

## CHAPTER III.

### IMPLEMENTED SURVEY CONTENTS AND METHODS DURING THE STAGE-I AND STAGE-II STUDIES



CHAPTER III. IMPLEMENTED SURVEY CONTENTS AND METHODS DURING THE STAGE-I AND STAGE-II STUDIES

The Study was carried out with two stages, Stage-1 and Stage-II, of which major activities are described below.

3.1 Stage-I Study

3.1.1 Preparation Works of the Inventory Survey

1) Selection of Pilot NIS Areas

Major objectives of the Phase-1 Study were to formulate the preliminary inventory survey formats through field works and necessary data collection at Pilot NIS Areas among 195 NISs. As the Pilot NIS Areas, following three areas were selected in consultation with NIS staff concerned.

- a) AMRIS (Working Station-2) (Region-III)
- b) Sta. Cruz RIS (Region-IV)
- c) Aganan RIS (Region-VI)

In selection of the three Pilot NIS Areas, following factors were taken into consideration..

- Regional classification of the Philippines, such as Luzon, Visayas, and Mindanao
- Climate type of the Philippines and fluctuation of available irrigation water resources during dry and wet seasons
- Present conditions of major irrigation facilities such as diversion dams and main/lateral canals, and the scale of service areas
- Location of RIO and NISO
- Progress of IMT and IA activities
- Discussion results of NIA-SMD and their preference

Following table indicates prevailing conditions of each Pilot NIS Area from a view point of above factors. Table 3-1 indicates the major features of the selected three Pilot Areas.

Prevailing Conditions of the Selected Pilot NIS Areas

Items	AMRIS	Sta. Cruz RIS	Aganan RIS
Regional Classification	Luzon	Luzon	Visayas
Climate Type,	Type-1	Type-1	Type-1
Average River Runoff (m <sup>3</sup> /sec)	Qd= 33.09, Qw=38.63	Qd=4.58, Qw=4.42	Qd=2.55, Qw=0.91
Watershed Area (km <sup>2</sup> )	309	103	104
Irrigation Facility Conditions	Damaged downstream apron	Severely scored downstream apron	Direct inflow of sediment materials to the irrigation system
Scale of FUSA (ha)	2,175	2,184	4,467
Location of RIO and NISO	Same compound	Same compound	5 km away
Progress of IMT (ha)	○	—	—
IA Activities	Active	Not very active	Active
NIA-SMD Suggestion	○	○	○

Qd : Average river discharge during dry season  
 Qw: Average river discharge during wet season

Table 3-1 Major Features of the Selected Three Pilot NIS Areas for the Inventory Survey

Items	AMRIS (Working Station: II)	Sta. Cruz RIS	Aganan RIS
1. Location			
1.1 Region	III (Bulacan), Tambubong, San Rafael, Bulacan	IV (Laguna), Region IV, Pila, Laguna	VI (Iloilo), Tacas Jaro, Iloilo City
1.2 Climate Type (Annual Rainfall)	Type-1 2,674 mm (1961-1982)	Type-1 1,861 mm (1961-1986)	Type-1 1,686 mm (1958-1983)
2. Irrigation System			
2.1 Official Opening of System	1925	1958	1925
2.2 Improvement History of Main Facilities	Improved by Japan Grant Aid Program (1998)	No Improved	Improved by Japan Grant Aid Program (1998)
3. Present Main Facility Conditions 1/			
3.1 Diversion Dam	Well-Managed	Severely Damaged	Poorly-Maintained
3.2 Main & Lateral Canal	Normally-Maintained	Normally-Maintained	Normally-Maintained
4. Irrigation Water Resource			
4.1 River Name	Angat River	Sta. Cruz River	Aganan River
4.2 Water Resources	Bustos Diversion Dam (Rubber)	Sta. Cruz Diversion Dam (Ogee)	Agana Diversion Dam (Ogee)
5. Irrigation Service Area and Main Crop			
5.1 Designed Service Area	Area of Working Station II: 2,231 ha (31,485 ha) 2/	4,133 ha	5,500 ha
5.2 Firmed-up Service Area	2,175 ha (26,791 ha) 2/	2,184 ha	4,467 ha
5.3 Main Crops			
Wet Season	Paddy	Paddy	Paddy
Dry Season	Paddy	Paddy	Paddy
5.4 Average Farm Size	1.6 ha/house hold	1.1 ha/house hold	2.0 ha/house hold
6. Irrigators Association	8 IA (95 IA) 2/	4 IA	7 IA

- 1/ : Well-Managed : presenting in the ranges more than 80 percent of the original functionality  
 Poorly maintained : presenting in the ranges less than 50 percent of the original functionality  
 Severely damaged : presenting serious situations of facilities with critical deterioration through loss of function  
 2/ : Figures in parentheses show the whole service areas in AMRIS.

## 2) Preparation and Examination of Inventory Survey Format

### a) Major Survey Items proposed in the Inventory Survey

Main objectives of the Inventory Survey were to formulate adequate maintenance, rehabilitation and improvement (MRI) plans of NISs, in order to cope with the following requirements, i) effective realization of project benefits with limited investments for the MRI works considering severe financial conditions of NIA, ii) sustainable irrigation management to secure the targeted irrigation service areas, iii) reasonable and transparent selection and implementation of NISs for MRI works, etc., from technical points of view.

For formulation of a MRI plan for NISs, first of all, one of the important information of the Inventory Survey was that of water resources consisting of both water availability at diversion dam sites, irrigation water requirement up to the on-farm level, and facility functionality of diversion dams, main/lateral irrigation canals. However, in order to expect safe and effective operation of NISs, additional information and data on floods at the diversion dam sites, O&M organization and activities related to the NISs would be also needed. Therefore, major subjects to be involved in the Inventory Survey are primarily proposed as shown below.

- Water resources and irrigation water use information
- Flood and drainage information
- Facility functionality information
- O&M organizations and their activity information

### b) Preparation of Contents and Formats of the Inventory Survey

Preliminary inventory survey formats were prepared through a field survey and data collection at the selected three Pilot Areas, and also through discussions with NIA and related agencies, considering the relationship with various inventory surveys currently undertaken by NIA. Applied software for the proposed Inventory Survey is MS Excel, which is popular and familiar with regional level staff.

In preparation of the formats, due considerations on the following matters were paid; i) inventory format should be as simple as possible to expect a sustainable Inventory Survey, and ii) necessity of a new Inventory Survey for NISs should be fully recognized by NIA staff.

Major contents of the proposed Inventory Survey are itemized as shown below;

#### I. General Information

- Name and Location of the Irrigation System
- Official Opening of the System
- Source of Water Supply and its Water Right
- Design Service Areas, Firm-up Service Area,
- Town Served
- Number of Landowners, Farm Households, and Average Farm Size
- Irrigation Facilities
- Main Crops
- No. of Organized IA and Their Activities

## II. Water Resources and Irrigation Requirement Information

- 2.1 Available Water Resources
- 2.2 Irrigation Water Requirement
- 2.3 Farm Management Conditions
- 2.4 Balance of Available Water Resources and Irrigation Water Requirement in Average Year
- 2.5 Evaluation of Water Use

## III. Flood and Drainage Information

- 3.1 Flood Information
- 3.2 Drainage Information
- 3.3 Evaluation of Flood and Drainage Conditions

## IV. Functionality Information on Irrigation and Drainage Facilities

### 4.1 Diversion Dam

- Dimension Survey
- Facility Functional Survey
- Present Structural Situation of Spill Way
- Present Structural Situation of Sluice Way
- Present Structural Situation of Protection Dike and Sidewall
- Present Structural Situation of Fish Ladder
- Present Structural Situation of Intake
- Present Structural Situation of Sediment Settling Basin

### 4.2 Canal

- Dimension and Facility Functional Survey
- Present Structural Situation of Main Canal
- Present Structural Situation of Lateral A and Sub-Lateral A
- Present Structural Situation of Lateral B and Sub-Lateral B
- Present Structural Situation of Lateral C and Sub-Lateral C
- Present Structural Situation of Lateral C and Sub-Lateral D

## V. Organizations and O&M Information

### 5.1 NISO Information on Management and Facility

- Organization
- Facility and Equipment Conditions

### 5.2 NISO Information on O&M Status of Irrigation Facilities

- Maintenance
- On-Farm Water Management Information
- Last 5-Year Records of Program of Works (PoWs)
- Collaboration with Other Agencies

The details of the preliminary inventory formats formulated are given in Form IS-1.

## c) Basic Plan for Formulating the Sector-Wised Inventory Survey Format

### (1) Water Resources, Irrigation Water Use and Flood and Drainage Information

In order to analyze and identify the water balance conditions in the NIS irrigation system considering available water resources from river catchment areas at diversion dam sites, diverted intake irrigation water, and required irrigation water demand on a basis of cropping patterns, following data and information were collected.

### Water Resources

- Monthly average river discharge records at diversion dam sites
- Monthly average river discharge records at an adjacent station in other catchment areas (in case no discharge records are available at any diversion dam site)
- Monthly average diverted discharge records
- Monthly rainfall records (near the service area)
- Monthly rainfall records in drainage areas /diversion dam sites

### Irrigation Water Requirement

- Firm-up service areas, program areas, irrigated areas and benefited areas
- Irrigation parameter for land soaking (L/S) and land preparation (L/P)
- Monthly average irrigation water requirement
- Maximum unit land soaking irrigation water requirement
- Water shortage area, location, and its damages
- Utilization condition of return flow (re-use)

### Farm Management Conditions

- Present typical cropping patterns of paddies
- Introduction of water saving technologies and an introduction period during dry season

### Balance of Available Water Resources and Irrigation Water Requirement

- Comparison of river discharge, diverted intake discharge and irrigation diversion requirement

### Evaluation of Water Use

- Conditions and problems of irrigation water use
- Countermeasures to solve the problems

In addition to the water resources and irrigation information mentioned above, following data and information on flood and drainage were also collected to analyze the flood and drainage conditions in the systems.

### Flood Conditions

- Past peak flood discharge and maximum daily rainfall
- Design flood discharge

### Drainage Conditions

- Inundation areas by lateral bases
- Inundation damages
- Reasons of inundation occurrence

### Evaluation of Flood and Drainage

- Conditions and problems of flood and drainage
- Countermeasures to solve the problems

## (2) Functionality Information on Irrigation, and Drainage Facilities

### (a) Function and Operation Conditions of Main Facilities

#### Diversion Dams

- Effective utilization of the formulated inventory undertaken through the JICA Short-Term Expert Program in 2004

Pumping Stations

- Major dimensions of pumping station (year constructed, pump type, design pump discharge, design head, design output)
- Improvement records (date, contents, costs), O&M costs
- Pump operation record (total operation hours in 2004, maximum and minimum monthly operation hours), fuel consumption in 2004
- Damaged extent of pumping station

(b) Function and Damaged Extent of Canals and Related Facilities

Main and Lateral Canals (surveyed at Each Main and Lateral Canal)

- Major dimensions of canals (year constructed, canal length and design discharge, canal type, canal design gradient)
- Improvement records (date, contents, costs), O&M costs
- Damaged extent of main and lateral canals, and sediment conditions

Related Facilities

- Major dimensions of head gate and check gate (gate types and number, and gate sizes)
- Major dimensions of drop (sizes and number)
- Major dimensions of siphon (sizes and number)
- Major dimensions of aqueduct (sizes and number)
- Major dimensions of bridge (sizes and number)
- Major dimensions of drainage crossing (sizes and number)
- Improvement records (date, contents, costs), O&M costs
- Damaged extent of related facilities

(3) Organizations and O&M Information

The purpose of this part is to collect information on organizations and O&M conditions. The organizational information covers information on NISO and other organizations. On the other hand, an Excel file of this field consists of seven sheets, three main sheets, two supporting sheets and two sample sheets for summarizing Program of Works (PoWs). Their relationship is described as shown below.

Contents of Organizations and O&M Information

Chapter	Excel Sheet		
	Main Sheet	Supporting Sheet	Sample Sheet
5.1 Organization			
5.1 A. NISO	5.(1) for NISO		
5.1 B. NIS	5.(2) for NIS Org		
5.1 C. IA		5. IA	
5.1 D. LGU			
5.2 O&M Status of Irrigation Facility			
5.2 A. Past Records	5.(3) for NIS O&M	5. PoW Summary	5. PoW Sample 1 PoW
5.2 B. Maintenance			5. PoW Sample 2 Summary
5.2 C. On-Farm Water Management Information			

This Inventory Survey focuses on physical information mainly for every NIS. Nevertheless O&M of each NIS is carried out by NISOs, so that even if a NISO is managing several NISs, there is inseparable information as a NISO. Therefore, information on NISO is collected first, and next information on NIS. There are 111 NISOs for 205 NISs nationwide, and one NISO is managing about two NISs mathematically. However, some NISOs are managing many NISs, headed by Cavite Friar Lands RIS's 15 NISs. The mega systems of MRIIS and UPRIS are in the same status with that of Regional Offices, whereas the four District Offices under them are in the same status with that of NISO.

More than 2,200 IAs are organized for about 690,000 ha of nationwide NISs. As it is explained above, the main target of this inventory is information at the NIS's level. It is not practical to collect and analyze detailed data of all IAs. Therefore, basic information on IAs in each NIS is collected on the supporting Excel sheet and summarized on the main format.

Financial information is one of the pillars in the O&M information to overview the available financial sources for maintenance and repair work. However, there is no appropriate statistics, which shows how much they actually spend for what kind of works, so such information shall be collected through this Inventory Survey, based on PoWs.

### 3.1.2 Holding of a Workshop Seminar

Prior to the workshop seminar held on November 22, 2005, a joint meeting between the Study Team and related NIA officials from SMD and PDD was held on November 18, 2005, aiming at preliminary explanation and discussion on the formulated inventory survey formats.

Following the joint meeting, the Study Team in collaboration with NIA-SMD and PDD staff held another workshop seminar to explain and discuss the objectives, contents, survey procedures, compilation of collected data on the Inventory Survey for 195 NISs, especially on formulated inventory survey formats, with attendance of the related government agencies such as DA and DENR-FMB. The date and venue of the workshop seminars were 10:00 am on November 22, 2005 at the NIA-DCIEC Conference Room (3rd floor).

The major contents of the workshop seminar were as follows.

- Introduction of the Study Team
- Presentation of the objectives and output of the Study using a projector
- Presentation of the inventory survey formats preliminarily formulated
- Replies and discussions on questions/reaction/comments/suggestions on the presentation and other related discussions

At the explanation and discussion seminar, the Study Team handed out the following data to the each RIO representative for requesting them to carry out the Inventory Survey in their regions by the end of March 2006.

- Sampled data of the actual Inventory Survey at Aganan RIS in Region VI
- Inventory survey formats preliminarily formulated
- Description guidelines for the NIS Inventory Survey



- Floppy diskette for storing above data indicating contents

Following questions, comments, suggestions, etc. against the presentation on the Inventory Survey were raised by attendances.

- Confirmation to undertake the Inventory Survey for 195 NISs with NIA responsibility
- JICA financial assistance to undertake the Inventory Survey
- Confirmation of whereabouts of JICA Short-Term Expert Inventory Survey data
- Severe inventory survey periods of four month (December 2005 to March 2006) in the case that Region IV has 15 NISs under one NISO
- Adequate time of a year for implementation of proposed Inventory Survey considering the working schedule of NISO staff routine works
- Inventory survey procedures in the case that several diversion dams exist
- Confirmation of technical terms such as "dam", "diversion dam", "fixed type" and "gate type"

### 3.1.3 Implementation of the Inventory Survey

After the first field works during the Phase I Study, NIA implemented the Inventory Survey for 205 NISs by means of NIA responsibility during December 2005 to March 2006. Actual undertakings of the Inventory Survey have been done by the National Irrigation System Office (NISO) in collaboration with the related IA in each Region, under assistances of NIA Central Office, especially NIA-SMD and PDD, and Regional Irrigation Office (RIO).

Followings give the contents of the Inventory Survey;

- Part-I : General Information
- Part-II : Water Resources and Irrigation Water Requirement Information
- Part-III : Flood and Drainage Information
- Part-IV : Functionality Information on Irrigation and Drainage Facilities
- Part-V : Organizations and O&M Information

Accomplishment rates of the inventory survey by the end of March 2006 and the beginning of May 2006, which correspond to the targeted closing date on the Inventory Survey and starting date of the Phase II Study respectively, are summarized as follows.

Accomplishment Rates of the Inventory Survey

Part	By the End of March, 2006			By the Beginning of May, 2006		
	Target	Actual	(%)	Target	Actual	(%)
I	195	163	84	195	176	90
II	195	110	56	195	174	89
III	195	71	36	195	166	85
IV	195	67	34	195	165	85
V	195	111	57	195	165	85
Ave.	195		53	195		87

As a sample of the actual Inventory Survey, Aganan data are attached in Table A2-1 in Appendices in Manual.

## 3.2 Stage-II Study

### 3.2.1 Tabulation of the Data on the Implemented Inventory Survey

The obtained data of the Inventory Survey classified into five Parts were tabulated in terms of following three major subjects to precede the forwarding analysis and evaluation studies on the irrigation systems. Detailed descriptions of the tabulation concerned are given in paragraph of "2.3.1 Tabulation of Inventory Survey Data" in Manual.

- Water resources, irrigation water use and flood and drainage information
- Functionality information on irrigation and drainage facilities
- Organizations and operation and maintenance (O&M) information

#### 1) Water Resources, Irrigation Water Use and Flood and Drainage Information

Following subjects are itemized in the sectors of information on water resources, irrigation water use and floods and drainage.

- Water Resources for Irrigation
  - Annual rainfall (mm)
  - Average runoff discharge (m<sup>3</sup>/sec)
  - Annual diverted intake discharge (m<sup>3</sup>/sec)
- Irrigation Area and Cropping Intensity
  - Firmed-up service area (ha)
  - Irrigated area (ha)
  - Main crop
  - Cropping intensity (%)
  - Average irrigation water requirement (m<sup>3</sup>/sec), (lit/sec/ha)
- Damaged Area
  - Irrigation damage due to water shortage (ha)
  - Drainage damages due to poor drainage and flood (ha)
- Average Benefited Area and Crop Yield
  - Benefited area (ha)
  - Crop yield (ton/ha)
- Evaluation of Irrigation and Drainage Conditions
  - Present conditions and problems
  - Countermeasures to solve the problems

#### 2) Functionality Information on Irrigation and Drainage Facilities

Following subjects are itemized in the sectors of functionality information on irrigation and drainage facilities.

- Form TB-2 (1): Tabulation of the Inventory Survey Results for the Sector of Functionality of Irrigation and Drainage Facilities (General Information and Dimension of Diversion Dam)
  - Names of diversion dams
  - Service areas (ha)

- Intake discharge ( $\text{m}^3/\text{sec}$ )
  - Flood discharge ( $\text{m}^3/\text{sec}$ )
  - Diversion dams: width (m), height (m)
  - Spillway: width (m), height (m), length (m)
  - Sluice way: width (m), height (m), no. (set)
  - Intake: width (m), height (m), no. (set)
  - Protection dikes: length (m), height (m)
  - Protection sidewalls: length (m), height (m)
- Form TB-2 (2): Tabulation of Inventory Survey Results for Sector of Functionality of Irrigation and Drainage Facilities (General Information and Dimension of Pumping Station)
    - Names of pumping stations
    - Service areas (ha)
    - Total discharge ( $\text{m}^3/\text{sec}$ )
    - Flood discharge ( $\text{m}^3/\text{sec}$ )
    - Intake gates: width (m), height (m), no. (set)
    - Suctioned sump: length (m), height (m), width (m)
    - Pump: head (m),  $q$  ( $\text{m}^3/\text{sec}$ ), no. (set)
    - Discharge sump: length (m), height (m), width (m), no. (row)
    - Slope protection: length (m), height (m)
    - Pump house: length (m), height (m), width (m), no. (nos)
- Form TB-2 (3): Tabulation of the Inventory Survey Results for the Sector of Functionality of Irrigation and Drainage Facilities (General Information and Dimension of Canal)
    - Names of water sources
    - Main canals: irrigation service area (ha), discharge ( $\text{m}^3/\text{sec}$ ), length (m), width (m), height (m)
    - Lateral canals: irrigation service area (ha), discharge ( $\text{m}^3/\text{sec}$ ), length (m), width (m), height (m)
- Form TB-3 (1): Tabulation of Present Functionality of Irrigation and Drainage Facilities (Diversion Dams)
    - Names of diversion dams
    - Weir, spillway piers, spillway gates: damaged, rust leak
    - D/s apron, d/s riverbed protection: damaged, scoured
    - Sluice ways, sluice way piers, sluice way gates: damaged, leak, sediment, rust
    - Protection dikes, protection sidewalls: washed, scoured, damaged, leak
    - Intake, intake gates: damaged, leak, sediment, rust
- Form TB-3 (2): Tabulation of Present Functionality of Irrigation and Drainage Facilities (Pumping Station)
    - Name of a pumping station
    - Intake gates: rust, damaged, leak
    - Suction sump: damaged, leak, sediment, scoured
    - Pump: rust, damaged, leak, function
    - Discharge sump: damaged, leak, sediment, scoured
    - Slope protection: damaged, leak, sediment, scoured
    - Pump house: damaged, leak
- Form TB-3 (3): Tabulation of Present Functionality of Irrigation and Drainage Facilities (Canal)
    - Names of main canals
    - Main canals: damaged, leak, sediment, related structure
    - Lateral canals: damaged, leak, sediment, related structure

### 3) Organizations and Operation and Maintenance (O&M) Information

The Inventory Survey data of Part-V are tabulated under the title of "Organizations and Operation and Maintenance". Form TB-5 indicates the tabulation format for this part, and an actual table is attached in Table A 2-7 in Appendices as references. Major tabulation items are listed below;

RC (NISO)/ NIS	Item	Major Contents
RC (NISO)	Management Information	FUSA, No. of personnel, viability index, expenses & income, Program of Works (PoWs)
	Maintenance Information	Status of maintenance activities such as utilization of manuals, maintenance of intake and other facilities
NIS	Management Record	FUSA, IMT area, cropping intensity, yield, irrigation service fee (ISF) collection efficiency
	IA	Debt, coverage area, average size, membership rate, functionality survey results

#### 3.2.2 Evaluation of Implemented Data

Data collected through the Inventory Survey were evaluated for each part and ranked in four grades from A to D according to the quality and quantity of data. Definition of each class is;

Class	Definition
A	Almost complete data sets
B	Incomplete but still useful data sets
C	Not useful for prioritization due to lack of most data or important information
D	Not submitted

The result is summarized in the table below. When a certain NIS marks only A and B for all parts, it is ranked in A or B as the overall NIS. Ninety-nine (99) NISs, about a half (48 %) of all NISs, are classified as A or B and selected as targets for prioritization. Looking at the sub-total for each part, the number of NISs in the part of I to III is the smallest. That is to say, the data on water resource information is the hardest to collect compared with other parts. The overall result is tabulated as Appendix TA-2.

Classification		Part			
		I to III	IV	V	NIS
Score	A	63	49	77	52
	B	55	80	95	47
	Sub-total	118	129	172	99
	C	47	54	4	61
	D	40	22	29	45
	Total	205	205	205	205
Ratio	A	31	24	38	25
	B	27	39	46	23
	Sub-total	58	63	84	48
	C	23	26	2	30
	D	20	11	14	22
	Total	100	100	100	100

### 3.2.3 Identification of Problems for Inventory Survey Contents

#### 1) Questionnaire Survey

In order to clarify the problems on contents and procedures of the Inventory Survey, a questionnaire survey was conducted. The questionnaire was distributed to each Regional Office addressed to its O&M chief. The result is summarized in the table below, while the overall results are tabulated in Appendix TA-3. TA-4, TA-5 and the questionnaire is put as Appendix TA-6.

#### Outline of Questionnaire Survey

Item	Major Answers
<b>I. General</b>	
Regional Level	- Regional offices took most of the necessary steps, though there was not enough time to clarify data from the field offices.
RC (NISO) Level	- It took time for the survey in RCs mostly due to lack of manpower and budget, dispersion of records and unfamiliarity of data. Especially it was difficult to collect hydro-meteorological the data. - The person who instructed data compilation and the person who compiled the data were not always the same, which caused confusion of the data. - Major expenditures for the survey were fuel for transportation and office supplies such as inks for a printer, papers and CDs.
Timing	- Preferable months for the Inventory Survey were January to April and July to August. - As for the frequency of the survey, most officers chose once/ 2 years rather than every year due to few changes of facilities and heavy workloads.
<b>II. Quality of Data</b>	
Common	- Reasons for data incompleteness were lack of facilities & manpower for observation, dispersion of records, financial constraints, incomplete instruction to personnel and NISO's low priority.
Water Resource	- Most of observation facilities are malfunctioning and manpower for observation is insufficient. - Discharge management is mostly based on experiences and all current flow of a river is diverted during dry season.
Facility	- RCs did not have enough time and manpower to collect appropriate data and they are also dispersed or not recorded. - Data were not encoded correctly due to misunderstanding and incomplete instruction.
Organization	- It was found that some information were not compiled in NIS base but NISO base and different RCs had different ways of data compilation.
<b>III. Others (Comments)</b>	- The activity should be well-financed. - Excel worksheet should provide for unique situations in NIS/NISO e.g. water distribution scheme of NIS with multiple source of water supply affecting the water requirement calculations. - Personnel should be hired. - Official implementation through memo circular - CO staff should go to RIOS. - The format should be more simplified - Old records could hardly found. - CO should prepare a policy guidelines including penalties/ sanction for non-compliance.

## 2) Water Resources, Irrigation Water Use and Drainage Information

In the courses of the Phase-II Study, some items of the inventory survey contents in terms of “General, Water Resources and Irrigation Water Requirement” were modified, and their details are summarized in Table 3-2.

## 3) Functionality Information on Irrigation and Drainage Facilities

### a) Evaluation of NIS Inventory Survey Date

Data on the NIS inventory survey were collected from 183 NISs (89 % of 205 NISs). The evaluation results of these data are shown in the following table.

Evaluation Data on the NIS Inventory Survey for Irrigation and Drainage Facilities

Evaluation	Diversion Dam		Pumping Station		Canal		Overall	
	No.	%	No.	%	No.	%	No.	%
A: Very good	70	36	3	18	103	50	49	24
B: Good	62	32	8	47	65	32	80	39
C: Not good	42	21	6	35	15	7	54	26
D: Not submitted	22	11	0	0	22	11	22	11
Total	196	100	17	100	205	100	205	100

### b) Identification of Problems

The problems and issues of the survey contents and procedures in the sector of functionality information on irrigation and drainage facilities are itemized as follows.

- The rate of collected data is 89 percent in the 183 NISs, which were analyzed. Some important items are included in the unanswered items. Therefore, the analysis and evaluation on the implemented NIS Inventory Survey are obstructed.
- The collected survey data for diversion dams include inventory survey data undertaken through the NIS irrigation facility survey made by the JICA Short-Term Expert Program in 2004. These collected data were not put in the present NIS inventory format. Therefore, the analysis and evaluation on the implemented NIS Inventory Survey are obstructed.
- While many incomplete and unclear data are included two, analysis and evaluation on the implemented NIS Inventory Survey are also obstructed.

## 4) Organization and Operation and Maintenance Information

Problems identified for the inventory format in the sector of organizations and O&M are itemized as below.

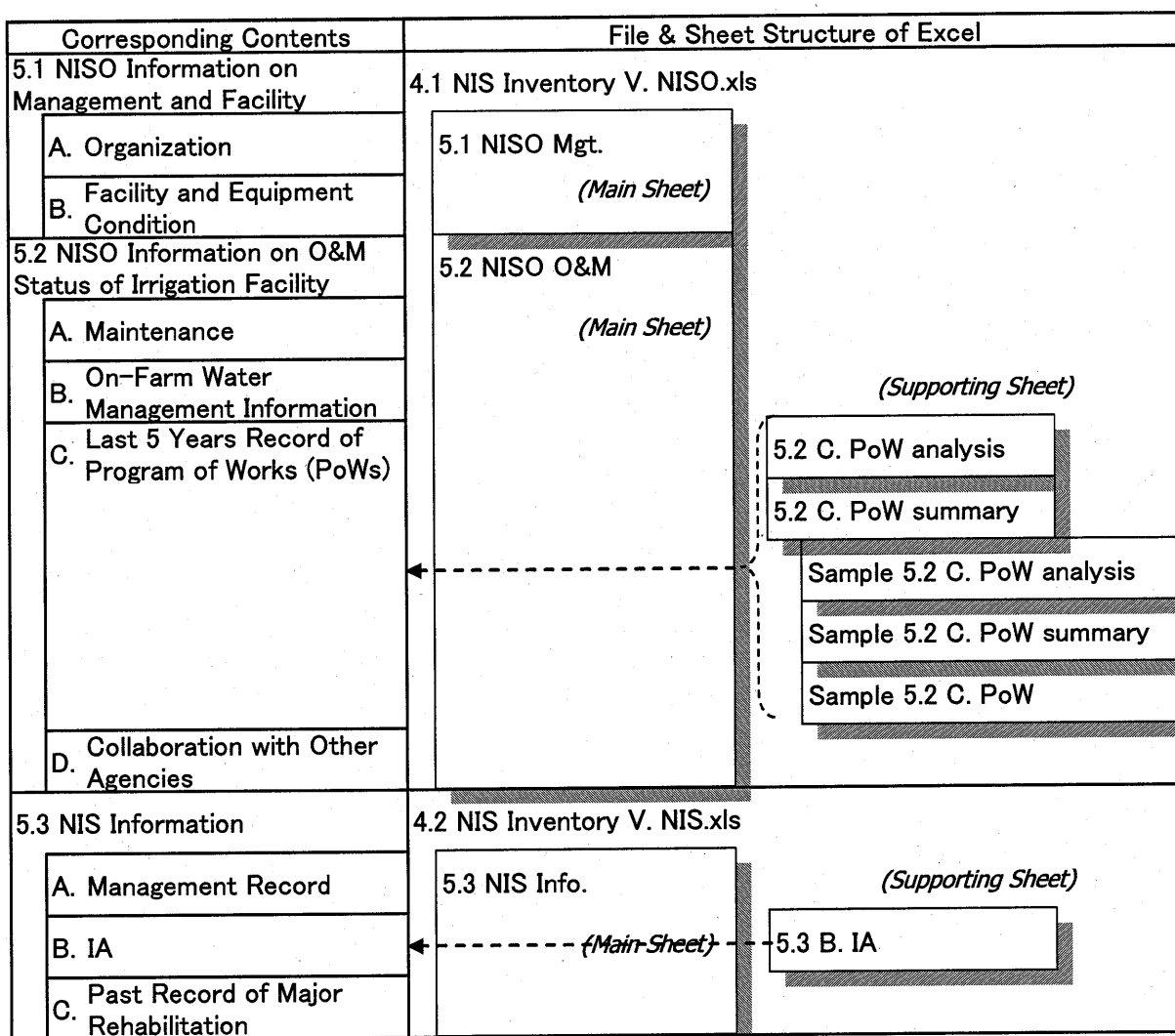
- The first problem is that information of NISO and NIS might not have been clearly differentiated. About 40 percent of 106 NISOs in the nation manages 70 percent of 195 systems (remaining offices manage only one system). The maximum number is 15 for a single NISO, and such NISOs may not have detailed information on every system. And NISOs may not be able to understand the aim of the Study Team, because information of both NISO and NIS are included in only a single digital data.

Table 3-2 Comparison of Survey Items between Original and Modified Formats in Terms of General, Water Resources and Irrigation Water Requirements

Information	Original Format	Modified Format
I. General Information	13. Main Crops and Cropping Intensity	13. Main Crops
II. Water Resources and Irrigation Requirement Information	2.1 Available Water Resources (4) Annual Rainfall : Catchment Area Service Area (5) Available Runoff Discharge Records at Div. Site (6) Average Runoff Discharge at Diversion Site (7) Average Diverted Discharge (Actual Observation Records)	2.1 Available Water Resources (4) Average River Discharge at Diversion Site (5) Average Diverted Intake Discharge (6) Total Rainfall : Service Area Drainage Area
	2.2 Irrigation Water Requirement (IWR) (4) Irrigation Parameters for LS/LP Soil Type Soil Saturation (Sn) Percolation (P) Evaporation (E) Evapo-Transpiration (Et) (5) Average Monthly Irrigation Water Requirement (IWR) Losses (Farm Waste and Delivery Loss) Losses (Canal Conveyance Loss) Effective Rainfall  (6) Max. Monthly Irrigation Water Requirement  (7) Max. Unit Irrigation Water Requirement (8) Designed Irrigation Water Requirement (9) Area and Percentage of Water Shortage (10) Location of Water Shortage Occurrence in Dry Season (11) Damaged Amounts by Water Shortage (12) Reasons of Water Shortage (13) Utilization Conditions of Return Flow (Re-Use)	2.2 Irrigation Water Requirement (IWR) (4) Irrigation Parameters for LS/LP Soil Type Percolation (P) Evaporation (Et) Evapo-Transpiration (Et)  (5) Average Monthly Irrigation Water Requirement (IWR) 1/ Crop Water Requirement (CWR) (W/O Effe. Rainfall) Turn-out Water Duty (qtni) (W/O Effective Rainfall) Irrigation Diversion Requirement (IDR)  1/ derived from newly formulated "Operation and Maintenance Plan", and Summary Table of water Resources and Irrigation Requirement was eliminated.  (6) Max. Unit Land Soaking Irrigation Requirement (qtsi)  (7) Location and Percentage of Water Shortage (8) Location of Water Shortage Occurrence in Dry Season (9) Damaged Amounts by Water Shortage (10) Reasons of Water Shortage (11) Utilization Conditions of Return Flow (Re-Use)
	2.3 Farm Management Conditions (1) Present Cropping Pattern	2.3 Farm Management Conditions (1) Present Cropping Pattern and Irrigated Area
	2.4 Balance of Available Water Resources and Irrigation Water Requirement in Average Year and CY Average River Runoff Discharge (ARRD) (1/2) Average River Runoff Discharge (ARRD) (1/3) Average Diverted Intake Discharge (ADID) Irrigation Water Requirement in CY (IWR)	2.4 Balance of Available Water Resources and Irrigation Water Requirement in Average Year Average River Discharge (RD) Average Diverted Intake Discharge (DID) Average Irrigation Diversion Requirement (IDR) 1/  1/ : derived from "Operation and Maintenance Plan"
III. Flood and Drainage Information	3.1 Flood Information (3) Past 10-Year Peak Flood Discharge, Daily Rainfall and Date at Diversion Dam Site	3.1 Flood Information (3) Peak Flood Discharge for Past 10-Year
Attached Data	Table-1 Monthly Rainfall Records (in Drainage Area/ Diversion Dam Site) (mm/month) Table-2 Monthly Rainfall Records (near Service Area) (mm/month) Table-3 Monthly Effective Rainfall (mm/month) Table-4 Monthly Average Discharge Records (at Diversion Site) (m <sup>3</sup> /sec) Table-5 Monthly Average Discharge Records (at Adjacent Station on Other Drainage Area Table-6 Monthly Average Intake Discharge Records (m <sup>3</sup> /sec) Table-7 Irrigated and Benefited Areas (ha)	Table 2-1 Monthly Average River Discharge Records (at Diversion Site) (m <sup>3</sup> /sec) Table 2-2 Monthly Average River Discharge Records (m <sup>3</sup> /sec) (at Adjacent Station in Other Drainage Area) (Tabulated in Case Data in Table 2-1 are not Available) Table 2-3 Monthly Average Diverted Intake Discharge Records (lit/sec) Table 2-4 Monthly Rainfall Records (near Service Area) (mm/month) Table 2-5 Monthly rainfall Records (in Drainage Area/ Diversion Site) (tabulated in Case Data in Table 2-4 are not Available) (mm/month) Table 2-6 Firm-up Service Area, Program Areas, Irrigated and Benefited Areas Figure 2-1 Typical Cropping Pattern of Paddy  The data in Table 2-1 to Table 2-6 are made up by seasons (dry, wet and annual)

- Secondly, it is important to confirm that when a NISO is concurrent with PIO, how the total input is allocated for each function. In case a NISO functions as a PIO at the same time, it also supports CISs in the province. As the support requires a large input, that should be considered, when the O&M capacity is evaluated for each NISO.
- Because some NISOs and NISs are different in the list of the Study Team and in the list of NIA, all NISOs and NISs, and their regions should be finalized through discussion with NIA.

In order to solve these problems, the structure of the format was rearranged. Information on office organization, equipment, maintenance activities, Program of Works (PoWs), etc. should be collected on a NISO basis, while information on area, IA, and past record of facility rehabilitation were collected on a NIS basis. In the same way, the Excel file was also rearranged. The revised format consists of two Excel files, and the file "4.1 NIS Inventory 5. NISO.xls" has seven sheets, while "4.2 NIS Inventory 5. NIS.xls" has two sheets. The relationship is described as the figure below.



As it was raised as a problem of the initial inventory format, when a NISO is managing several NISs, there is inseparable information as a NISO or it is very difficult for several NISOs to separate some sorts of information. Therefore, managerial information is collected as one NISO and physical information is collected as one NIS.



### 3.2.4 Finalization of the Inventory Survey Format

Based on the modified contents of the Inventory Survey mentioned above, Inventory Survey formats are finalized as indicated in the “2.1.1 Inventory Survey Format” in Manual.

### 3.2.5 Formulation of Planning Methodology of NISs Operation, Maintenance, Rehabilitation and Improvement (MRI) Works

#### 1) Water Resources and Irrigation Water Use

As the results of the Inventory Survey for all NISs, it was proved that the rates of NISs not conducting observation of the hydrological data (runoff discharges of river adjacent to the irrigation area and diverted intake discharges to the area) against all NIS is about 50 percent of the total number of NISs, as shown below. These situations cause various problems in terms of water management in the system, as indicated in Figure 3-1.

- NISs not conducting observation of river runoff discharges : 101 NISs
- NISs not conducting observation of diverted intake discharges : 97 NISs

Therefore, in the sector of water resources and irrigation water uses, following subjects are considered to be the minimum requirements in terms of operation and management of effective water utilization.

- Procedures for canal discharge measurement and water distribution
- Computerization of Operation Plan for water delivery schedule
- Estimation procedures for effective rainfall

#### 2) Irrigation and Drainage Facilities

##### a) Components of Maintenance, Rehabilitation and Improvement for Irrigation Facilities

##### (1) Maintenance Plan for Irrigation Facilities

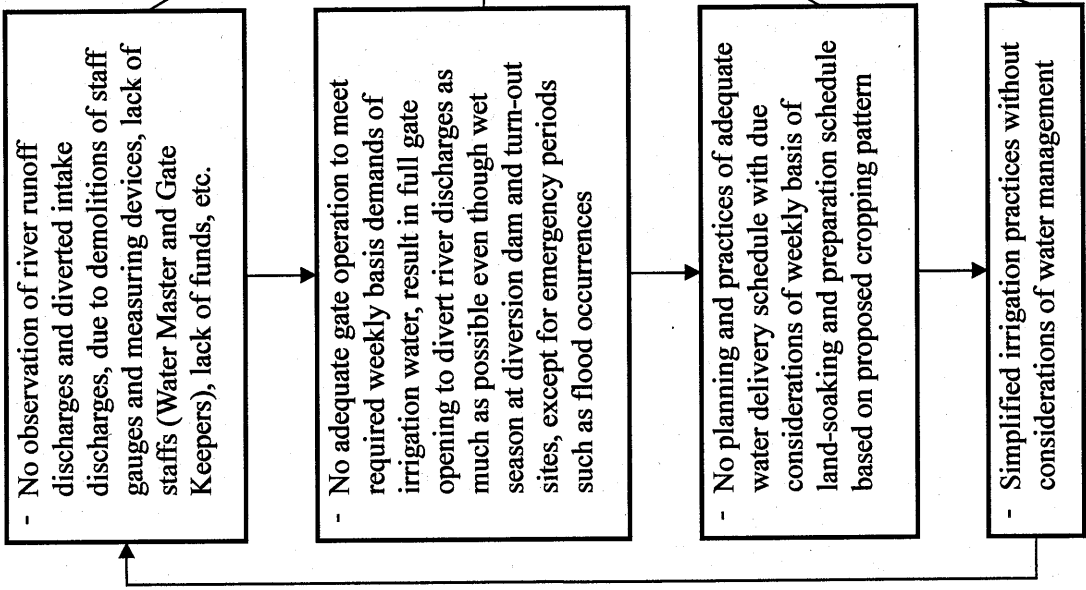
Maintenance works could be defined as normal and routine works for maintaining the function of the irrigation system. Based on NIS inventory survey results, the components of maintenance plans for NISs irrigation facilities are summarized as follows.

##### (a) Diversion Dam

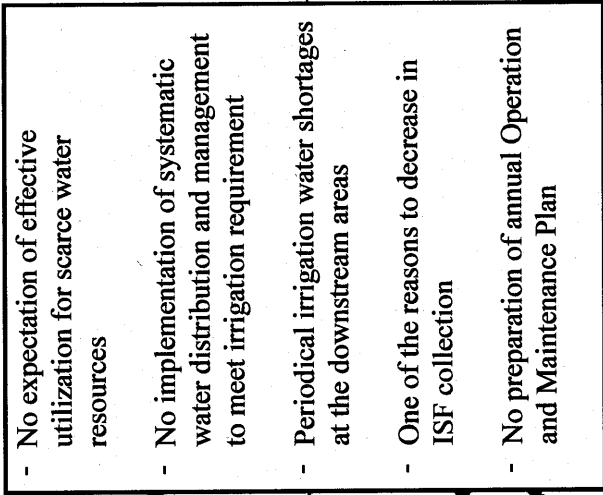
Work Item	Condition	Part of Facilities	Remarks
Repair	Damaged/Scoured	1) Concrete structure	- Patchwork
		2) Downstream riverbed protection	- Patchwork
		3) Protection dike	- Patchwork
		4) Protection sidewall	- Patchwork
		5) Gate	- Patchwork
Desilting/Flushing	Sediment	1) Sluice way	- Flushing by gate
		2) Intake	- Desilting/Flushing
Replace	Leak	1) Gate	- Replace seal rubber
Repainting	Rust	1) Gate	- Patchwork

Figure 3-1 Field Survey Results of Pilot NISs in the Sector of Water Resources and Irrigation Water Use

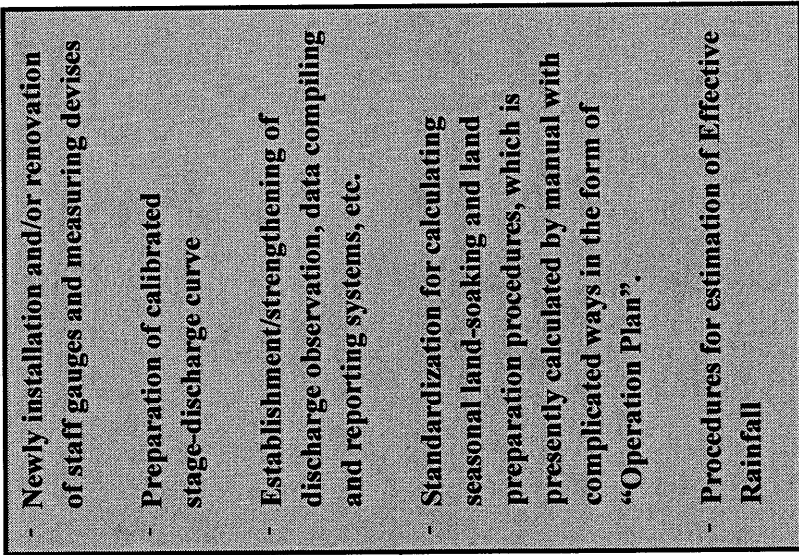
**Major Problems**



**Effects Caused**



**Countermeasures to be Taken**



(b) Pumping Station

Work Item	Condition	Part of Facilities	Remarks
Repair	Damaged/Scoured/Leak	1) Concrete structure	- Patchwork
		2) Pump	- Patchwork
		3) Slope protection	- Patchwork
		4) Pump house	- Patchwork
		5) Gate	- Patchwork
Desilting	Sediment	1) Suction sump	- Desilting/Flushing
		2) Discharge sump	- Desilting/Flushing
Repainting	Rust	1) Gate	- Patchwork
		2) Pump	- Patchwork

(c) Main and Lateral Canal

Work Item	Condition	Part of Facilities	Remarks
Repair	Damaged	1) Structures related with main and lateral canals	- Patchwork
		1) Main and lateral canal	- Patchwork
	Leak	2) Structures related with main and lateral canals	- Patchwork
Desilting	Sediment	1) Main and lateral canal	- Patchwork
		2) Structures related with main and lateral canals	- Patchwork
Repainting	Rust	1) Gate of related structure	- Patchwork

(2) Components of the Rehabilitation and Improvement Plan for the Irrigation Facilities

When the functionality of irrigation systems is devastated or lost, it should be restored at the same level of the original status by means of implementation of rehabilitation works. Under these systems, following conditions are observed, that is, decreasing in water resources for irrigation, increasing in sediments from the devastated catchment areas due to long pass of period after construction of facilities. In this case, as a rehabilitation policy, if the expected project effects could not be realized though rehabilitation works were implemented, scope of the works should be reduced considering an expected effect obtained though the works.

Improvement plans could be defined as reconstruction of the irrigation system to increase its efficiency. Scope of the improvement works is planned within the range of the same level with that of the original function. According to the NIS inventory survey results, components of the improvement plans for NISs irrigation facilities are as follows.

(a) Diversion Dams

Work Item	Condition	Part of Facilities	Remarks
Repair/Reconstruction Replace	Damaged/Scoured/Leak	1) Concrete structure	- Patchwork or whole work
		2) Downstream riverbed protection	- Patchwork or whole work
		3) Protection dike	- Patchwork
		4) Protection sidewall	- Patchwork
		5) Gate	- Patchwork or whole work
Improvement	Damaged/Scoured/Washed-away	1) Concrete structure	- Patchwork or whole work
		2) Downstream riverbed protection	- Patchwork or whole work
		3) Protection sidewall	- Patchwork or whole work
		4) Gate	- Replace

	Sediment	1) Sluice way	- Additional sluice way
		2) Intake	- Additional intake - Intake mouth
		3) Sand settling basin	- Additional sand settling basin
	Rust	1) Gates	- Whole work
Repainting/Replace	Rust	1) Gates	- Whole work

(b) Pumping Station

Work Item	Condition	Part of Facilities	Remarks
Repair	Damaged/Scoured/Leak	1) Concrete structures	- Patchwork
		2) Slope protection	- Patchwork
Improvement	Damaged/Scoured/Leak	1) Slope protection	- Patchwork or whole work
Desilting	Sediment	1) Suction sump	- Desilting by manual
Repainting	Rust	1) Gates	- Patchwork or whole work

(c) Main and Lateral Canal

Work Item	Condition	Part of Facilities	Remarks
Repair/Reconstruction	Damaged/Leak	1) Main and lateral canals	- Patchwork
		2) Related structures of main and lateral canals	- Patchwork
Improvement	Damaged/Leak	1) Main and lateral canals	- Patchwork
Desilting	Sediment	1) Main and lateral canals	- Patchwork
		2) Related structures of main and lateral canals	- Patchwork
Repainting/Replace	Rust	1) Gates of related structures	- Whole work

3) Organizations and Operation and Maintenance

Important and objective criteria to measure the capacity of organizations and O&M are tabulated in the table below, including national average of the Inventory Survey. Each NISO or NIS should analyze the management situation and capacity of their system through comparison with the national average figures, and plan the improvement measures.

Item	Unit	National Average	Problems/Conditions	Countermeasures
1) FUSA / Personnel 1. FUSA/Personnel	ha/ person	196	Actual number of staff is just a half of the approved number and IMT would be promoted further.	Because streamlining policy would be implemented in the future, further efforts for efficient execution of work are expected.
2) Viability Index and O&M Cost /FUSA 2. Viability Index 3. Operation Cost /FUSA 4. Income/FUSA	Peso/ha  Peso/ha	1.10 1,125 1,221	Viability Index (V.I.) is calculated dividing income by expenditure. When V.I. is more than 1.0, the system is financially viable. However, there is an indication that performance evaluation by V.I. is leading to under investment in maintenance.	It is necessary to improve work efficiency, to increase income through improve-ment of ISF collection efficiency, and to secure at least minimal amount of operation cost.
3) Maintenance Index 5. Maintenance Index		5.3	Maintenance Index (M.I.) shows the status of actual activities on maintenance. The most positive status is rated as 10, while the most negative	WRFTs should carry out maintenance activities and reporting. Situations beyond their capacity should be managed by ISSs. Such system

Item	Unit	National Average	Problems/Conditions	Countermeasures
			state is rated as 0. M.I. of 5.0 indicates not sufficient.	of maintenance should be established.
4) Project Cost/FUSA 6. Program of Works (PoWs) for Maintenance for Rehab.&Imp.	Peso/ha Peso/ha Peso/ha	1,201 489 712	Transparency is not sufficient on project prioritization, although urgency and benefited area are raised as criteria.	This study shall clarify criteria on project prioritization and transparency will be improved.
5) Cropping Intensity 7. Cropping Intensity	%	140	Cropping intensity has not been improved since early 90's, although it is one of the important criteria to measure the service from NIA to farmers.	It is necessary to improve the irrigation efficiency and to facilitate effective use of water resources.
6) ISF Collection Efficiency 8. ISF Collection Efficiency	%	62 (SMD 2004 53 %)	ISF has the largest share in NIA's income but its collection efficiency (C.E.) still remains at a low level (53 % in 2004). It is said that C.E. should be more than 70 % to secure financial viability. The inventory survey results of 2006 shows a positive correlation between ISF collection efficiency and IA functionality points.	There are various factors affecting to improvement of ISF C.E. They include not only improvement of irrigation infrastructures but also farmers' satisfaction on NIAs service, dialogue on legal enforcement, IA strengthening, etc.. Comprehensive approach is required.
7) Irrigator's Association 9. Average IA Size 10. Membership Rate of IA 11. IA Functionality Point	ha %	413 75 1.7	IAs' institutional capacity has been improved year by year but it is not still sufficient. Very few IAs can operate and maintain their irrigation system by themselves.	Important measures to improve IAs' institutional capacity are; to secure 5 % institutional development project (IDP) fund, assignment of institutional development officers (IDOs), reorientation of WRFTs as IDOs, etc.

### 3.2.6 Preparation of Manual for the NIS Inventory Survey and its Maintenance Methodology

#### 1) Inventory Survey Manual

For implementation of the Inventory Survey by NIA, following Manuals are prepared by the Study Team.

- Inventory survey formats for five parts and their description guidelines (see Form IS-1 and Form IS-2)
- NIS numbers, location and related areas by Region (Form AR-1)
- Tabulation of the inventory survey results (see Form TB-1, Form TB-2, Form TB-3, Form Tb-4, Form Tb-5, and Form TB-6)
- Evaluation of inventory survey data
  - Monthly average river discharge (see Form PW-1)
  - Monthly average diverted intake discharge (see Form PW-2)
  - Evaluation of development potential for seasonal water resources (see Form PW-3 and Form PW-4)

## 2) Updating Procedures of the Inventory Survey

### a) Timing and Interval of the Inventory Survey

To determine appropriate timing and interval of inventory survey implementation, the Study Team and NIA officials concerned had a series of discussions and undertook the “Questionnaire for the Inventory Survey”<sup>1</sup> for the targets of Regional Offices and representative large-scale National Irrigation Systems such as MRIIS and UPRIIS.

Through these discussions and questionnaire surveys, timing and interval of the Inventory Survey were determined as shown below.

#### Timing of Inventory Survey

- Field survey, data collection and filing work : April – May
- Tabulation of data/information : April – May
- Data evaluation and identification of problems : October
- Preparation of MRI Plans : November
- Submission of survey results to Regional Office : End of November

#### Interval of Inventory Survey

: Every Year

Figure 3-2 indicates the spreadsheets presenting the implementation of the Inventory Survey, tabulation and evaluation of data, formulation of MRI plan, prioritization analysis of R/I works, etc.. The Study Team Prepared CD storing the inventory survey formats, tabulation of survey data and their analysis and evaluation methods, etc., and the CD was presented to the NIA side.

### b) Data Compilation and Submission Procedures

Data compilation of the implemented Inventory Survey and their report submission procedures are shown in Figure 3-3.

## 3.2.7 Preparation of Manual for Formulation of MRI Planning Methodology of NISs

### 1) Water Resources and Irrigation Water Uses

As mentioned in the previous paragraph of “3.2.5 Formulation of Planning Methodology of NISs Operation, Maintenance, Rehabilitation and Improvement (MRI) Works”, major keen issues identified in the sector of the water resources and irrigation water use are; a) procedures for canal discharge measurement and water distribution, b) computerization of Operation Plan for water delivery schedule, and c) estimation procedures for effective rainfall.

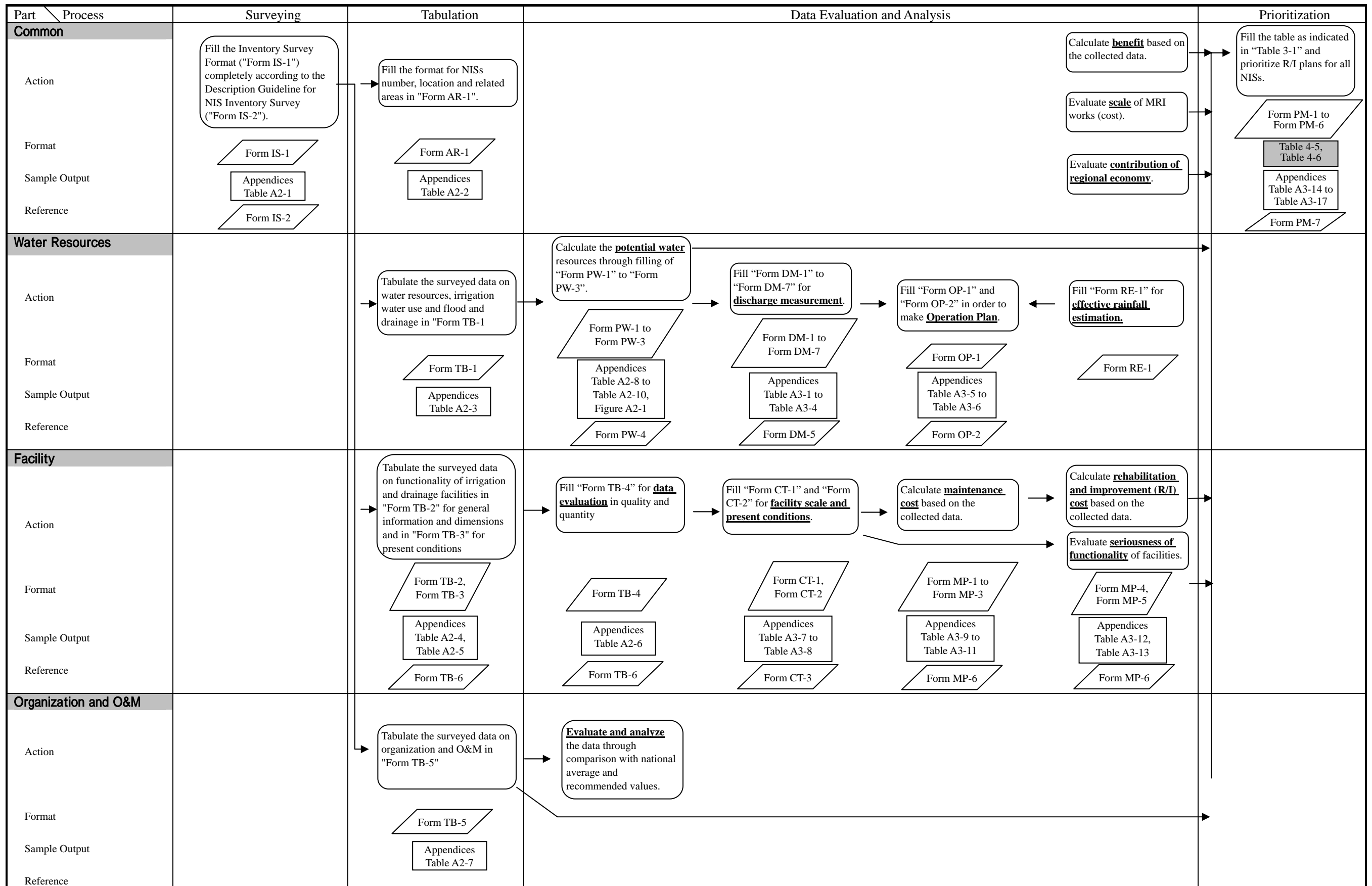
Therefore, the above issues are compiled in the following Manuals.

- Procedures for canal discharge measurement and water distribution
  - Fabrication and installation of staff gauges (see Form Dm-1, Form Dm-2, and Form DM-5)

---

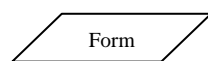
<sup>1</sup> Contents of the Questionnaires and their evaluation results are referred to Appendix TA-3, TA-4 TA-5 and TA-6 in Main Report.

Figure 3-2 Spreadsheet Showing Necessary Files and Processes from Implementation of NIS Inventory Survey to Prioritization Analysis of R/I Works for NISs

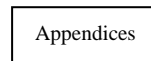


3-22

LEGEND:



Form Format in Manual,



Appendices Appendices in Manual,

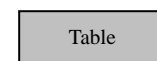
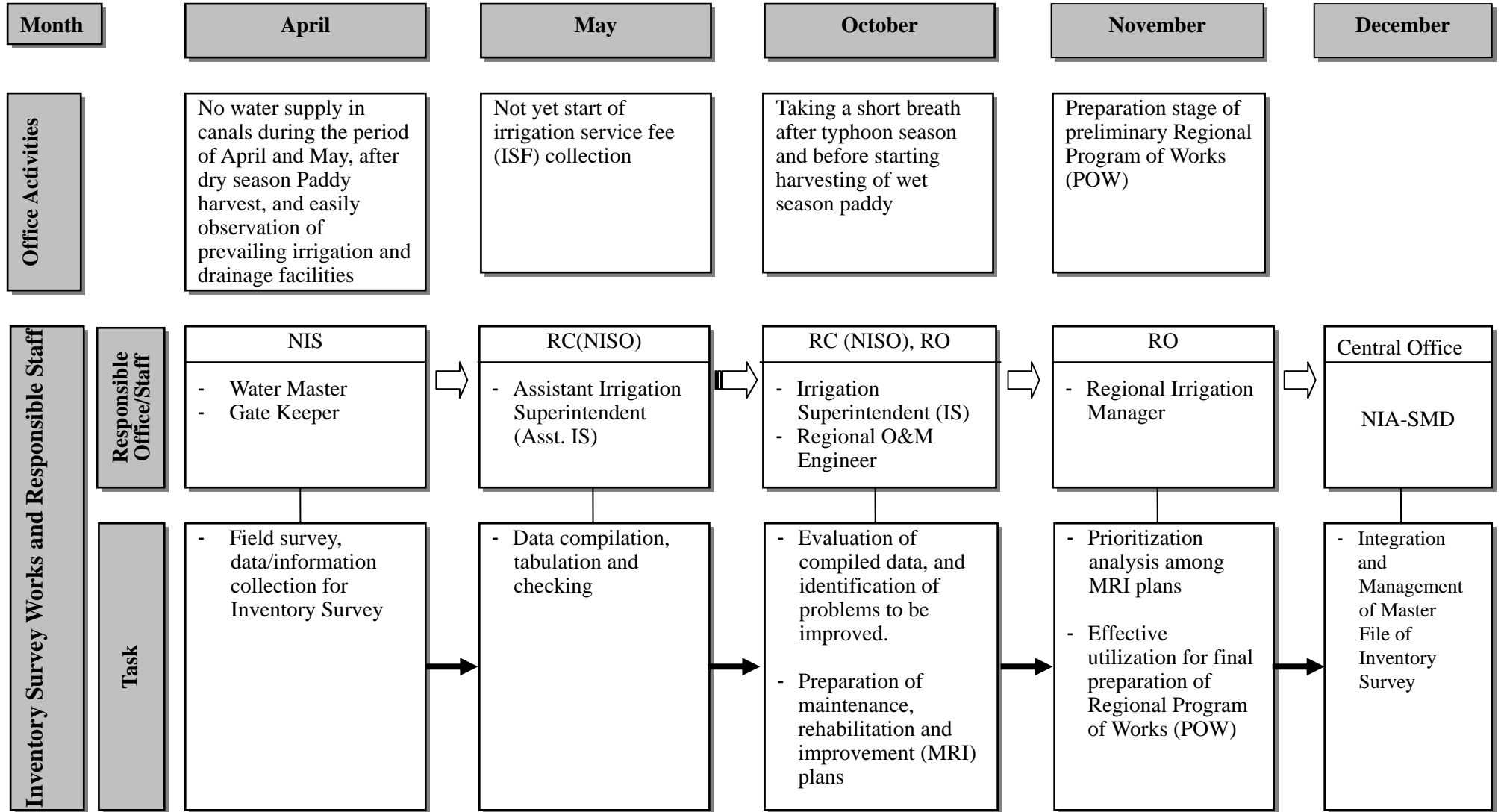


Table Table in Main Report

Figure 3-3

Flow Diagram of Data Compilation of Inventory Survey and Report Submission Procedures





- Calibration and development rating curve (stage-discharge curve) (see Form Dm-3 and Form Dm-4)
  - Observation of canal discharges (see Form DM-6)
  - Water distribution procedures (see Form Dm-7)
- Computerization of Operation Plan for the water delivery schedule (see Form OP-1 and Form OP-2)
    - Calculation of monthly average water supply and effective rainfall
    - Characterization of water management parameters
    - Water requirements, turn-out duty and discharge and irrigation diversion requirement
    - Calculation of areas to be programmed for irrigation and date of initial water delivery
    - Compilation of weekly land soaking areas during land soaking period
- Estimation procedures for effective rainfall (see Form RE-1)
    - Daily rainfall records
    - Analysis of rainfall distribution on a 10-day basis and calculation of effective rainfall
    - Analysis of monthly rainfall distribution on a 10-day basis

## 2) Irrigation and Drainage Facilities

### a) Scales of NIS Facilities

The criteria and results of classification of the NIS facility by scale are as follows (see Form CT-1).

#### Diversion Dams

Diversion dams classified into the categories of large, medium and small-scales are at 20 places (14 %), 80 places (56 %) and 44 places (30 %), respectively.

#### Pumping Station

The pumping stations classified into the categories of large, medium and small-scales are at five places (28 %), six places (33 %) and seven places (39 %), respectively.

#### Main Canal

The main canals classified into the categories of large, medium and small-scales are at 32 lines (16 %), 100 lines (51 %) and 65 lines (33 %), respectively.

### b) Present Conditions of NIS Facilities

The present conditions NIS facilities are as follows (see Form CT-2).

#### Diversion Dams

The diversion dams classified into the categories of good, moderate or severe conditions are of 82 places (48 %), 75 places (43 %) and 16 places (9 %), respectively.

#### Pumping Stations

The pumping stations classified into the categories of good, moderate or severe condition are of six places (34 %), 11 places (62 %) and one place (4 %), respectively.

#### Main Canals

The main canals classified into the categories of good, moderate or severe condition are of 28 places (13 %), 128 places (60 %) and 57 places (27 %), respectively.

### 3) Organization and Operation and Maintenance

As mentioned in the previous paragraph of “3.2.5 Formulation of Planning Methodology of NISs Operation, Maintenance, Rehabilitation and Improvement (MRI) Works”, important and objective criteria to measure the capacity of organizations and O&M are selected for evaluation.

#### Criteria to Measure the Capacity of Organizations and O&M

Item	Unit	National Average	Max	Min	Evaluation
1) FUSA / Personnel  1. FUSA/Personnel	ha/ person	196	700	41	The number of personnel in most of NISOs ranges 2.2 to 5.3 persons per 1,000 ha, while the national average is 4.3 persons per 1,000 ha. When the current number of personnel is quite different from that in those figures, the situation should be improved.
2) Viability Index and O&M Cost /FUSA 2. Viability Index 3. Operation Cost /FUSA 4. Income/FUSA	Peso/ha Peso/ha Peso/ha	1.10 1,125 1,221	2.28 12,174 6,717	0.36 150 93	V.I. should be more than 1.1 and more than 20 %of expenditure for maintenance, operation and other expenses (MOOE) should be secured for smooth operation.
3) Maintenance Index 5. Maintenance Index		5.3	8.4	2.3	When the M.I. is lower than 7.0, more efforts should be made for maintenance activities.
4) Project Cost/FUSA 6. Program of Works (PoWs) for Maintenance for Rehab.&Imp.	Peso/ha Peso/ha Peso/ha	1,201 489 712	19,589 489 712	0 489 712	Actual budget allocation varies very widely. Project prioritization should be done in a transparent way based on a method proposed in this study.
5) Cropping Intensity 7. Cropping Intensity	%	140	230	46	The target of cropping intensity should be 160 %. Efficient water use is the key for improvement of the cropping intensity.
6) ISF Collection Efficiency 8. ISF Collection Efficiency	%	62 (53 %; SMD 2004)	121	10	More than 70 % of ISF C.E. should be secured for financial viability. Institutional development is the key for improvement of ISF C.E. Other important factors are legal enforcement, remedial measures on collection activities, collaboration with LGUs and dialogue with farmers.
7) Irrigators Association					The inventory survey results show a positive correlation between ISF C.E. and IA functionality point. Five to 20 % of increase on ISF collection efficiency is expected corresponding to one point increase of IA functionality point, while the average increase is 12 %. IA functionality point should be more than 2.0, equivalent to “Satisfactory” in adjective rate.

### 3.2.8 Holding of Workshop Seminars for Presentation of Draft Final Report

For presentation of Draft Final Report (DF/R) compiling the latest study results, workshop seminars were held at the termination of the Stage-II Study dated on September 21 and 22, 2006 at the venue of NIA-DCIEC Conference Room with attendance of the related NIA staff (SMD, and PDD in NIA Central Office, and representatives of O&M staff from 13 Regional Offices, MRIIS and UPRIS Offices).

The major issues of the seminars were as follows:

- Explanation on implementation and tabulation/analysis of the NIS Inventory Survey (Sept. 21, 2006)
- Explanation on maintenance, rehabilitation and improvement (MRI) planning methodology of NIS (Sept. 22, 2006)

Following questions, comments, suggestions on the DF/R were raised by attendances.

- Flood damages in the Magat Reservoir area
- Implementation of the Inventory Survey and utilization of survey results without financial sources
- Better ways of water management during drought periods and ways for improving system operation
- Simplification of the inventory survey format
- Implementation timing and interval of the Inventory Survey
- Costs of rehabilitation and improvement
- Countermeasures to improve viability under irrigation management transfer (IMT)
- Operation and maintenance of gates, related structures and other related social structures
- Classification criterion of irrigation and drainage facilities
- Modification of organization and O&M formulas presented in the DF/T
- Effective and smooth implementation of the Inventory Survey under restrictive financial and personal resources
- Political aspect in selecting the prioritized MRI plan
- Detailed data of prioritization analysis on irrigation and drainage facilities
- Effective utilization of the outcome of the inventory survey
- Preparation of adequate spreadsheet to implement the Inventory Survey smoothly
- Study Team request to NIA side for preparation of comments on the DF/R
- JICA headquarter interested in utilization of the inventory survey results

These issues were compiled in the Minutes of Meeting agreed upon by both Study Team and NIA side on September 25, 2006.