAs' willingness
(3) Status of amortizing loan
(4) Status of CARP progress
(5) Ceiling of development cost
(6) Necessity of rehabilitation
(7) EIRR

CIPs

(1) Status of CARP progress
(2) Cropping intensity
(3) Land suitability for irrigation
(4) Limitation of changes in land use
(5) Limitation of development scale
(6) Average farm size
(7) Farmers' willingness
(8) Minimum requirement of facilities
(9) Ceiling of development cost
(10) EIRR

The proposed sub-projects should meet all of the guidelines to qualify. The results are summarized below:

Sub-Projects	Qualified	Disqualified
CISs	313	272
CIPs	146	58
Total	459	330

Interpretation of Priority Grouping Process

7.10 "A" Group: Sub-Projects to be Implemented

Among the candidate sub-projects, 313 CISs and 146 CIPs are finally classified as the "A" Group (sub-projects to be implemented) through the following steps:

CISs		No.of sub-projects	
(1)	Candidate sub-projects for the study	2,423	(100%)
(2)	Rehabilitation works are required	1,391	(57%)
(3)	Designed irrigable area is adequate	763	(31%)
(4)	Basic data are sufficiently available	585	(24%)
(5)	Selection criteria is satisfied	313	(13%)

CIPs		No.of sub-projects	
(1)	Candidate sub-projects for the study	1,466	(100%)
(2)	Basic study was finished	280	(19%)
(3)	Designed irrigable area is adequate	204	(14%)
(4)	Basic data are sufficiently available	204	(14%)
(5)	Selection criteria is satisfied	146	(10%)

7.11 "B" Group: Sub-Projects to be Re-Studied

The "B" Group (sub-projects to be re-studied) are 450 CISs (19%) and 58 CIPs (4%). These sub-projects have the following characteristics:

CISs (450 sub-projects,19%)

- Rehabilitation works are required;
- Designed irrigable area is adequate; and
- Basic data are not sufficient; or
- Basic data are sufficiently available; but
- Selection criteria is not satisfied.

CIPs (58 sub-projects,4%)

- Basic study has been finished;
- Designed irrigable area is adequate;
- Basic data are sufficiently available; but
- Selection criteria is not satisfied.

7.12 "C" Group: Sub-Projects to be Newly Investigated

The sub-projects to be newly investigated are 628 (26%) CISs and 1,262 (86%) CIPs. These sub-projects have the following characteristics:

CISs (628 sub-projects,26%)

- Rehabilitation works are required; but
- Designed irrigable area is questionable.

CIPs (1,262 sub-projects,86%)

- Basic studies are not completed, or
- Basic studies have been completed; but
- Designed irrigable area is questionable.

Results of Priority Grouping

7.13 Results of Priority Grouping

The results of the priority grouping are summarized as follows:

	Group	CISs		CIPs	
		Nos.	Area (ha)	Nos.	Area (ha)
(1)	"A" Group	313 (13%)	49,024 (14%)	146 (10%)	21,807 (10%)
(2)	"B" Group	450 (19%)	62,826 (18%)	58 (4%)	7,999 (4%)
(3)	"C" Group	628 (26%)	89,734 (25%)	1,262 (86%)	181,895 (86%)
(4)	Sub-projects excluded from candidate sub-projects for Master Plan Study	1,032 (42%)	150,262 (43%)	-	-
	Total	2,423(100%)	351,846(100%)	1,466(100%)	211,701(100%)

7.14 General Features of "A" Group Sub-projects

The general features of the "A" Group sub-projects are as follows:

Items	CIPs	CISs	Total (average)
Nos. of sub-projects (nos.)	146	313	459
Designed Irrigable Area (ha)			
Wet season	21,807	49,024	70,831
Dry season	19,623	43,325	62,948
Total	41,430	92,349	133,779
Cropping intensity (%)	190%	188%	189%
Irrigation areas to be restored (ha)			
Wet season	0	16,300	16,300
Dry season	0	20,200	20,200
Total	0	36,500	36,500
Farmers beneficiaries (nos.)	14,219	39,455	53,664
Average farm size (ha)	1.53	1.24	1.32
Incremental rice production (tons)	113,000	88,000	201,000
Project cost (₱ 1,000)			
Chargeable cost	727,528	399,046	1,126,574
Non-chargeable cost	231,853	132,763	364,616
Total	959,381	531,809	1,491,190
Chargeable cost per ha (₱)	33,362	8,140	(15,905)

(for details, see Annex-H: general features of "A" Group Sub-projects)

7.15 General Features of "B" Group Sub-projects

Among 508 sub-projects of "B" Group, 330 sub-projects (CISs: 272, CIPs: 58) are disqualified by applying the "minimum selection criteria". Most of these CISs/CIPs will be qualified after the re-studies are made, because most of them are satisfying 7 out of 8 guidelines but are disqualified by not satisfying only one remaining condition as shown below :

Nos of Non-conformity to the Guidelines	Nos.of Disqualified Sub-Projects			
	CISs		CIPs	
One Condition	200	(74%)	48	(83%)
Two Conditions	53	(19%)	8	(14%)
Three Conditions	18	(7%)	2	(3%)
Four Conditions	1	(0%)	-	
Total	272	(100%)	58	(100%)

7.16 The disqualified sub-projects are classified by reasons of disqualification as summarized below (for details, see Table 7-01):

CISs	No.of Sub-Projects Disqualified
(1) EIRR (less than 10%)	158
(2) Status of amortizing loan (IAs are not amortizing)	81
(3) Development Cost (more than ₱35,000/ha)	62

CIPs	No.of Sub-Projects Disqualified
(1) Minimum Requirement of Facilities	23
(2) Development Cost (more than ₱70,000/ha)	17
(3) EIRR (less than 10%)	11

Prioritization of "A" Group Sub-Projects

7.17 The "A" Group sub-projects are prioritized by applying the general guidelines for prioritization which are discussed in Chapter VI. The results are shown in Annex-H, as one of the general features of "A" group sub-project.

CHAPTER VIII INSTITUTIONAL DEVELOPMENT FOR SSIDP

Basic Concept of Institutional Development

8.01 Institutional development plays a key role in the communal irrigation program. In general, this involves a two-pronged approach directed towards both the farmer beneficiaries and NIA tasked to assist the IAs attain a desired development objective. The primary components of such an approach are the conduct of training for and provision of material/logistics support to both IAs and NIA. Ultimately, the goal of institutional development is to enable the farmer beneficiaries identify and understand their problems, needs and capabilities and then empower them to uplift their conditions using their resources with only minimal or no assistance from the concerned agency/entity.

8.02 In the case of SSIDP, major target groups for institutional development will be the PIOs (and to some extent RIOs) and the IAs. The NIA provincial and regional offices have direct contact with the farmers and hence, are in a better position than any other unit within NIA to assist the IAs. However, they are generally constrained to do the task because they are understaffed and/or have inadequately trained staff as well as lack the necessary facilities, equipment and vehicle supports. The problem has even worsened in view of the current wider scope of the PIO's responsibilities due to the shift of development focus from medium/large-scale to communal type irrigation schemes.

8.03 The IAs are heavily dependent on the PIOs for organizational and training/logistic supports. Many IAs are therefore still wanting in terms of organizational and operational efficiency. The participatory approach has helped forge a more effective partnership between NIA and the IAs. This approach has given a new dimension to the bottom-to-top planning process which has been welcomed among the local government officers and farmers representatives. It has opened new possibilities which are considered unthinkable in rural development perspective. To further ensure the success of such participatory approach, there will be a need to sustain and improve the present institutional development efforts of NIA.

Strengthening and Improvement of RIOs/PIOs

8.04 The implementing capability of the field offices, particularly the PIOs, can be strengthened by focusing assistance on (1) the organizational/operational supports, (2) personnel complement, (3) facilities and logistics support and (4) funding aspects. The first three factors are heavily dependent on the fourth one. An adequate and timely presence of these factors combined with strategic approaches will help ensure a successful implementation of CID program.

8.05 Authorities and Responsibilities

There is a need to firm-up the over-all coordination, planning, programming and implementation of the CID program. This will necessitate a continuous effort to strongly pursue the establishment of a Communal Irrigation Department (CID) in the NIA Central Office. The shift of development focus from large-scale/national system type to communal irrigation projects with its new and challenging tasks or requirements further justify the creation of a single body that will cater exclusively to these special needs. Moreover, the proposed CID should be manned with qualified personnel and equipped with adequate facilities, including a computerized database system which can later be hooked up with the field offices.

8.06 The authority or participation of the field offices, specially the PIOs, in the packaging and bidding of sub-projects and other activities relative to project implementation should be gradually increased. In particular, the possibility of providing the PIOs and/or RIOs with the authority to approve project contract in toto or as a whole depending on the project cost, size of the project area and/or nature of funding should be looked into. Likewise, a periodical adjustment in the limit of authority of the PIEs to procure spare parts for equipment and vehicles should be continuously observed. These measures may help reduce delay in project implementation.

8.07 Staffing and Training

To meet the bigger tasks ahead, it is important for the PIOs/RIOs to be adequately staffed. However, the recruitment of additional personnel and/or re-hiring of laid-off employees shall always depend on sufficient budgetary appropriation. Since this appears to be a perennial problem of NIA, phasing of personnel recruitment may be suggested as follows:

Period	Recruitment Level
Short-term	Number of personnel equivalent to October 1990 level, i.e. prior to the substantive lay-off of personnel due to austerity measures
Medium/long-term	Number of personnel equivalent to the short-term period plus filling-up of the vacant but approved permanent posts as of October, 1990 including non-permanent positions under various new projects

8.08 The number of personnel to be recruited under the two phases are estimated:

Period	RIOs	PIOs	Total
Short-term	1,723	5,170	6,893
Vacant approved permanent positions	219	284	503
Medium/long-term	1,942	5,454	7,396

8.09 Training of PIO/RIO Staff

NIA's current training program particularly for field personnel is still wanting in some respects. In the first place, the PIOs have a relatively lower training ratio (number of training slots availed so far over the number of field personnel) than the RIOs; namely, 0.6 as compared to 1.4. This means each RIO has availed of at least one training course but not the PIO which ironically is at the fore front of CID implementation. Apparently, this is attributed to a bias in favor of the RIOs regarding allocation of training funds. There are also cases where in the central office personnel have gained some advantage in the selection of training grants specially those based abroad. The field personnel particularly the PIO staff, are still difficult in such training areas as contract management, and construction methods for project-in-charge and engineers specially on quality control and safety measure of division weir. Institutional development courses, which constitute the bulk of training courses availed by the field staff, are in some cases shortened in terms of duration because of budgetary constraint.

8.10 The proposed training program seeks to strike a well-balanced allocation of training opportunities among the field personnel based on training, needs and demand/ preferences including available resources. In particular, it will give more emphasis

on the training of PIO rather than RIO personnel, by raising the training ratio of PIO personnel from 0.6 to at least one and prevent the RIO's current training ratio of 1.4 from falling below one. This means entitling each PIO and RIO staff to a least one training slot over the long-run. For the 10-year SSIDP implementation, the PIOs are expected to avail of 8,259 training slots equivalent to a training ratio of 1.5 while the RIOs will have 2,210 slots or 1.1 training ratio. Details are shown in Table 8-01.

8.11 Other recommendations are as follows:

(1) Give priority in the training of permanent personnel over project contractual and other non-permanent personnel;

(2) Provide equal opportunity to both field office and central office personnel in the allocation of all training opportunities;

(3) Continue to provide regular funding for basic training courses like basic leadership development, financial management and system management but accommodate new relevant training courses with significant demand such as irrigated crop diversification scheme, IA loan management, accounting, recording, monitoring and reporting, geodetic survey and construction methods and management;

(4) In general, avail more of short-term courses instead long-term courses, whether local of foreign based, specially those under grant-in-aids;

(5) In view of the limited number of permanent staff vis-a-vis projects to be implemented, provide more emphasis on supervisory management courses, specially for engineers; and

(6) Let the existing training development unit at the NIA central office provide over-all coordination in the planning, programming and implementation of all training courses for NIA personnel regardless of funding courses.

8.12 Salaries and Incentives

While the salaries of NIA personnel have been generally covered by the Government Salary Standardization Plan, those of the Provincial Irrigation Engineers (PIEs) have not yet been upgraded to the compensation level of other agencies' chiefs of offices who have similar province-wide duties and responsibilities. Efforts along this line should be continuously pursued by NIA. Moreover, it is important that a more attractive compensation package be provided to project contractual personnel and other temporary employes like project-in-charges and IDOs.

8.13 The possibility of standardizing rules on VIG (viability incentive grant) allocation needs to be further reviewed by NIA. At present, the VIG allocation at the field level is based on the discretion of the concerned RIDs (Regional Irrigation Directors) and PIEs, hence the sharing formula differs from one field office to another field office. There may also be a need to study the possibility of incorporating in the long-run a sort of "penalty system" in addition to the present incentive scheme in the selection of RIOs/PIOs to qualify for VIG. This will complement the current incentive scheme in improving the performance of other PIOs/RIOs whose productivity records are not so encouraging.

8.14 Release of Implementation Funds

Since SSIDP falls under the communal type of irrigation projects, the proposed local and foreign funds for this program shall have to pass through the standard implementing procedures already established by NIA for communal irrigation development projects. This means that budgetary allocation for SSIDP will have to be covered also by the DPWH Rural Infrastructure Program and coordinated by the CID/CIDIP Group of NIA.

8.15 To minimize funding constraints for the implementation of SSIDP, the following are also recommended:

(1) Given limited fund allocation, adopt a workable phasing of construction activities without sacrificing structural quality;

(2) Seek other sources of temporary financing for project construction activities (until DBM's fund allocation is actually released) like the NIA's Corporate Fund, government and private commercial banks and non-government organizations so as to commence construction work from January to June which is the ideal construction period and be assured of adequate supply of construction materials;

(3) Establish a regular seed fund for investigation and survey of proposed projects which would then be replenished once project funds are already available for continuity of such activities; and

(4) Minimize the part of project funds (about 30%) that is regularly allocated for budgetary reserve fund, management fees and general overhead surcharges and instead, provide more allotment directly to project construction works.

8.16 Facilities and Equipment

The RIOs/PIOs are wanting in adequate buildings, office equipment, vehicles and other facilities for survey/construction to meet the increasing work volume. The requirements of these facilities and equipments are described hereunder:

8.17 PIOs' Building

According to the supplemental questionnaire survey on institutional aspect, the present status of PIOs' buildings, namely administration office and equipment shed, are as follows:

(Unit: No. of facilities)

	Building	New One Required	Rehab. Required	Adequate	No Answers	Total
(1)	Administration Office	14 (21%)	31 (46%)	19 (28%)	3 (5%)	67 (100%)
(2)	Equipment Shed	24 (36%)	19 (28%)	16 (24%)	8 (12%)	67 (100%)

(Refer to Table E 2-06 of Annex-E)

8.18 As shown above, only one-fourth of 67 PIOs' buildings are adequate and two-thirds of them require new construction or rehabilitation. This is mainly attributed to deterioration of the facilities and insufficient space due to an increase of staff and equipment. Since inadequate facilities are likely to constrain the daily activities of PIO and induce a decrease in work efficiency, it is recommended that NIA make a detailed inventory survey and make an effort to improve the present PIOs' buildings.

8.19 The suggested improvement works of the PIOs buildings are as follows :

Building	New Construction	Rehabilitation
Administration Office	14 PIO	31 PIO
Equipment Shed	60 PIO	19 PIO

8.20 Office Equipment

Main office equipment are personal computer, blue printing machine, copying machine and typewriter. Since the foreign assisted programs such as CIDP-I & II and VCIPP have recently provided the PIOs with a considerable number of the office equipment, the present availability of office equipment at the PIOs has largely been improved as shown below:

(Unit: Nos.)

	Office Equipment	Available as of 1990	Provided under Foreign Aid	Total	Average No. of Equip./PIO
(1)	Personal computer	18	80	98	1.5
(2)	Blue copying machine	21	24	45	0.7
(3)	Copying machine	18	-	18	0.3
(4)	Type writer	291	361	652	9.7

(Refer to Table E 2-11 and 13 of Annex-E)

8.21 Considering the implementation of SSIDP, the Team has an opinion that every PIO should have at least one each unit of personal computer, blue printing machine and copying machine. It is hoped that NIA will provide the PIOs with additional blue printing machines and copying machines for smooth implementation of SSIDP. The suggested number of additional requirement is as follows:

Copying Machine	50 units
Blue Printing Machine	22 units

8.22 Survey Equipment

The present availability of the survey equipment is as follows:

(Unit: No.)

Survey Equipment	Available as of 1990	Provided under Foreign Aid	Total	Average No. of Equip./PIO
Transit	100	67	167	2.5
Automatic/Ordinary level	157	67	224	3.3
Current meter	76	67	143	2.1

(Refer to Table E 2-07 and E2-13 of Annex-E)

8.23 The present availability of survey equipment seems to be insufficient for the increasing requirement of survey work in implementation of SSIDP. The suggested additional requirements for the survey equipment are as follows:

Transit	306 units
Automatic Level	264 units
Current Meter	7 units

8.24 Construction Equipment and Vehicles

Construction equipment and vehicles owned by PIOs are classified into two, A1-class and A2-class. The A1-class is the equipment which are in good condition and operable, while the A2-class is the one which needs spare parts and minor repair. As of 1990, about 34 % of the equipment belong to A2-class on an average. Total number of major equipment available at PIOs as of 1990 is estimated as shown below:

(Unit: No.)

Construction Equipment & Vehicles	Available as of 1990 A1-Class (1)	A2-Class (2)	Total (3)=(1)+(2)	% (2)/(1) x 100	Provided under Foreign Aid (4)	Total (5)=(3)+(4)
1. Bulldozer	129	38	167	22.8	-	167
2. Backhoe	79	24	103	23.3	13	116
3. Dump truck	137	77	214	36.0	67	281
4. Ordinary track	38	20	58	34.0	67	125
5. Fuel tanker	3	2	5	40.0	-	5
6. Concrete mixer	83	43	126	34.1	67	193
7. Welding machine	13	0	13	0.0	28	41
8. Concrete vibrator	69	8	77	10.4	23	100
9. Roller	22	4	26	15.4	67	93
10. Water pump	188	52	240	21.7	335	575
11. Generator	54	3	57	52.6	-	57
12. 4WD car	101	41	142	28.9	-	142
13. Pick-up	112	39	151	25.8	80	231
Total/average	1,028	351	1,379	34.1	747	2,126

8.25 The above number of the presently available equipment seems to be still insufficient for the implementation of 10 year development plan. The number of equipment additionally required is estimated as given in Table 8-02 (for details, refer to Annex-E), on the following assumptions:

(1) A2-class equipment are repaired with procurement of appropriate spare parts.
(2) Construction works are mainly carried out by manual labor, and a large scale of works such as diversion weir are constructed by using the equipment.
(3) The annual construction work volume is assumed to be the annual average for 10 year development program at the provincial level.
(4) The maximum use of the equipment is envisaged as follows:
   - Pick-up, water pump and generator : one unit for two sub-projects
   - Fuel tanker : one unit for each PIO
   - Others : one unit for four sub-projects

8.26 The construction equipment and vehicles additionally required are summarized as follows (for details, see Table 8-02):

1.	Bulldozer	64 units
2.	Backhoe	83 units
3.	Dump truck	22 units
4.	Ordinary track	58 units
5.	Fuel tanker	62 units
6.	Concrete mixer	32 units
7.	Welding machine	128 units
8.	Concrete vibrator	82 units
9.	Roller	85 units
10.	Water pump	36 units
11.	Generator	242 units
12.	4WD car	71 units
13.	Pick-up	116 units

8.27 Other suggestions for proper O&M of the facilities and equipment include:

(1) Conduct a periodical inventory of facilities, equipment and vehicles in order to keep abreast of their current status and priority needs for repair and replacement; and

(2) Give attention to proper O&M of such facilities, equipment and vehicles.

Institutional Development of IAs

8.28 Importance of the Farmers Participatory Approach

Considered to be a milestone in rural development efforts, the farmers participatory approach is both relevant and timely. The approach is relevant because it recognizes the need for, capability and right including responsibility of the beneficiaries to participate in decision making starting from project inception. The approach is also timely because it provides for a self-liquidating mechanism (in terms of equity generation and amortization by project beneficiaries).

8.29 Consistent with the opinion of RIDs/PIEs, the Study confirmed that the approach should still be used as a long-run strategy of NIA specially on communal irrigation development. To enhance its effectiveness, the following are suggested:

(1) Conduct a periodical assessment among the field offices, including the IAs whenever necessary, of the workability of the General Guidelines on CIDP implementation as well as ensure that their suggestions are incorporated in the action plan;

(2) Gather multi-sectoral insights on the participatory approach by conducting a regular forum wherein representatives from the concerned government and private sectors shall be gathered; and

(3) Enrich NIA's participatory approach with the experiences of other similar rural development approaches (like the NEDA Local Resource Management Project) by adopting relevant strategies and methodologies.

8.30 Relationship Between PIOs and IAs

The PIOs are the government's direct link to the IAs. It is important that this link be maintained and strengthened. However, considering the bigger tasks faced by the PIOs vis-a-vis their limited resources, it is advisable that such a link does not create too much dependency of the IAs on the PIOs. As the IAs progress towards independent status, the PIOs can gradually reduce their presence until they reach a mere coordinating and monitoring role. While still maintaining a good relationship with NIA, the IAs must also develop linkages with other government and private sector institutions which can provide other sources of assistance like credit, training and extension. The PIOs, however, should still keep tract of the status and activities of the IAs. This will enable the PIOs to continuously assess IAs' weakness, strength and potential and then provide appropriate assistance.

8.31 Role and Responsibilities of Irrigation Development Officer (IDO)

The Irrigation Development Officer (IDO) plays a key role in so far as the relationship between the PIOs and IAs is concerned. In line with the basic strategies discussed above, it is necessary to avoid over-dependency of IAs on IDO. As opportunity arises, IDO must encourage the IAs to handle a bigger share of the task or responsibility of any given project activity.

8.32 In the long-run, when the limited number of IDOs shall constrain the establishment and capability-building of IAs, NIA should train Farmer Irrigators Organizers (FIOs) for assignment in the CISs/CIPs. The FIOs shall come from among the farmer-irrigators themselves and shall assume the major responsibilities of the IDOs. The FIO concept has already been pilot-tested in national irrigation systems and has shown good potential for replication in the CISs/CIPs with some possible modifications to suit the unique requirements of communal irrigation development. Likewise, the activities of the Irrigation Technicians (ITs) who are much more limited in number (one IT is to one province) must be well coordinated with the IDOs and FIOs so that maximum extent of services could be generated for the IAs.