Draft

# Asian Regional Workshop

on the

# Inventory of Farmer-Managed Irrigation Systems

and

# Management Information Systems

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**INTERNATIONAL IRRIGATION MANAGEMENT INSTITUTE**

Asian Regional Workshop on the Inventory of Farmer-Managed
Irrigation Systems and Management Information Systems
13-15 October 1992

*6 October 1992*

*Dear Colleague,*

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*We look forward to your active participation and hope you will find the workshop interesting and beneficial.*

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ANNOUNCEMENT NO.3B

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# INVENTORY OF IRRIGATION SYSTEMS: NOTES FROM BALI, INDONESIA [1)]

by

I Gde Pitana [2)]

## ABSTRACT

An inventory of irrigation systems has been conducted in Bali. The main objectives of the activity were of twofolds: firstly, to describe social-institutional and physical characteristics of the irrigation systems, which can be used as basic information for further development and management planning of the systems. Secondly, the activity was also expected to produce a tested method on inventorying irrigation systems, especially in Bali setting, which can later be used by government agencies to conduct inventory.

Three regencies were selected for the first round of the inventory, namely Gianyar, Badung, and Tabanan regencies.

The inventory finds out several basic data which differ from the published ones. This paper discuss some of the findings and lessons learned from the conduct of inventory.

## INTRODUCTION

In line with the efforts of Indonesian government to achieve self-sufficiency in rice (rice being the staple food of its population), extensification and intensification of rice production has been one of the highest priority program in its national development for decades. Irrigation development is one of the main components in the effort, and hence, it has been a priority in the development. A massive irrigation projects have been carried out, both rehabilitation of the existing irrigation systems and construction of new ones.

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1). Paper presented in Asian Regional Workshop on the Inventory of Farmer-Managed Irrigation System and Management Information Systems in Manila, 13-15 October 1992. IIMI.

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In Bali province, rehabilitation of the existing irrigation systems has been the focus of the irrigation development, because of the limited land available for extensification. In the rehabilitation projects, the government might merely rehabilitate a single system, or merge a number of smal-scale systems into a new bigger system.

Despite its significant roles in increasing rice production, government intervention in the Balinese traditional irrigation systems has been severely criticized because it created a lot of negative impacts (see Sutawan et al. 1987; Sutawan 1984; and Pitana 1989). Several factors are identified associated with this, among others are the lack of basic data of the irrigation systems being intervened, especially from socio-cultural point of views. More importantly, data about the nature of irrigation systems a long a river course were also lacking, and the government failed to recognize the nature of "irrigation network" a long a river basin.

**THE NEED FOR INVENTORY**

Although traditional irrigation system in Bali (the so-called *subak*) has long been intensively studied, the nature of inter-subak coordination a long a river basin is still not comprehensively understood. This is due to the focuses of the previous studies were mostly on individual systems. On the other hand, because of its density and the topography of Bali, one can not clearly understand a system without understanding the coordination or network of the systems along a river. Water distribution system employed in a system is highly influenced by the upper systems. In Bali setting especially, the existence of "water borrowing system" plays important roles in this regard.

Available data regarding irrigation systems a long a river in Bali is inconsistent, and even more for the province as a whole. For example, different sources of data will give different number of subak. According to the Provincial Office of Public Works (DPUP), the number of subak in Bali is 1733 with 100.430 ha service area; according to the Office of Agricultural Service (Distan Tanaman Pangan), there are 1235 subak covering 93.000 ha riceland; while the Provincial Office of Internal Revenue (Dispenda) records that the number of subak is 1274. This implies that consistency and reliability of other data must have been at the same level or even worse. Hence, they are very weak for development planning basis. For these reasons, inventory of irrigation systems in Bali is considered an immediate need.

Furthermore, inventory of irrigation systems in Bali is very important at least from the following reasons:

1. It provides general descriptions of irrigation systems a long a river (watershed), to include coordination of these systems one to another;

2. It can direct the "outsiders", (including the government) in prioritizing the development needs;

3. It provides preliminary guidance for the government in defining the management of the systems, whether a particular system will be managed by the government, jointly, or be fully managed by the farmers; and

4. In case a system will be turned over to the farmers, it suggests what must be done prior to the turnover process;

**OBJECTIVES**

Relevant to the benefits expected from the inventory, the objectives of the inventory were as follows.

1. To profile physical characteristics of any single system in the area where the inventory in conducted. This include:

   a. the primary and secondary source(s) of irrigation water (spring, river, or both);
   b. location of the weir(s) and location of the area covered, i.e. geographic location relative to others, location a long the river (upstream, midstream, or downstream), administrative location (village, district, etc.);
   c. the size of the service area;
   d. physical status of the syastems (weir, canal, division structures, etc.);
   e. water sufficiency; and
   f. cropping patterns and cropping intensity.

2. To profile the social-institutional aspects of the systems, to include:

   a. number of water users' association *(subak)* using the system and their leaders;
   b. number of farmers; and
   c. the existence of intersubak coordinating body (*subak-gede*);

3. To identify the present management status of the systems, whether they are managed solely by the government, by the farmers, or jointly by the gobernment and the farmers; and

4. To describe the relationship/coordination of systems a long a river course.

Noteworthy that aside from the above mentioned objectives, the conduct of the inventory was also intented to develop methods of irrigation inventory especially in Balinese setting, which can later be used by government agencies.

## M E T H O D S

Methods used in doing this inventory was basically combination (and modification) of methods introduced by Romana (1985), Andalas (1988) and Pitana (1989). The main components of the methods consist of: 1) secondary data collection; 2) walk through and observation; and 3) interviews. For these, a set observation and interview guides were developed. It is worthwhile to note that the inventory was started from the downmost stream of the river, moving upward. The assumption was that, the farmers in the downstream generally more knowledgable about the upstream system than the other way around. This knowledge is considered very useful especially in exploring the coordination between (among) adjacent systems.

The results of the inventory were presented in matrixes of individual system as well as description of the whole systems in a region.

To apply the methods, operational definitions of variables/indicators were discussed and agreed in advance, such as the definition of *subak*, *subak-gede*, *tempek*, irrigation system, and irrigation boundary. These were considered very crucial in determining the success of the inventory to produce reliable data.

For the first round, the inventory was conducted in three regencies (out of 8 regencies) in Bali, that is: Tabanan, Badung, and Gianyar regencies.

## R E S U L T S

It was found out that there are considerable difference between the data produced by this inventory and those available in government agencies. The number of irrigation systems found in the inventory is much more higher than that og government figures. It was found that in the regencies of Tabanan, Badung, and Gianyar, the number of irrigation systems were 459, 93, and 136 irrigation systems respectively, which were higher tha DPU records (142, 20, and 112 respectively). On the other hand, the size of the riceland was found smaller. Comparison of the selected data produced from the inventory with those of DPUP for the three regencies aggregatively can be seen in Table 1.

**LESSONS LEARNED**

The difference of the number of irrigation systems found with that of DPUP is due the difference of the definition used. In defining an "irrigation system", DPUP follows the unit of "irrigation development project". One irrigation project sometimes consists of several small-scale systems, which were individually rehabilitated. Eventhough without any physical system connecting one to another, DPUP insists to count the rehabilitated system as one irrigation system. On the other hand, this inventory defines irrigation system based on Government Regulation (PP) No. 23/1982, which mentions that "irrigation system is a complex of ricefield getting irrigation water from a single irrigation network". Hence, one system in DPUP records often consists of more than one system according to the inventory.

The difference of the number of subak was also caused by the difference definition employed, aside from the difficulty in identifying a subak in the field. It seemed that DPUP was inconsistent in defining what a subak is. In addition, the farmers often interchange the terms of *subak, tempek* (sub-subak) and *subak-gede*.

Regarding to the riceland size, the difference figures might be caused by one or more of the following factors: 1) the newly expanded riceland could not be recorded during the field work; 2) in some cases, the size of the ricefield was intentionally recorded above its real size to help the small-scale systems, because there was a rule that a system can only be rehabilitated by the government if its size is more than 150 ha; 3) in the newly rahabilitated projects, the riceland had not been expanded, while DPUP had recorded the planned expansion areas as actual; and 4) in some irrigation systems, the size of the riceland had been reduced ( converted into other uses such as clove, grave, or vanilla plantation as well as non-agricultural uses), while DPUP still uses records before the riceland is converted (according to a study conducted by Hassall et al. 1992, the size of riceland in Bali averagely decreased as high as 1,000 hectares a year in the period of 1980-1990).

This inventory also discovered that a lot of irrigation systems used by several subak have not yet developed a coordinating body *(subak-gede)*. Each subak independently concentrates in their own areas, while operation and maintenance of the main system is the responsibility of the government (DPUP). If this type of systems are to be turned over to the farmers, it is recommended to strengthen the organization covering the system as a whole, namely the formation of *subak-gede*. In the systems where *subak-gede* have been in operation, the government should strengthen their organizational capacity.

For small-scale systems which are considered a single system by DPUP, it is recommended to make their status clear if the government will turn over the management of the systems. It automatically means that "to whom the management will be turned over" is also clearer.

Since this inventory has revealed a number of significant results, it is recommended to continue the inventory for the other five regencies (Jembrana, Buleleng, Karangasem, Klungkung, and Bangli). To do so, the methods developed by this inventory is recommended to be used.

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## Tabel 1
## Comparison Between Data of DPUP and The Results of The Inventory

| NO | VARIABLE | DPUP *) | INVENTORY |
|---|---|---|---|
| 1 | Number of Irrigation System | 274 | 688 |
| 2 | Number of Subak | 763 | 1.147 |
| 3 | Riceland (ha) | 63.123,07 | 60.367,85 |
| 4 | Number of Weir | n.d. | 696 |
| | a. Gov't Rehabilitated Weir | 140 | 168 |
| | b. Traditional (farmer's) ** | n.d. | 528 |
| 5 | Number of Subak Gede | n.d. | 96 |

Notes :

| | |
|---|---|
| * | Analysed from "Buku Pintar DPUP 1989" |
| ** | Including spring without weir structure |
| n.d. | no data |

MATRIX A. IDENTIFICATION OF IRRIGATION SYSTEM

| No | CODE OF I.S. | NAME OF I.S. | MANAGEMENT STATUS | LOCATION OF WEIR | | SUPPLEMENTARY WATER SOURCE | WEIR CONSTRUCTION | LENGTH OF THE WEIR (m) | DISTANCE TO OTHER WEIR (m) | | EXISTENCE OF COORDINATION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | RIVER | VILLAGE | | | | UPSTREAM | DOWN STREAM | |
| | | | | | | | | | | | |

MATRIX B. IRRIGATION FACILITIES AND COMMAND AREA

| NO | NAME OF I.S. | LENGHT OF MAIN CANAL (Km) | | | | YEAR OF REHABILITATION | RICE LAND | | |
|---|---|---|---|---|---|---|---|---|---|
| | | LINED | EARTHEN | TUNNEL | TOTAL | | LOCATION | | SIZE (HA) |
| | | | | | | | VILLAGE | DESA ADAT | |
| | | | | | | | | | |

MATRIX C. FARMERS' ORGANIZATION

| NO | NAME OF I.S. | NAME OF SUBAK | LOCAL TERMS | NUMBER OF SUB - SUBAK | SERVICE AREA (HA) | NUMBER OF MEMBER | NAME AND ADDRESS OF LEADER | REMARKS |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |



MATRIX D. CROPPING PATTERNS AND CROPPING INTENSITY

| NO | NAME OF I.S. | CROPPING PATTERNS | CROPPING INTENSITY | | |
|---|---|---|---|---|---|
| | | | RICE | SECONDARY CROPS | TOTAL |
| | | | | | |

# INVENTORY OF FARMER MANAGED IRRIGATION SYSTEM IN INDONESIA, A BASIC CONCEPT

by BAYUDONO

## ABSTRACT

The total irrigated ricefield in Indonesia is 4,334,654 hectares, some 43,44 % of the area are village managed irrigation system.

The Government of Indonesia has long been aware of the importancy of inventory of irrigation system, as stated in several laws and regulation related on water resources or irrigation.

Through a programme called "handing-over of small scale irrigation system" the Government of Indonesia intended to turn over the right and responsibility to manage small scale irrigation system to the related Water Users Association (WUA). The experiences in implementing the programme will be the basic reference of this paper.

An irrigation inventory may have great importancy as the data and information resources for evaluating system performance, preparing irrigation plan, designing rehabilitation and modification works as well as increasing water use efficiency.

Irrigation Service have the responsibility to undertake inventory of Farmer-Managed Irrigation System (FMIS) and into some extent, in cooperation with WUA.

Inventory of FMIS should cover ; Inventory of the physical facilities of the system, Performance of the system and Institutional status, while data taken from the field survey can be divided into ; Basic data, Periodical data, and Supplemental data.

At the lowest level, field survey can be carried out in cooperation with farmers or village official. The next inventory process will be undertake by Irrigation Service with its hierarchical ranks.

Two stage data verification should be taken to the data obtained from survey, other data may be processed further. Computer aided data processing will be very helpfull.

The outputs of such inventory are ; Inventory Resume, Correction Sheet and Detailed Inventory, which should be delivered to appointed institution.

The inventory process should an annual basis, but data collecting should follow the irrigation period.

There are two main beneficiaries of the inventory, firstly is the Irrigation Service and secondly is the WUA.

## I. PREFACE

The total area of irrigated ricefield in Indonesia is 4,334,654 hectares, out of this some 1,885,742 hectares from 25,304 small scale irrigation system or 43,44 %, are what so-called "village irrigation systems " managed by village authority or farmers through Water Users' Association (WUA).

The Government of Indonesia (GOI) has long been aware of the importancy of inventory for irrigation system. Law No. 11/1974 on Water Resources stating in Article 3 the obligation of the Local Government to make an inventory of the irrigation system inside its administrative boundary, and Government Regulation No. 23/1982 on Irrigation in Article 9 states the need to undertake an inventory of water resources all over the country.

Many inventories of irrigation systems had been made available at regional or lower levels, but there were only two prominent inventory system had been established at national level, both for FMIS and government managed irrigation system (GMIS). Unfortunatelly, the inventories reflect only the technical and engineering aspects of the irrigation system.

Since 1987, The GOI through Directorate of Irrigation (DOI) had established a programme by which small scale irrigation system formerly managed by the Government (GMIS) will be handed-over to the WUA. One among the activities of the programme is the inventory of the irrigation system. The inventory was used to evaluate the physical condition of the irrigation system, institutional status of WUAs and performance level of the system either at the main and the tertiary levels, so that a detailed action plan can be prepared and implemented before handing over the irrigation system and its management responsibility to WUAs.

The experience in carrying out the above mentioned handing over programme is one of the most important reference to this paper.

## 2. THE OBJECTIVES OF THE INVENTORY

The main objective of the inventory is to provide detailed data and information of irrigation system to be used as a data base for evaluating system performance, preparing irrigation plan, designing rehabilitation or modification works, increasing water use efficiency and others.

## 3. IMPLEMENTATION RESPONSIBILITY

Stated in the Government Regulation of the Republic of Indonesia No. 23/1982 Article 2 Paragraph 2 that the rights to manage irrigation water and irrigation network of irrigation system at the farm level and village owned irrigation system or Farmer-Managed Irrigation System (FMIS), be given to WUA(s) or Village Authority, with the assistance from Local Government Authority through Irrigation Service.

So, based on the government policy stated above, it is clear that the WUAs should be responsible to carry out inventory programme of their own irrigation system. Due to the limited skill and knowledge as well as financial resources, the WUA itself seemed will not be able to carry out such an inventory programme. Therefore, it is the Local Government through its Irrigation Service, which have been given the reponsibility to assist WUAs, should implement the programme, and an active participation from the WUAs will be one among the condition of the programme. Appendix 2 shows where the Irrigation Service and its hierarchical ranks take place in the implementation of the inventory.

It is important to consider that not necessarily to establish special operational unit or project to undertake the inventory, since this should be put as one part among the duties of the irrigation staff, although special efforts should be paid in the begining of the programme to collect and manage basic data as a benchmark to the next inventory processes.

## 4. SCOPE OF INVENTORY

Inventory of FMIS should cover 3 (three) aspects ;

a. **Inventory of the physical facilities of the Irrigation System;** through this activity the technical data on all irrigation facilities, i.e. structures, canals and infrastuctures can be compiled, including their present condition.

b. **Performance of the system** ; comprises records of the streamflow, reliability of the flow, water requirement, water balance, the seasonal irrigated area, level of irrigation efficiency, cropping pattern, cropping intensity, yield and production and others.

c. **Institutional status** ; existing WUA(s), number of members, efficiency of the organization, financial status of the organization and others, the inventory should express the institutional profile of the WUA.

A comprehensive data compilation will give a great contribution to the users, but the tendency to provide detailed information with broader range of data should be avoided as this will require a large scale inventory activity that needs special efforts, skills, manhours and, morevover, an adequate budget, that may beyond the capacity of the irrigation service to conduct. Exception is given to the benchmark survey where detailed basic data will be kept as benchmark inventory.

## 5. DATA SPECIFICATION

Data taken from an inventory survey can be divided into three specification, i.e. ;

a. **Basic data** ; all data that will not change within a short time period, such as ; command irrigation area, area of ricefield, technical specification of the headwork, canal and structures. Commonly, this specification is closely related to technical and engineering data.

b. **Periodical data** ; data that should be renewed in a certain period of time, for example ; seasonal cropping area, harvested area, crop yields, cropping intensity and others. Usually, the data are needed to evaluate the performance of the system.

c. **Suplemental data** ; such as hydroclimatological data, streamflow and others. The data can be classified as secondary data an may be obtained from other sources.

## 6. DATA COLLECTION

Data must be collected through field survey by means of inventory instrument, such as ; questionnaire, inventory sheets or others. The instrument should be of standardized form so that data can be obtained from the same specification altough they are taken from different surveys and/or different period. The lowest rank of Irrigation Service i.e. Subbranch Irrigation Service (SBRIS) or Irrigation Supervisor together with the WUA(s) of the irrigation area, are responsible to carry out the field survey. Field survey schedule should be arranged with respect to the schedule of irrigation activities in the field as several data can only be obtained during a certain period of time.

An Inventory Book and Correction Sheet will be produced as the result of the survey, and sent to the higher rank office i.e. Branch Irrigation Service (BRIS). The Inventory Book consists the compiled raw data from the survey, while the Correction Sheet is the resumed data from the survey.

A manual on the inventory system will be absolutely needed. This explains the terms, methodology, instruments, procedures, data processing and analisis, distribution of information and others. Inventory objects should be described into several categories according to its complexity and diversity, so that the inventory can be compiled on a systematically file. The procedure should be completed with flowchart as well as barchart.

## 7. DATA PROCESSING.

Data obtained from field survey should firstly be verified, especially in accordance with the validity and completeness. Doubtfull data should be checked by comparing present correction sheet with the previous one(s), and if it does not give any good result then those ambiguous data must be resurveyed in the field.

Some data may be processed further, for example ; cropping area data, together with stream flow data and hydroclimatological should be processed to find out water requirement and water balance. Estimation of cropping intensity will require data on irrigation command area as well as cropping area.

Data that needs further processed and the output can be seen in Appendix 3.

## 8. FLOW OF DATA PROCESSING

Verified (new) data will be used to renew the previous inventory book(s). In case a computer was made available in the BRIS Office to aid the inventory process then all data in the book should be entered to disk(s). A special software designed for the inventory will be very helpfull. If none, then worksheets using Lotus 123 or other similar software may be applicable. A personal computer with a 20 megabyte harddisk onboard will be preferrable. If possible, a MODEM facility can be installed in the computer, but sending a printout or hardcopy seem to be the cheapest way to send the data from BRIS offices to Provincial Irrigation Service (PRIS).

PRIS should verify the data received from BRIS before entered to higher level data management where a Master File was already available. The available Master File in PRIS Office must be renewed by using the new data. Appendix 2 shows the flowchart of the process.

## 9. INVENTORY OUTPUT AND THE DISTRIBUTION

Beside an Inventory Book for each irrigation area, the inventory activity will produce other outputs, those are ;

1. **Resume of the Inventory of Irrigation System** ; this document after legalized by the Head of the District will be returned to the BRIS for filing.

2. **Correction Sheet** ; consists of resumed verified data from the survey and returned to SBRIS to be used for the next survey.

3. **Detailed Inventory** ; delivered to each corresponding WUA for filing.

## 10. INVENTORY IMPLEMENTATION SCHEDULE

Although the inventory activities may be of annual basis, the data collection should be carried out periodically in accordance with the irrigation activities in the field.

Since the output of the inventory may be used as inputs for planning of irrigation operation and other activities, then it is suggested that all inventory output should be issued and delivered before the beginning of planting season. Tentative schedule of an inventory of FMIS can be seen in Appendix 4.

## 11. UTILIZATION

In accordance with the utilization of FMIS Inventory, there are two beneficiaries of the inventory. Firstly, is the Irrigation Service that have been given the responsibility to technically assist and promote the activity of WUA(s) in managing the irrigation water at the farm level. Using the inventory, the PRIS may have a better access in monitoring and evaluating the performance of FMIS's, any detailed action plan for improving irrigation system performance may be prepared easier if data were made available in the inventory.

Secondly is the WUA(s) which can take the benefit from such inventory to manage the irrigation system, e.g. prepare irrigation planning, irrigation water distribution scheme, operate and maintenance the system.

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APPENDIX 3

DATA PROCESSED FURTHER AND THE OUTPUT

| CODE NUMBER | SPECIFICATION | | OUTPUT |
|---|---|---|---|
| B.4. | Command area of tertiary block. | -----> | Landownership. |
| P.10. | Total number of farmers | | |
| B.4. | Command area of tertiary block. | | |
| P.1. | Wet season cropping area | -----> | - Cropping pattern |
| P.2. | Dry season cropping area | | - Cropping intensity. |
| P.3. | Third season cropping area. | | |
| P.1. | Wet season cropping area | | - Crop water requirement |
| S.2. | Daily rainfall | -----> | |
| S.3. | Monthly evapotranspiration | | - Irrigation water requirement |
| S.6. | Deep percolation rate. | | |
| | Irrigation water requirement | -----> | Water balance. |
| S.1. | Daily records of streamflow | | |
| | Irrigation water requirement | -----> | Overall irrigation efficiency. |
| S.4. | Daily discharge in the primary canal | | |
| | Crop water requirement | | |
| S.5. | Daily discharge to each tertiary block. | -----> | Irrigation efficiency at tertiary level. |

APPENDIX 1.

LIST OF DATA FOR THE INVENTORY OF F.M.I.S.



| CODE NUMBER | DATA CLASSIFICATION | SPECIFICATION |
|---|---|---|
| B. | BASIC DATA | |
| B.1. | | Name of irrigation area. |
| B.2. | | Number of tertiary blocks. |
| B.3. | | Names of tertiary blocks. |
| B.4. | | Command area of each tertiary block. |
| B.5. | | Technical specification of the head-work ;<br>B.4.a. T y p e.<br>B.4.b. Length of weir.<br>B.4.c. Number of intake gates.<br>B.4.d. Number of sluice gates. |
| B.6. | | Technical specification of the canal ;<br>B.5.a. Length of primary canal.<br>B.5.b. Length of secondary canal.<br>B.5.c. Length of tertiary canal.<br>B.5.d. Design capacity of the primary canal. |
| B.7. | | Number of irrigation structures ;<br>B.7.a. Regulator.<br>B.7.b. Turnout.<br>B.7.c. Side spillway.<br>B.7.d. Drop structure.<br>B.7.e. Check structure.<br>B.7.f. Measuring device.<br>B.7.g. Culvert.<br>B.7.h. Syphon.<br>B.7.i. Flume. |
| B.8. | | Drainage system ;<br>B.8.a. Length of drainage canal/ditch.<br>B.8.b. Type and number of structures. |
| B.9. | | Irrigation infrastructure ;<br>B.9.a. Number of office building.<br>B.9.b. Number of staff housing.<br>B.9.c. Number of bridges.<br>B.9.d. Length of inspection road. |
| B.10. | | Water Users Ascociation.<br>B.10.a. Number of WUA in the irrigation area.<br>B.10.b. Number of WUA member.<br>B.10.c. Availability of Bylaws. |

P. PERIODICAL .......

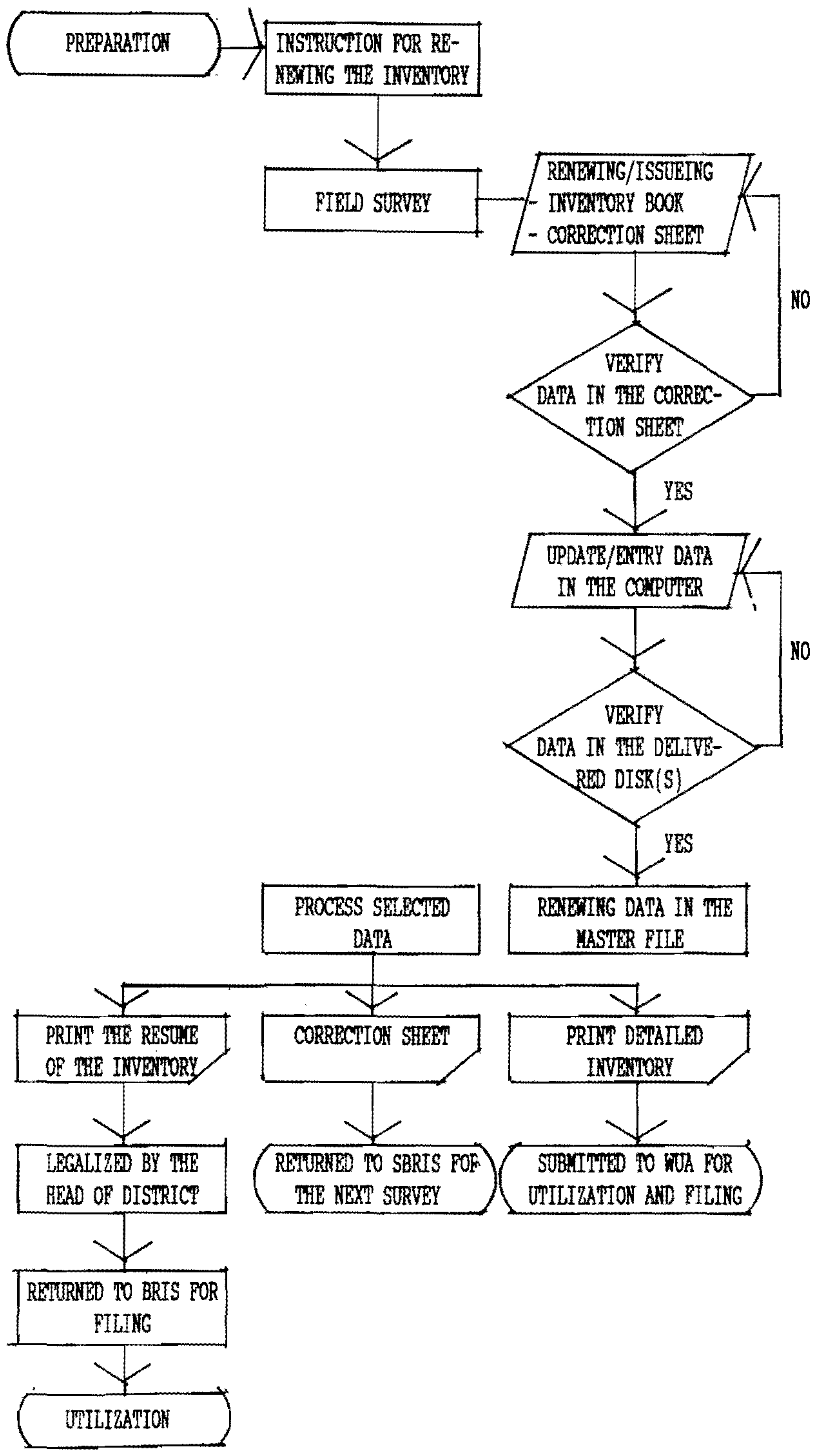
| CODE NUMBER | DATA CLASSIFICATION | S P E C I F I C A T I O N |
|---|---|---|
| P. | PERIODICAL DATA | |
| P.1. | | Wet season cropping area (in hectar).<br>P.1.a. R i c e.<br>P.1.b. Upland crops. |
| P.2. | | Dry season cropping area (in hectar).<br>P.2.a. R i c e.<br>P.2.b. Upland crops. |
| P.3. | | Third season cropping area, if any (in hectar).<br>P.3.a. R i c e.<br>P.3.b. Upland crops. |
| P.4. | | Wet season harvested area (in hectar).<br>P.4.a. R i c e.<br>P.4.b. Upland crops. |
| P.5. | | Dry season harvested area (in hectar).<br>P.5.a. R i c e.<br>P.5.b. Upland crops. |
| P.6. | | Third season harvested area, if any (in hectar).<br>P.6.a. R i c e.<br>P.6.b. Upland crops. |
| P.7. | | Average discharge of the primary canal (in liter/second). |
| P.8. | | Average rice yields (tonnes/ha.).<br>P.8.a. Wet season.<br>P.8.b. Dry season.<br>P.8.c. Third season (if any). |
| P.9. | | Average yields (tonnes/ha.). of ;<br>P.9.a. Peanut.<br>P.9.b. Soybean.<br>P.9.c. Corn.<br>P.9.d. Others ; ........... |
| P.10. | | Total number of farmers in the irrigation area. |
| P.11. | | Effectivenes of the WUA ;<br>P.11.a. Frequency of member's meeting.<br>P.11.b. Frequency of mass field activity.<br>P.11.c. Number of structures constructed/ rehabilited since the last survey.<br>P.11.d. Length of canal constructed/re - habilited since the last survey. |

S. SUPLEMENTAL .........

| CODE NUMBER | DATA CLASSIFICATION | S P E C I F I C A T I O N |
|---|---|---|
| S. | SUPPLEMENTAL DATA | |
| S.1. | | Daily records of streamflow. |
| S.2. | | Daily records of rainfall. |
| S.3. | | Monthly evapotranspiration. |
| S.4. | | Daily discharge in the primary canal. |
| S.5. | | Daily discharge to each tertiary block. |
| S.6. | | Deep percolation rate. |
| MD | MAP AND DIAGRAM | |
| MD.1. | Topographical map of the irrigation area. | |
| MD.2. | Irrigation Network Schematic Diagram. | |
| MD.3. | Organizational structure of WUA. | |

APPENDIX 2

FLOWCHART OF DATA PROCESSING FOR THE INVENTORY OF FMIS




RESPONSIBLE AGENCY

PROVINCIAL IRIGATION SERVICE

SUBBRANCH IRRIGATION SERVICES/IRRIGATION SUPERVISORS

BRANCH IRRIGATION SERVICES

BRANCH IRRIGATION SERVICES

PROVINCIAL IRRIGATION SERVICE

PROVINCIAL IRRIGATION SERVICE

PROVINCIAL IRRIGATION SERVICE

## APPENDIX 3

### DATA PROCESSED FURTHER AND THE OUTPUT

| CODE NUMBER | SPECIFICATION | | OUTPUT |
|---|---|---|---|
| B.4.<br>P.10. | Command area of tertiary block.<br>Total number of farmers | -----> | Landownership. |
| B.4.<br>P.1.<br>P.2.<br>P.3. | Command area of tertiary block.<br>Wet season cropping area<br>Dry season cropping area<br>Third season cropping area | -----> | - Cropping pattern<br>- Cropping intensity. |
| P.1.<br>S.2.<br>S.3.<br>S.6. | Wet season cropping area<br>Daily rainfall<br>Monthly evapotranspiration<br>Deep percolation rate. | -----> | - Crop water requirement<br>- Irrigation water requirement |
| <br>S.1. | Irrigation water requirement<br>Daily records of streamflow | -----> | Water balance. |
| <br>S.4. | Irrigation water requirement<br>Daily discharge in the primary canal | -----> | Overall irrigation efficiency. |
| <br>S.5. | Crop water requirement<br>Daily discharge to each tertiary block. | -----> | Irrigation efficiency at tertiary level. |

APPENDIX 4

TENTATIVE SCHEDULE OF THE IMPLEMENTATION OF INVENTORY OF FMIS.

| CODE NUMBER | S P E C I F I C A T I O N | CROPPING PRIODE | | | | | | | | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | WET SEASON | | | | DRY SEASON | | | | THIRD SEASON | | | | |
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
| B.1. | Name of irrigation area. | | | | | | | | | | | | ## | |
| B.2. | Number of tertiary blocks. | | | | | | | | | | | | ## | |
| B.3. | Names of tertiary blocks. | | | | | | | | | | | | ## | |
| B.4. | Command area of each tertiary blocks. | | | | | | | | | | | | ## | |
| B.5. | Technical specification of the headwork. | | | | | | | | | | | | ## | Benchmark data |
| B.6. | Technical specification of the canal. | | | | | | | | | | | | ## | |
| B.7. | Number of irrigation structures. | | | | | | | | | | | | ## | |
| B.8. | Drainage system. | | | | | | | | | | | | ## | |
| B.9. | Irrigation infrastructure. | | | | | | | | | | | | ## | |
| B.10. | Water Users Association. | | | | | | | | | | | | ## | |
| P.1. | Wet season cropping area. | | ## | | | | | | | | | | | Seasonal |
| P.2. | Dry season cropping area. | | | | | | | ## | | | | | | Seasonal |
| P.3. | Third season cropping area. | | | | | | | | | | ## | | | Seasonal |
| P.4. | Wet season harvested area. | | | | | ## | | | | | | | | Seasonal |
| P.5. | Dry season harvested area. | | | | | | | | | ## | | | ## | Seasonal |
| P.6. | Third season harvested area. | | | | | | | | | | | | | Seasonal |
| P.7. | Average discharge of primary canal. | ## | ## | ## | ## | ## | ## | ## | ## | ## | ## | ## | ## | Monthly. |
| P.8. | Average rice yields. | | | | | ## | | | | ## | | | ## | Seasonal |
| P.9. | Average yields. | | | | | | | | | | | | ## | |
| P.10. | Total number of farmer in the irrigation area. | | ## | | | | | | | | | | | |
| P.11. | Effectiveness of the WUA. | | | | | ## | | | | ## | | | ## | Seasonal |
| S.1. | Daily records of streamflow. | ######## | ######## | ######## | ######## | ######## | ######## | ######## | ######## | ######## | ######## | ######## | ######## | |
| S.2. | Daily records of rainfall. | ######## | ######## | ######## | ######## | ######## | ######## | ######## | ######## | ######## | ######## | ######## | ######## | |
| S.3. | Monthly evapotranspiration. | ## | ## | ## | ## | ## | ## | ## | ## | ## | ## | ## | ## | |
| S.4. | Daily discharge in the primary canal. | ######## | ######## | ######## | ######## | ######## | ######## | ######## | ######## | ######## | ######## | ######## | ######## | |
| S.5. | Daily discharge to each tertiary block. | ######## | ######## | ######## | ######## | ######## | ######## | ######## | ######## | ######## | ######## | ######## | ######## | |

Paper No.17a

# MALAYSIAN CASE STUDY II - THE KAMPUNG KEKABU FARMER-MANAGED IRRIGATION SYSTEMS [1]

A.M.ANSOR [2]


## ABSTRACT

Although Farmer Managed Irrigation Systems (FMIS) had been practised and implemented in many small irrigation schemes throughout the country the Department of Irrigation and Drainage (DID) has currently not maintained any form of monitoring or evaluation system for keeping tracks on those schemes. In future FMIS will be an important part to any agricultural development in the country. Therefore it necessitates the establishment of Management Information System (MIS) in the department for future improvement and development to the FMIS.


## Introduction

FMIS is not a new concept in Malaysia. The DID has over the years been involved in the design and construction of small irrigations schemes which most of them were initially requested by farmers through various Government agencies. Finally these irrigation schemes were surrendered over to the farmers for the management. One of these is the Kampung Kekabu Irrigation Scheme.

## Background

In 1986, a request was made to the government by the National Tobacco Board (NTB) for an irrigation project in Kampung Kekabu to overcome the problem of water shortage faced during dry periods. Water resources were not plentiful enough to support two crops of rice a year. The local rainfall allows farmer to plant paddy single-cropped. The fields were left idle during the dry season. They wanted to plant tobacco if water is available in rotation with paddy. Later in 1989, an investigation carried out by the DID had indicated the availability of ground water resources in the area.

The NTB which is a semi-government agency as the authorized body in Malaysia in Tobacco Industry had been allocated MR$130,000 (US$ 52,000) for the implementation of the scheme. The planning, design and construction works were carried out by DID. The scheme was completed in 1990. Since 1991, NTB had organized group farming through a system known as the Grower Curer System. Part of the management of the scheme was carried out by the farmers including operation and maintenance works.

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1. Paper presented at Asian Regional Workshop on the Inventory of Farmer-Managed Irrigation Systems and Management Information System, 13 - 15 Oktober 1992, Manila. International Irrigation Management Institute (IIMI) and the German Foundation (DSE)

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The farmers' participation in the day-to-day operation and maintenance (O&M) of the irrigation scheme has set a model of farmer-managed irrigation scheme which can be practised in other area.

This case study presents a model of a FMIS implemented in Kampung Kekabu Irrigation Scheme.

## Physical Layout

Kampung Kekabu is situated about 3.5 km to the southwest of Pasir Mas township. It comprises an area of approximately 65 hectares (160 acres) of paddy field. Physically, the area is flood free except occasional overflows from the Kelantan river. (Refer to Figure 1.Location Map of the State of Kelantan & Figure 2. Location Map of Kampung Kekabu & Figure 2A. Layout Plan of Kampûng Kekabu Irrigation Scheme). Most of the people living here are engaged in small holding farming activities either in full or part time basis for their source of income. The crop planted were mostly paddy. The yields were poor as there were lack of irrigation facilities to meet agricultural requirements.

## Soils

Soils belonging to the following soil series found in Kelantan plain are considerable suitable for tobacco ; Tok Yong, Chempaka, Lundang, Sungai Amin and Pasir Puteh. Soil surveys had identified the soil around the Kampung Kekabu scheme as the Tok Yong series on the upper terrace and the Chempaka series on the lower terrace. Both Tok Yong and Chempaka soil series have textures which range from silty clay loam to sandy clay loam. The soil reaction was found to be within the range of pH 4.5 to 5.5. Both of the soils are well drained and suitable for tobacco during the dry season.

## Agro-hydrology

Average annual rainfall in the State of Kelantan is approximately 2800mm/year of which 50% generally falls during the north-east monsoon (November to January). Figure 3. Average Monthly RainFall at Tok Uban shows the average monthly rainfall at rainfall station Tok Uban near Kampung Kekabu. For the months of February to May are relatively dry, with the rainfall intensity increasing steadily towards the monsoon season. Annual evaporation is 1700 mm/ year, while the annual deep percolation in the area is 22% of the annual rainfall.

## The Irrigation System

### The Pumping System

The borelog and the arrangement of pump is as illustrated in the

Figure 4. Kekabu Underground Water Pump Installation.

Seventy-two hours pumping tests using the airlift method were performed.

Result of the test and aquifer analysis are :
Aquifer depth = 21 m
Pumping Rate = 3820 cu.m/d
Transmissivity = 1420 sq.m/d
Permeability = 77.6 m/d
Storage coeff. = 4.7 x 10 -6.

Based on the data obtained from the yield tests, the production discharge suggested is 70 litre per second (lit./sec) while maximum pumping water level and suggested pump setting level is 13.32 m and 17 m below static water level respectively.

To extract water from the well, an electrical motor driven submersible pump was proposed to be used. The capacity of the pump is 62 lit./sec.

## The canal system

The system adopted is the open channel concrete conduit flume elevated on concrete stumps. This is to meet the required hydraulic gradient as well as to minimize the use of land and to avoid land aquisition. The size of the channel range from 30 cm to 45 cm in depth. The field offtake (water outlet valves) are provided at certain intervals for water distribution to the fields. Other associated structures are canal crossings, road culverts, corner boxes and end controls.

## The Drainage System

A localised drainage problem was encountered. A drain of 350m length was constructed by the Curer responsible for that location. The cost of the construction was incurred by the growers benefitted at later stage through deduction during sale of product to the Curer.

## On-farm system

For on farm level, the farmers are expected to play their role by collectively constructing head ditches along the canal and then perpendicularly make furrows to irrigate the crop. The field offtakes can be regulated by farmers to supply water to their head ditches, as required.

## Agricultural Practices

In Malaysia, tobacco crop is grown on padi land as a 'cash' crop during the off season period. In the padi land, tobacco fits into the rotation very well because padi requires a definite wet season in order that the crop may be innundated for a major portion of growing period. Tobacco being a dry land crop, is better suited to the drier part of the year and, because of this, the time of planting for tobacco in the padi land is limited to the padi off season which, in most cases, covers a period of about 5 to 7 months.

## Organization Structure

The NTB as the main organizer of the project is interested on the growing of tobacco. However due to the farmers' traditional preference paddy planting has to be continued during wet season. They believed that by having the rotational crop grown it can avoid disease thereby increasing the yield and maintain good quality of the production This is true because by growing these crops in rotational, not only the balance of plant nutrients in the soils are maintained but, at the same time, the life cycles of many soil borne pests and pathogens are distrupted, bringing about a reduction in their population. Because of this two kind of farmer organization set up are formed in the scheme during these two different planting seasons.

## Farm Management During The Dry Season

Tobacco is grown during dry period in the months of February to July. The general farm organisation at this period is as shown in Figure 5. On Farm Organization - Dry Season. A total of 43 growers were involved during the last planting season.

## Planting Schedule of Tobacco

The NTB is very firm with the adherence to the planting dates. Planting schedule is planned and fixed by the NTB at Headquarter level annually and make known to farmers and interested parties through out the country in advance. This planting schedule is printed in the form of pamplets and distributed to the district offices.

## Maintenance of The System

Growers had to take care the maintenance of the system. Clearing and minor repair works to the on-farm ditches for tobacco planting rather than for paddy were carried out to ensure proper and efficient delivery and distribution of water to the fields. These works had to be done and finished early before planting activities starts. They would seek assistance from the agency, NTB for any difficulty met during the course of doing maintenance work . For example, recently MARDI supplied them with a few bags of cement to be used in doing repair works to the concrete canals to overcome leakages at joints.This would be much help to them to reduce the production costs.

## Land Preparation

Land preparation involved tilling, ridging, furrowing and provision of secondary channels. Tilling and ridging were carried out by mechanical means. Curer would brought in their machines. Ridging needs trimming by manually. Cost of land preparation would be deducted during sales.

## Planting of Tobacco

The growers were not involve in producing seedlings. Curer made their own arrangement brought in the seedlings from nursery site situated outside Kampung Kekabu, and distributed to growers. Seedlings of virginia flue cured tobacco of TAPM36 variety came in the poly pots "kereks" manner.
Growers here practised single ridge system. The plant spacing is 1.02m between rows and 0.56m within rows giving a population of 17,500 plants per hectre.

## Fertilizers

The application of fertilizer LTN1 for tobacco in the scheme is at the rate of 53 kg/1000 plants as recommended by the Malaysia Agriculture Research and Development Institute (MARDI) and the NTB.

LTN1 is composed of;
Nitrogen(N) - 20 (kg/ha)
Phosphorous($P_2O_5$) - 168 (kg/ha)
Sulphate of Potash ($K_2O$) - 134 (kg/ha)
Magnesium (MgO) - 27 (kg/ha).

The application of fertilizer took place two to three days after transplanting. Growers are eligible to get 70% of the total cost from the NTB as subsidy.

## Pest Controls

Pesticides were used to avoid pests eg. armyworms and budworms. Topping and suckering were carried out to increase root growth, weight size and quality of leaf.

## Operation of Pump

The operation of pump was carried out by farmers. They elected a farmer amongst them who had been found to be willing to operate the pump through out the planting season. The elected farmer had served and sacrificed himself as an operator for the past two seasons without being paid. He was proud of being elected as the operator. Since the pump is electrically motor driven the operational is very much simpler and easier compare to a diesel engine driven pump. The operator had been trained by the DID before handing over the project to the NTB. Growers had to share for the electrical bills; average M$ 1,000 per month. Through their past experience an average daily pumping of 3 hours in the morning (7 am. to 10 pm.) and 1 hour pumping in the afternoon (3 pm. to 4 pm.) would be enough for irrigating their fields. However this would depend much on the weather.

## Distribution of Water

The operational of field offtakes were carried out by farmers. The farmer nearest to the canal had to give more attention to the opening and closing of the off takes. However the rest of the farmers should give full cooperation and should be easily available during his absent.

The MARDI had to played their important role in giving technical advice to the grower as far as the application of water at farm level is concerned. The application of water depends on the growing stage of plants i.e planting stage, growth stage and harvesting stage. For Kampung Kekabu scheme water requirement is 5 mm/day during planting stage, 7 mm/day at growth stage (50 - 60) days after planting) and 5 mm/day at harvesting stage. Again the application is not a daily affair. Much depends on the weather. Refer Figure 5 A.
Farmers had to ensure that their fields were not waterlogged. This situation could easily causes disease for example root-knot nematode biologically named Meloidogyne incognita.

## Harvesting of Tobacco

The ripeness of leaves affect quality and yield of tobacco. Growers had to ensure that no underripe or overripe leaf is harvested. Harvesting period starts 50 days after transplanting and lasted for about 30 days.

## Production and Yield of Tobacco

Green leaves are sold at the price of MR$65 (US$26) per kilogram (kg.) to curer. For 1992, the average yield was 8,450 kg./ha., hence this will give the average gross income of MR$5,500/ha. (US$2,200/ha.). However, the production cost for tobacco amounts to MR$2,222/ha. (US$889/ha.). (Refer Table 1. Production Cost For Green Leaf). This would generate an average income of MR$3,277/ha. (US$1,310/ha.).

## Management During The Wet Season

Paddy is grown during this period through the months of February to July. The farm organization during this period is as shown in Figure 6.
The Farmer Organization Assosiation (FOA) is the main agency to organize the group farming on paddy in the wet season. Eight farmers

were elected among them to be their representatives in the Farmer Representative Committe and a leader was choosen as the leader.

### Planting Schedule of Paddy

The leader would convene a meeting to fix the planting date, calling all the respective agencies involved. The committee with the advice of agencies i.e The Department of Agriculture (DOA), FOA, DID and MARDI make the decision and fixed on the planting schedule.

### Maintenance of the System

Ever since operational, the maintenance work of canal is very minimal. The drains were cleared through the traditional "gotong royong" concept, where every farmer has to do their own share of work.

### Operation of Pump

Since Paddy planting is carried out during wet season, pumping is only done as supplementary supply. The same operator was found to run the pump.

### Distribution of Water

Farmers are responsible for the operation of field offtake. However those farmers nearest to the field offake has to give more attention to the opening and closing of it.

### Maintenance of System

Since operational the maintenance of the canal is very minimal. The drains were cleared through the traditional 'gotong royong' concept, where every farmer has to do their own share of work.

### Production and Yield of Paddy

Average yield for 1991 was 3.5 tonne per hectre. This was found to be very much higher than before the project which was 2 to 2.5 tonne. The average yield would generate an income from paddy of MR$1,400 (US$56) per hectre. Farmers were free to sell their products to any buyer. However, a part from their products were kept for their own consumption.

## Generals

Meetings or discussions would be called by the organising agencies on request to discuss relevent matters or to solve problems which cropped up from time to time. Problems should not be left unsolved or accumulated.
The meetings or discussions would facilitate communication between government agencies and farmers. On the other hand the various agricultural agencies involved could provide services more effectively and in an integrated manner in solving technical problems.

## Joint Study on Water-distribution by DID and MARDI

The present system require farmers to construct their own secondary earthern canal in order to deliver water from the main canal to the fields. Operational and controlling of water in the secondary canal is very much difficult because of its earthern in nature which allow seepage and easily overflowing. To get a higher yield of tobacco the field must be free from water-logging. The MARDI is still carrying out further study on the possibility of using concrete canals at farm level for an efficient and effective water distribution.

## The need for an inventory

Some form of inventory for the scheme need to be prepared and continuous monitoring need to be done. Only then the existing and exact situations or problems of any FMIS can be grasped and performance evaluation of the scheme can be carried out. Any early sign of shortfalls or weakness which arised in the system can be quickly detected and correct measures can be taken immediately. Information from the scheme inventory is also very useful and helpful to the Government for further development of FMIS.

## Proposed Scheme Inventory

The scheme inventory similar to that developed by the rationalization and crop diversification study on small irrigation schemes undertaken under a Technical Cooperation Programme between the Government of Japan (JICA) and Malaysia in 1989 can be adopted with some modification. It can be as a model of MIS for the FMIS. The farmers' participation in the daily O&M, decision making and the on-farm organisation structure are among the items which be included in the scheme inventory. Table 2. Information for the Scheme Inventory shows the proposed general information and items in the scheme inventory for FMIS.

## Conclusion

The Kampung Kekabu Irrigation Scheme sets a good example of FMIS that can be replicated elsewhere. Cooperation between government agencies and farmers plays an important role in systems management. The participation of farmers in O&M can reduced the financial and management burden of the government. A good MIS is needed for FMIS to monitor and evaluate its performance for future improvement.


## Acknowledgement

The writer would like to thank the Director General of DID and the wokshop organizers, IIMI/and DSE/ZEL for giving the opportunity to write and present this paper.


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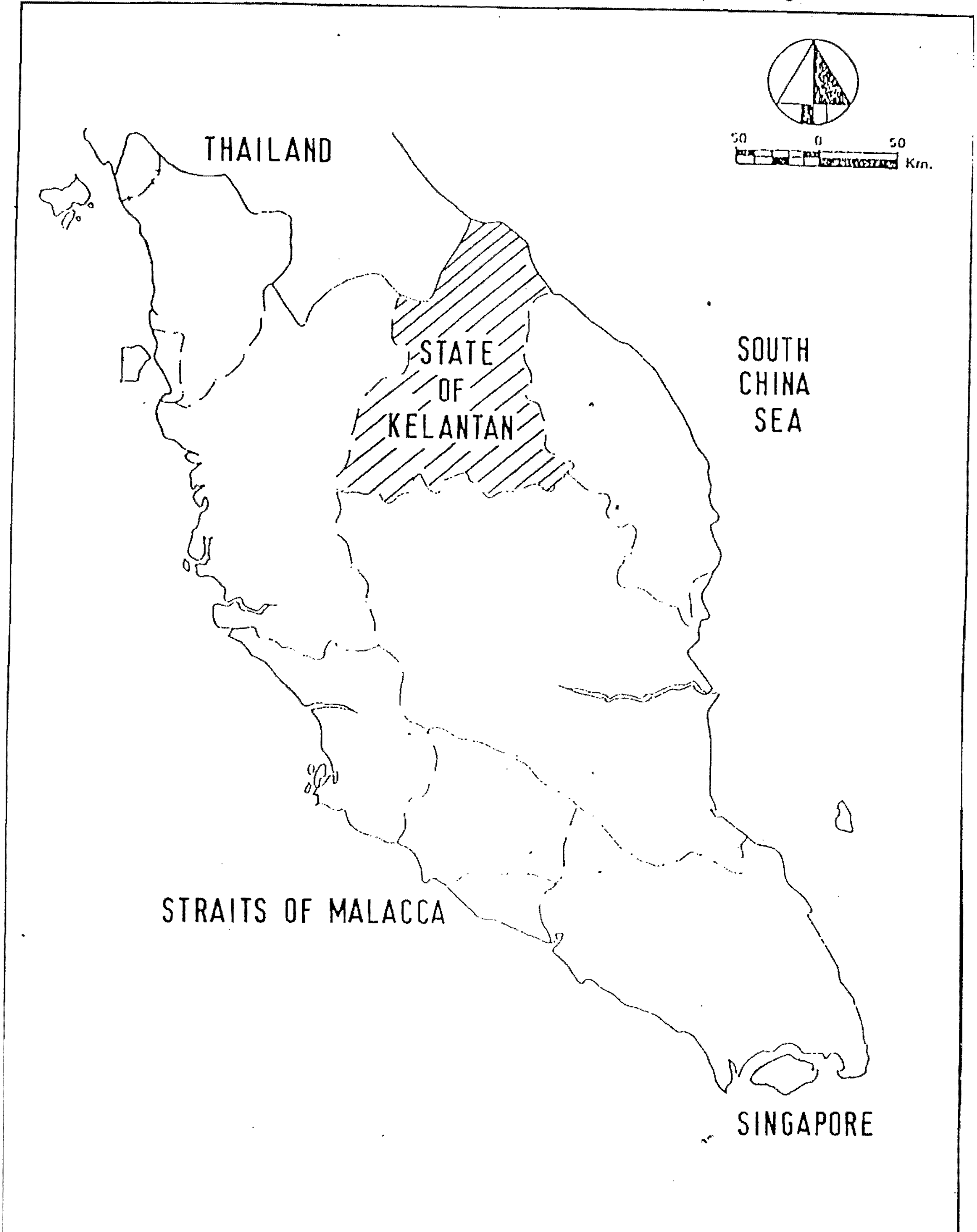
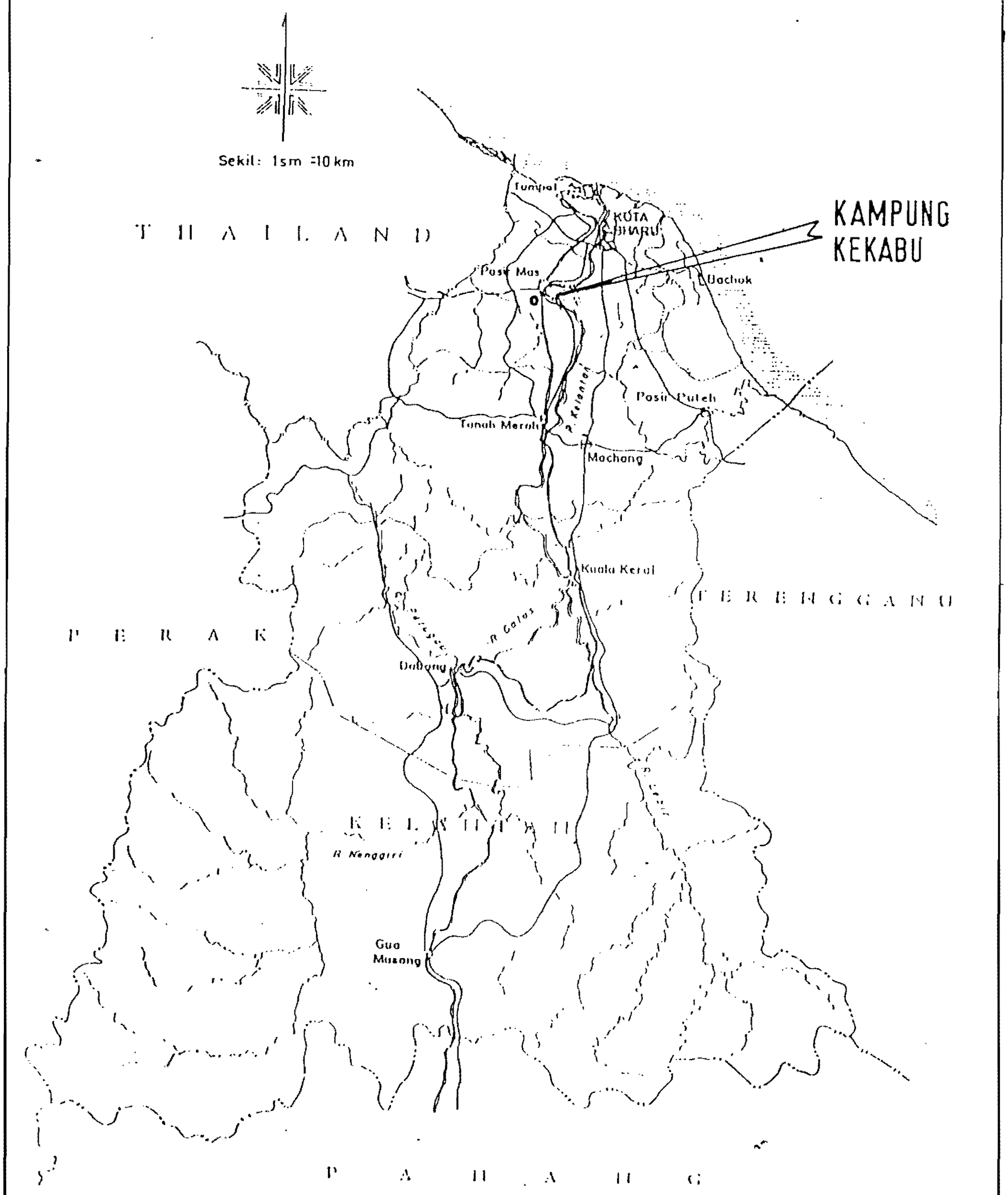
Figure 1

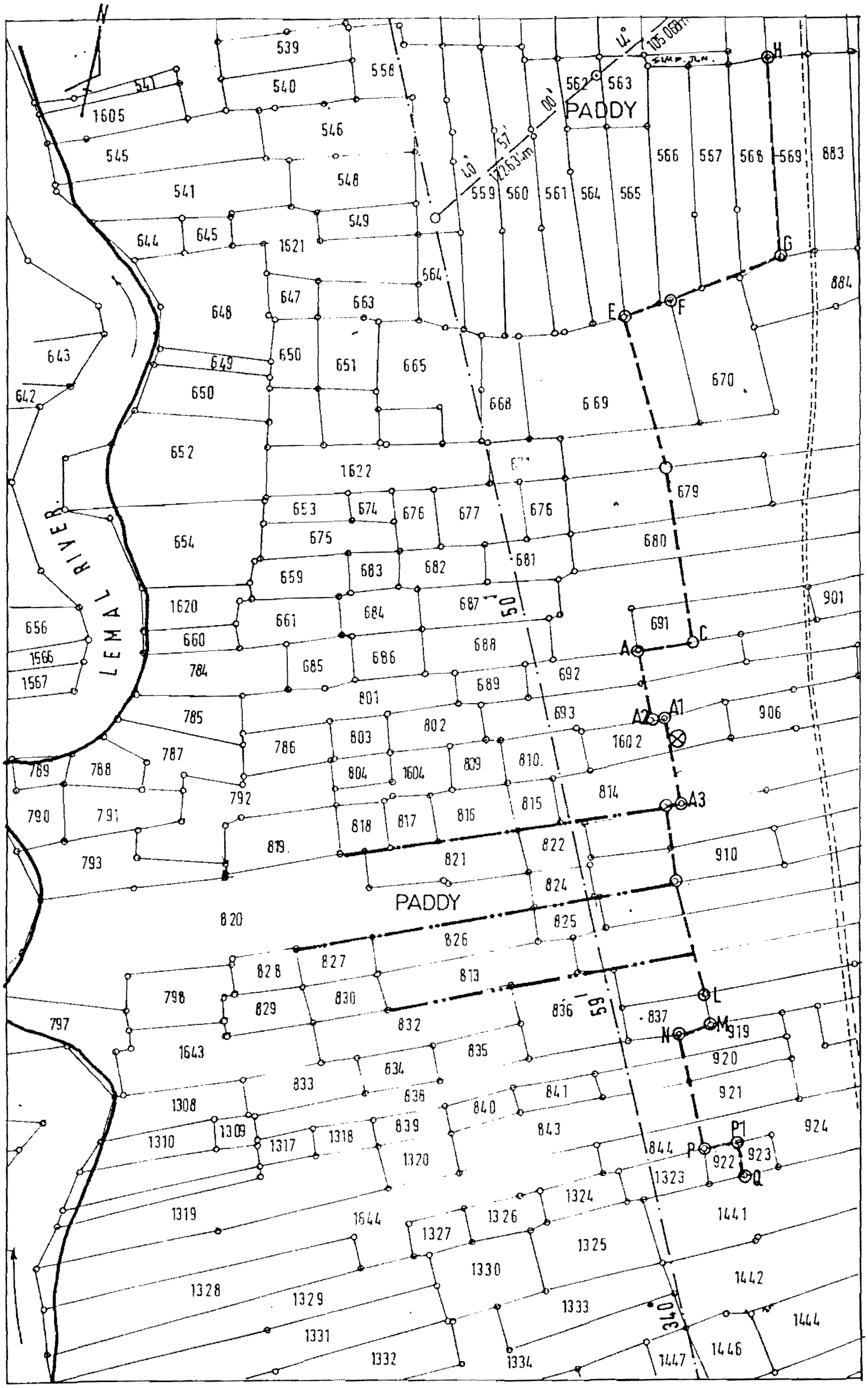



LOCATION MAP OF THE STATE OF KELANTAN

Figure 2




LOCATION MAP OF KAMPUNG KEKABU




Main Canal
Secondary Canal
Electric Submersible Pam

SCALE 1:3168

LAYOUT PLAN OF KAMPUNG KEKABU IRRIGATION SCHEME

FIGURE 2A

| AVERAGE MONTHLY RAINFALL AT TOK UBAN FOR 5 YEARS PERIOD (1987 – 1991) | |
|---|---|
| MONTH | AVERAGE (mm) |
| JAN | 136.4 |
| FEB | 31.1 |
| MAR | 45.9 |
| APR | 110.0 |
| MAY | 162.6 |
| JUN | 147.3 |
| JUL | 187.1 |
| AUG | 228.9 |
| SEP | 301.9 |
| OCT | 241.7 |
| NOV | 523.5 |
| DEC | 561.0 |

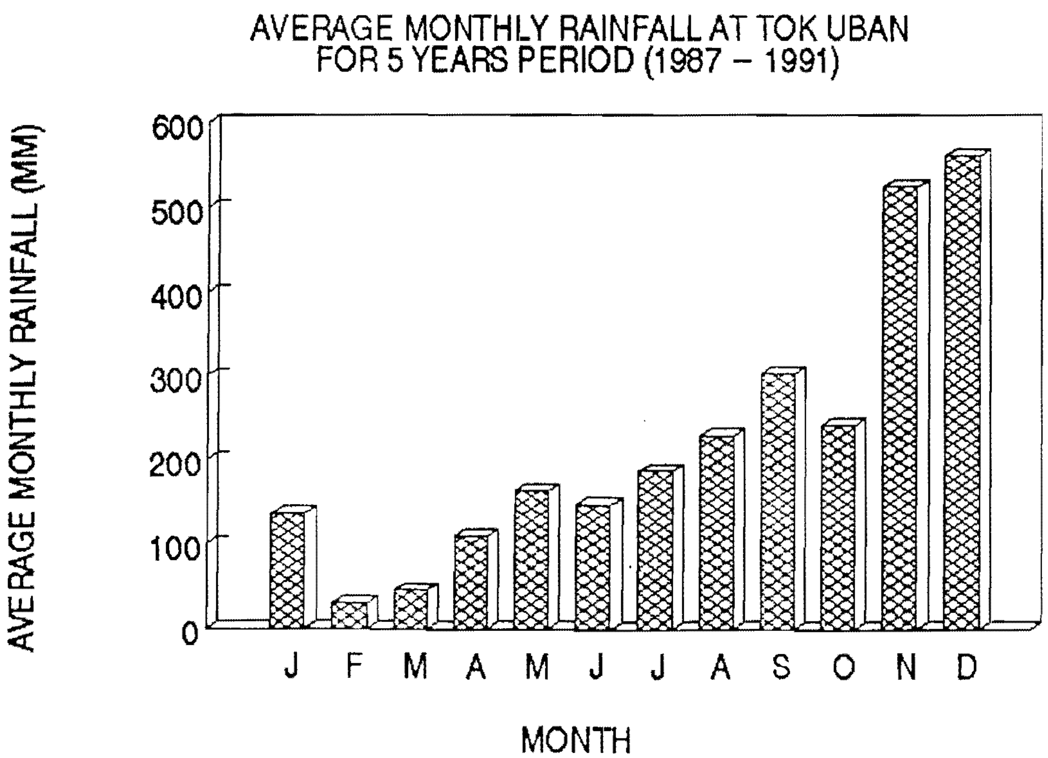



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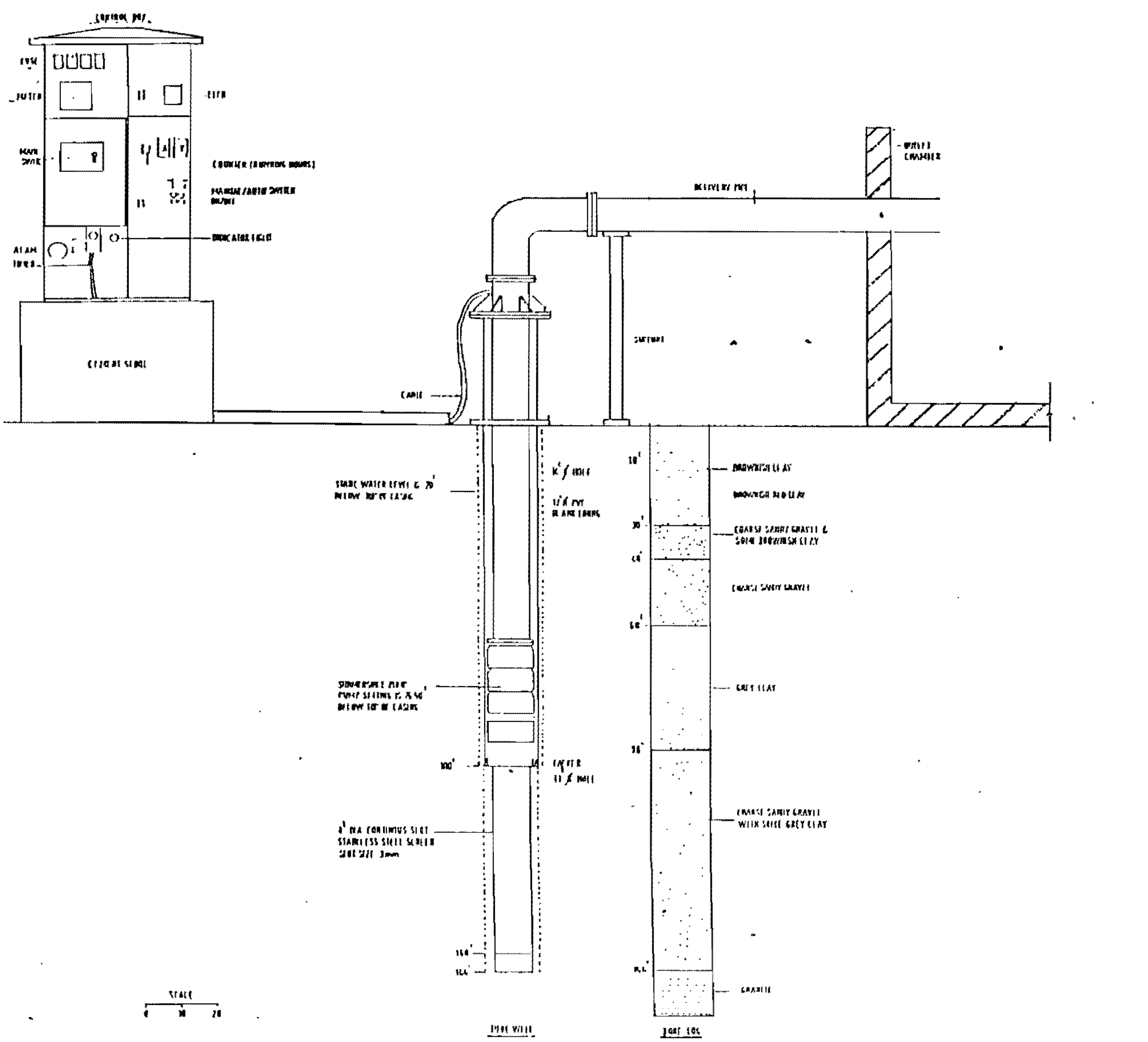
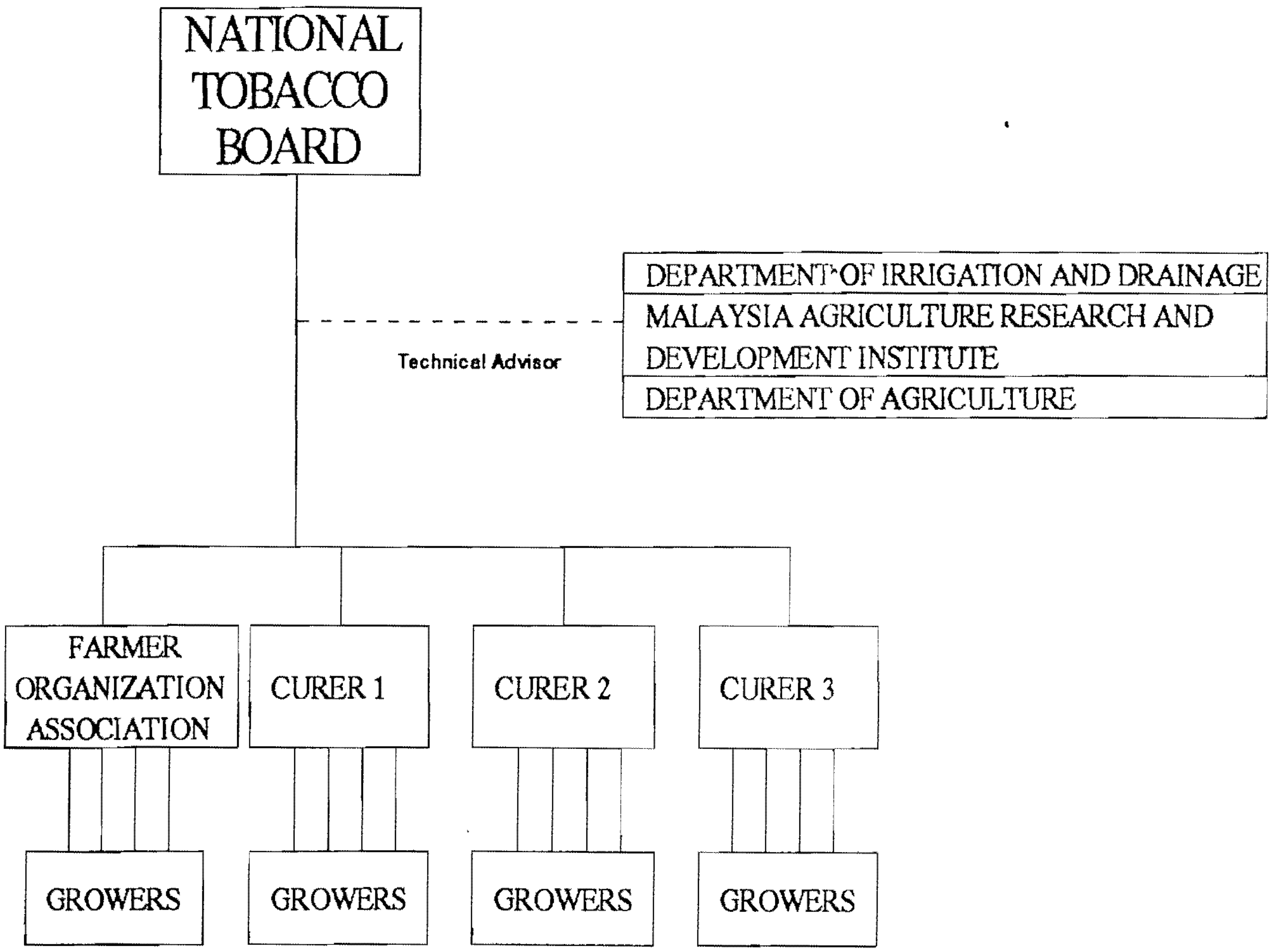
Figure 4




KEKABU UNDERGROUND WATER PUMP INSTALLATION

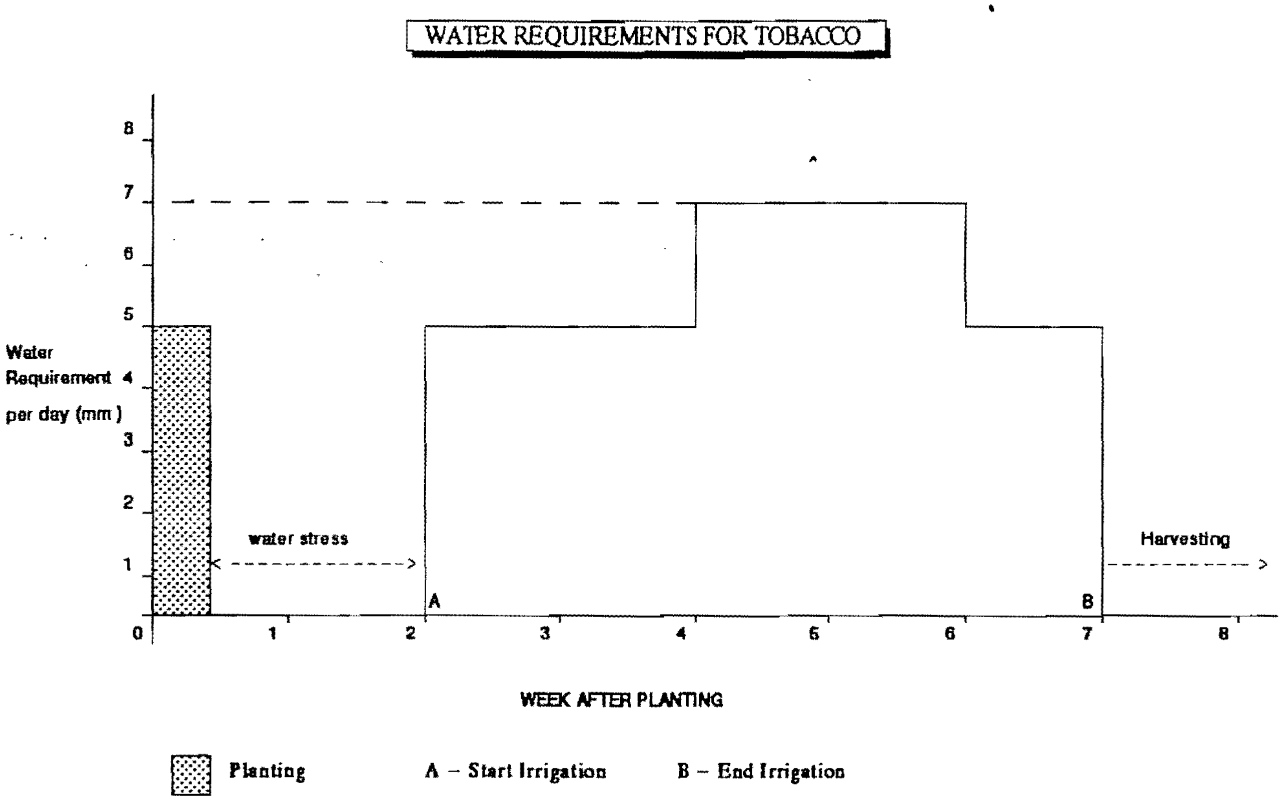
# ON-FARM ORGANIZATION

## DRY SEASON




REF.C:\AZ\NTB

FIGURE 5 A

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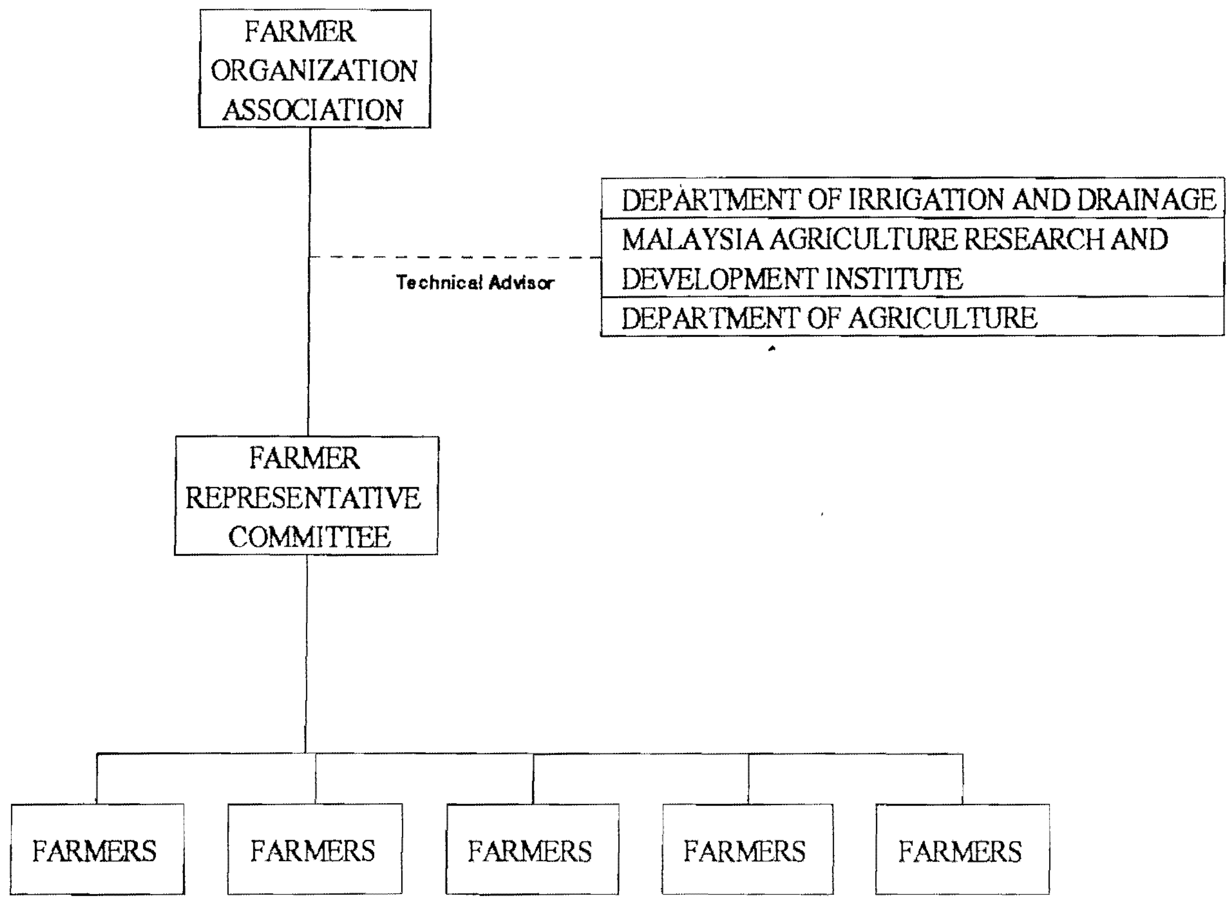
# ON-FARM ORGANIZATION

## WET SEASON




REF.A1.6\NTB

Table : 1

## PRODUCTION COST FOR GREEN LEAF

| ITEM | COST/HECTARE ($) |
|---|---|
| **A. PRODUCTION OF SEEDLINGS** | |
| 1. Seed | 0.88 |
| 2. Chemicals for pest and disease controls | 18.90 |
| 3. Fertilizer | 17.50 |
| 4. Seedbed cover | 92.75 |
| 5. Poly Pots " kerek " | 79.80 |
| Sub-Total: | 209.83 |
| **B. GROWTH STAGE** | |
| 1. Rent | 869.75 |
| 2. Fertilizer | 227.50 |
| 3. Chemicals for pest and disease controls | 174.83 |
| 4. Land Preparation | 428.75 |
| 5. Chemicals - sucker control | 63.70 |
| Sub-Total: | 1,764.53 |
| **C. EQUIPMENTS** | 190.59 |
| **D. ELECTRICALS CONSUMPTION** | 58 |
| GRAND TOTAL: | 2,222.95 |

REF.A1.6\PCGL

Information for the Scheme Inventory

| Main item | Item | Sub-item |
|---|---|---|
| Overall | General | Scheme code number, name of scheme, location, type of scheme, year of completion, area of scheme, major towns nearby, accessibility |
| | Socio-economy | Name,population, household number and farm household number of Mukim in which scheme is located; total number and land holding size of beneficiary farm household; land holding and tenure situations |
| | Topography and soil series | Topography, elevation, ground slope, soil survey previosly done, soil conditions, typical land use around scheme |
| | Agricultural development project | Existence of on-going rural and agricultural development projects covering scheme; name,responsible agency and sponsorship of projects |
| Facility | Water source | Name of water source river, river gauging station, diversion discharge, catchment area at diversion point, representative rainfall and meteorological station, quality of irrigation water |
| | Irrigation water demand requirement | Designed discharge value, actual diverted discharge, situation and affected area of water shortage in normal year, main reasons of water shortage |
| | Irrigation facilities | Type of diversion structures, headworks, pumphouse, intake structure at diversion site, total length of irrigation canal, canal structures, specific problems. |
| | Drainage and flood control facilities | Total length of drainage channels, drainage structures, drainage conditions, main reasons of poor drainage, area affected by floods, estimated flood damage, measures for flood mitigation with estimated costs |

r:tab2

| Main item | Item | Sub-item |
|---|---|---|
| | Farm road | Length and width of farm roads, surface pavement, specific problems, trunk road connected. |
| | Operation and maintenance | Annual O & M costs |
| | Investment cost | Initial investment cost, major rehabilitation cost |
| | Water charge | Basic rate, situation of collection main reason of difficulty to collect water charge |
| Cropping | Land | Land use changes and actual cultivated area for the previous five years, situation of idle land. |
| | Farming system | Farm operation system, cropping pattern, farm plot condition, use, possession and rental fee of agricultural machinery |
| | Crop production | Crop yield and total crop production for the previous five years |
| | Crop budget | Farm gate prices and production costs of crops, specific problems against increasing crop production |
| Supporting services | Post harvest facilities | Rice mill facilities, storage facilities, processing facilities other than tree crops |
| | Agricultural support services association | Farmers' association, farmers' cooperatives, extension services, available credit services, farm input supply, selling of crops, specific problems concerning supporting services |

r:tab2

# EVOLVING A MANAGEMENT INFORMATION SYSTEM FOR IRRIGATORS' ASSOCIATIONS*

Fay M. Lauraya, Antonia Lea R. Sala and Ma. Juliet Caceres**

ABSTRACT

This paper documents the procedure adopted in evolving a management information system for the Irrigators' Associations (IAs) using the results of the self-assessment of irrigation system performance by farmer leaders in a River Irrigation System in the Philippines. The management information system aims to strengthen the IA's managerial capability by introducing a systematic process for planning and monitoring IA activities, improve farmers' capacity to analyze the performance data they themselves have collected and to link the IA's management information system to the National Irrigation Administration's (NIA) information needs. The paper poses several challenges both for the farmer organization and to the partner agency in order to sustain the feedback mechanism instituted.

## INTRODUCTION

In 1991, the Bicol University (BU) together with the National Irrigation Administration (NIA) Region V, and IIMI Philippine Field Operations introduced a self-assessment mechanism for measuring Irrigators' Association (IA) performance in two farmer-organizations in Nabua, Camarines Sur (about 400 Km South of Manila). The project covered an aggregate of 2,636 members and 106 farmer-leaders. Encouraging the use of the self-assessment process among farmer-leaders as a routine performance monitoring mechanism within the organization became an impetus for evolving a management information system in the IA. This paper shall describe and analyze the process adopted by the farmers in developing a management information system for their organization.

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* Paper for presentation at the Asian Regional Workshop in the Inventory of Farmer-Managed Irrigation Systems and Management Information System

** Project Leader and Study Leaders, BU-NIA-IIMI Project to Strengthen the Management Capability of Irrigators' Associations in Bicol, Philippines

RATIONALE

IAs have been organized to operate and maintain the systems in cooperation with the NIA. In recent years, IAs have been assuming important system management responsibilities particularly those under Type II and III contracts. Under the Type II contract, farmer-organizations assume the system operations and irrigation service fee (ISF) collection functions. Systems operations include: 1) planning the O & M activities and undertaking the O & M from the turn-out to the main farm and supplementary farm ditches; 2) planning, implementation and monitoring of the cropping calendar; 3) water allocation and distribution; 4) conflict management; and 5) maintaining linkage between the farmer-users and the NIA. Collection functions include: 1) planning effective collection strategies; 2) distribution of ISF bills; and 3) undertaking ISF collection. Meanwhile, under the Type III contract, there is full turnover of the whole or part of the irrigation system to the farmers. Although the farmer leaders of IAs undergo leadership training before their organizations assume these tasks, they have not successfully internalized mechanisms that shall strengthen management capabilities in order to face the challenges poised by their new irrigation management responsibilities. Thus, the self-assessment of performance by farmer members and farmer leaders was conceived. The objectives of the self-assessment experiment are as follows: 1) monitor and evaluate performance of irrigation systems in general and IAs in particular; 2) to introduce a learning process to identify and characterize the types of strategies that could be used internally by farmers to catalyze collective action and thereby improve system performance as an alternative for external catalyst/intervention; 3) to strengthen the IA's managerial capability by introducing a systematic process for planning and monitoring IA activities (both for operations and organizational); 4) to improve farmer's capacity to analyze the performance data they themselves have collected; and 5) to link the self-assessment scheme with NIA's information system.

As the term suggests, the self-assessment mechanism required the Turn-Out Service Area (TSA) Leaders to gather data pertaining to the situation of his turn-out which are indicative of how well he is performing his O & M and institutional development responsibilities. This self-correcting scheme is complemented by participatory assessment by farmer-members at the lowest stratum of the organizational hierarchy spearheaded by the farmer-leaders at supplementary ditch levels. Utilization of the TSA Leaders' performance report by the Board of Directors (BOD) and Officials at the Central Level of the IA completes the information flow to the decision points of the organization.

Figure 1 illustrates the relationship of the organizational structure to the information flow required by the IAs' decision-makers. Tagged as Levels I to III are the stages where the data are generated, analyzed and acted upon.

DECISION POINTS (Levels I to III)

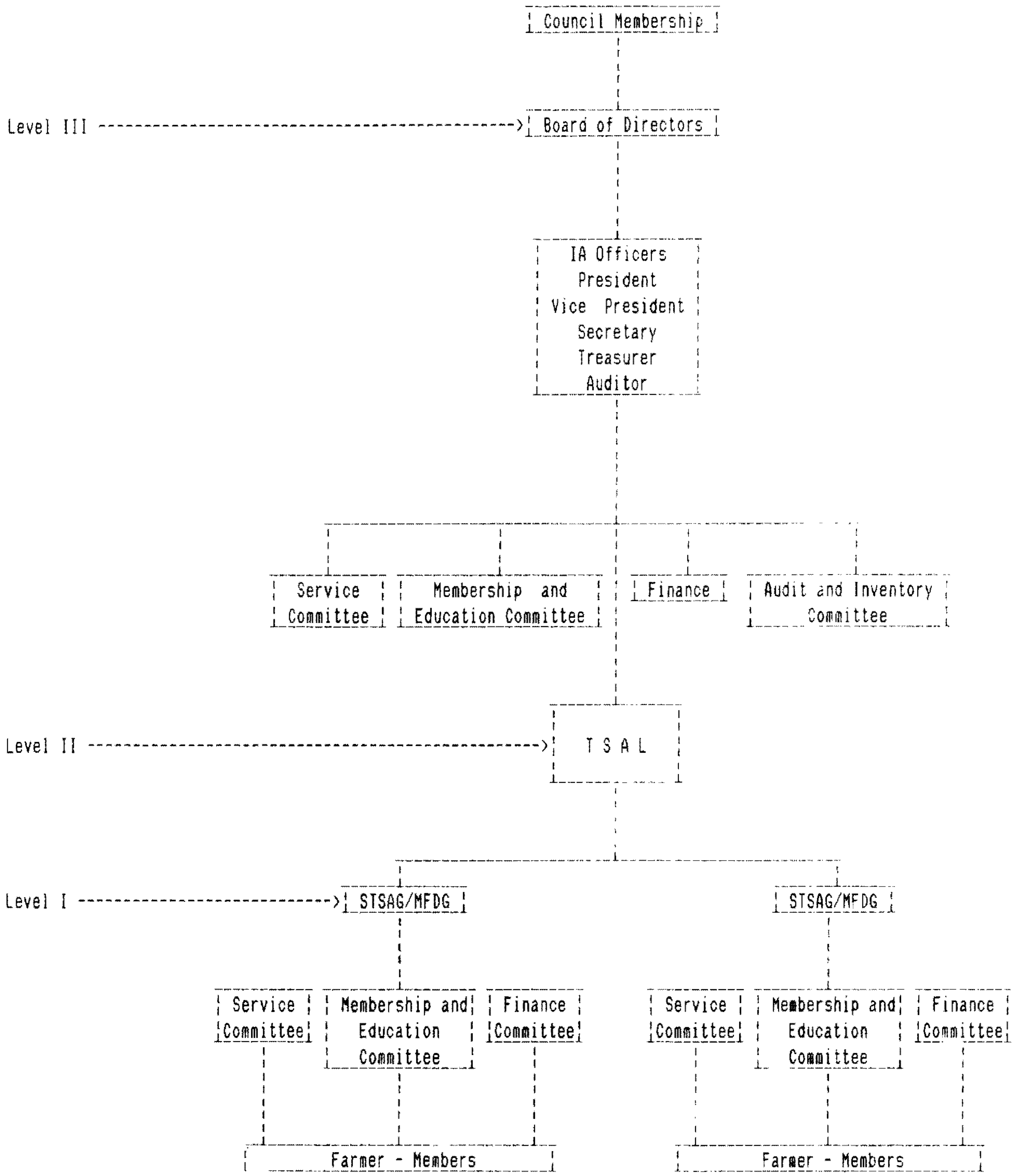


Figure 1. ORGANIZATIONAL STRUCTURE OF THE IA ADOPTED BY THE ACTION-RESEARCH PROJECT

Tracing the information flow in the organizational structure of the IA, the TSA Leaders are the vital link between the IA Central Level Officials and the mass-based membership. If the TSA Leaders are inactive, the chain in the information flow is broken resulting in inaction. Given this strategic role of the TSA Leaders in the organization, the IA officials should have an information system that would enable said officials to monitor the TSA Leaders' performance. Considering that the TSA Leaders are already collecting the data that reflect capability to carry out their mandated functions, the next step was to put in place a mechanism that would channel and process the information from the TSA Leaders to the Central Level Officials and the BOD. Inasmuch as the data generated by the TSA Leaders do not only capture their performance indicators but also cover information pertaining to the status of irrigation structures, farm data needed to establish probable collection level of irrigation service fees, problems and issues experienced by the members, among others, the self-assessment process as input to the information needs of the BOD and Central Level Officials would be of great help in arriving at sound decisions, responsive policies and regulations in the organization.

## CONCEPTUAL FRAMEWORK AND METHODOLOGIES USED

### Conceptual Framework

The self-assessment process serves as primary data source for the Management Information System of the IA. A sound feed-back mechanism shall have a direct consequence on the level of performance of supplementary, turn-out service are leaders and IA Officials which in turn shall have bearing on the degree of effectiveness of the farmer organization in delivering services to the water-users. The NIA would also benefit from the IA's Management Information System by facilitating its data generation requirement at the grassroots level. It may be mentioned that as part of the project's intervention activities, the O & M personnel have adopted their own performance assessment system utilizing the data reported by the TSA Leaders. Through regular interaction with the farmer-leaders, the NIA personnel are provided with timely information that could be used as basis for planning the O & M work of the agency. The designed reciprocal action between the agency personnel and the farmer-leaders is hoped to result in a better working relationship between this water-management partners that would propel an improvement in irrigation system performance.

Figure 2 illustrates the schematic flow of expected results of the Management Information System.

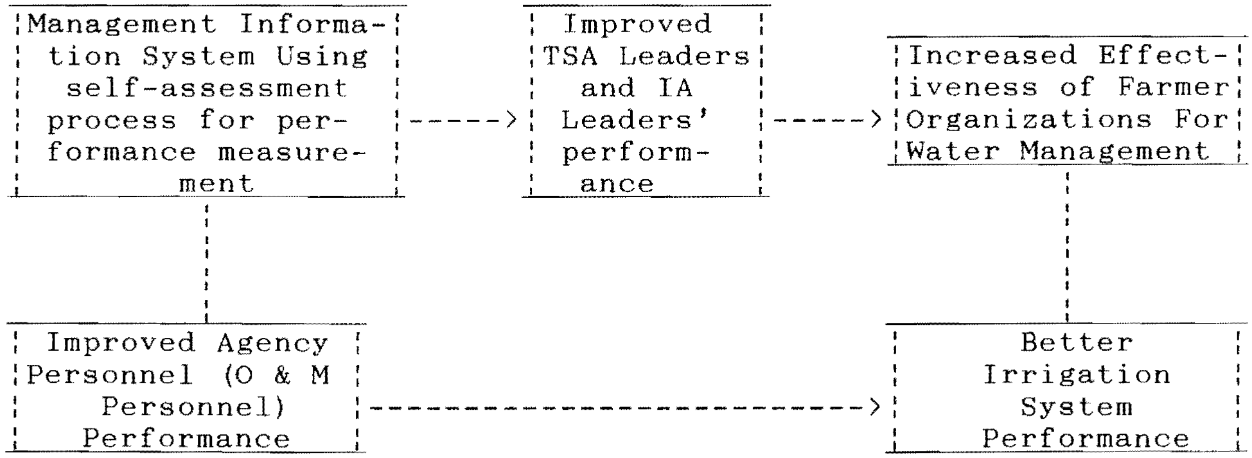


Figure 2. CONCEPTUAL FRAMEWORK

Methodologies Used

1. Establishing IA profile as baseline data. At the onset, the farmer-leaders felt the need for baseline data that would establish the profile for the organization. Using the spotmapping technique, the TSA Leaders sketched their service areas to reflect: a) boundaries of turn-out service area, supplementary and main farm ditches; b) lot number and lot area; c) structures and facilities; d) names of owners/tillers; and e) tenurial status. These data were deemed useful by the IA in updating water-user list as basis for membership campaign and collection of membership dues. On the part of the NIA, the spotmap data updated the list of water-users and validated farm areas for billing purposes. Although the said agency has an existing reporting mechanism (IAMIS), such is not currently adopted in the field due to its present format which requires voluminous data on a per farmer basis. Initial results showed that there are a number of farm lots not presently registered with the IA and the NIA that are using irrigation water but are not billed. For the next cropping season, it is expected that there will be an increase in irrigation service fee collection due to the inclusion of newly identified water users in the IA/NIA's billing list.

2. Data Generation. As mentioned earlier, the information system of the IA utilized the self-assessment of the performance by the TSA Leaders (including the leaders at the lower level of supplementary ditches) as primary inputs. In designing the self-assessment tool, the project team has taken into account the dynamics of the IA organizational activities vis-a-vis farming activities. There is facility in understanding the data gathered because the farmer-leaders are analyzing the data they themselves have collected. A sample of the data gathering instrument is herein attached as Annex 1. Through a series of consultation meetings with farmer-leaders the instrument had been streamlined to reflect the most essential questions needed by the TSA Leaders to carry out their functions. The questions had also been transformed to facilitate recording but at the same time draw out vital information for planning and decision-making. Data gathered cover the areas of water management, organizational activities, maintenance, conflict management and farming activities. Inasmuch as the self-assessment process had been structured to capture the indicators of performance of the TSA Leaders, a list of the latters' duties and responsibilities was attached to the questionnaire. This list served as the link between the self-assessment process and the farmer-leaders' mandated duties. By emphasizing the objective of the self-assessment process, i.e., it would guide the leader how to perform his duties better, the researchers gained the farmer-leaders' cooperation and appreciation for the need of the recording process. The spotmap drawn by the TSA Leader which contains valuable baseline data had been appended to the self-assessment questionnaire. The spotmap served two purposes: a) reference point in filling up the questionnaire; and b) space for recording status of canals and facilities.

On the part of NIA, its share of responsibilities in the participatory irrigation management scheme outlined in the O & M contract entered into with the IAs and are given flesh mainly by its own O & M personnel. These are the Water Masters and Ditch Tenders. Each ditch tender is assigned a specific area of assignment within the IA's service area and has a monitoring TSA Leader as counterpart for the O & M task. Since their duties are complementary, the researchers believed that the Ditch Tenders should also gather field information reflecting the situation in the turn-out which are relevant to the TSA Leaders and their performance. Thus, a monitoring form had also been devised for use by the said personnel, which is attached as Annex 2. The form contains data on farming activities, planted and harvested area and in addition to the TSA Leaders and Ditch Tenders' performance indicators such as length of canal cleaned and maintained, level of collection, status of structures, etc.

3. <u>Data Processing</u>. The TSA Leaders by virtue of the IA by-laws automatically comprise the BOD, the central decision-making body of the organization. In the pilot IAs, one IA has 59 TSA Leaders while the other has 47. To facilitate reporting and processing of data from the self-assessment results done by the TSA Leaders, the "small group" concept was adopted at the IA Central Level whereby each IA official was designated to oversee a group of TSA Leaders. Given the present number of 6-7 positions (President, Vice President, Secretary, Treasurer and Auditor; one IA opted to elect an Asst. Secretary.) each IA official is responsible for 7-8 TSA Leaders. He is tasked to supervise the accomplishment of the self-assessment tool, consolidate results and report same to the BOD during its monthly meeting.

Inasmuch as the performance data collected by the Ditch Tenders cover both the areas of responsibility of the TSA Leaders and the Ditch Tenders the Water Master who consolidates said report is provided a complete picture of the system for his own planning and decision-making function vital at this supervisory level. He then channels the consolidated report to the Irrigation Superintendent (IS) for action called for at this higher level. The Ditch Tender and the Water Master were designated by the IS to be NIA's representative to IA's BOD meetings or assemblies where NIA's participation is needed. This arrangement facilitates resolution of issues brought about during BOD meetings needing NIA attention. The NIA's Institutional Development Officer (IDO) tasked initially to organize the IAs is now responsible for developing training programs for farmers based on training needs identified by the O & M personnel as part of the NIA's pledge of enhancing the IAs' technical capability for irrigation management.

## LESSONS AND CHALLENGES FOR SUSTAINING A MANAGEMENT INFORMATION SYSTEM

At the time when this paper was written, the project team has just finalized the design for the self-assessment tool both for the IA's and the NIA's O & M personnel. The first round of the information flow is just about to commence although the self-assessment process at the TSA level has been ongoing since 1991. Nonetheless, even at this early stage the project team has faced several learning points that need to be pondered upon.

While we recognize that information is a key ingredient in decision-making process, and it is important for organizations to devote attention to designing appropriate systems of information flow (Kast and Rozenzweig, 1974), it is equally important to recognize the capability and resource at each decision point in the farmer organization to match the scope and influence of their decision-making functions. In the case of the IAs where the project is located, the TSA Leaders in LAPSEFIA which has a Stage II contract with the NIA, are responsible for clearing and maintaining farm ditches and has the authority to decide on how they may fulfill or undertake these obligations. Repairs, scheduling of cropping calendar, budgeting are decisions within the realm of the central decision-making body, the IA BOD. Prior to the installation of management information system, the generation and disbursement of funds are centralized functions of the organization which means that the TSA Leaders are not provided with regular funds which they can use to act on matters within their authority. The only resource available to them is voluntary services from members, which also requires mobilization funds for meals or snacks as incentive. A challenge that IA Leaders should ponder is how to provide real incentives to farmer leaders to turn in higher performance and act on the problems and issues resulting from the feedback mechanism instituted. As Goonesekera concludes (cited in Merrey, Rao and Martin, 1988), there is a need to provide irrigation managers with financial incentives to provide good management. For a start, LAPSEFIA and BRISDAFIA (the two IAs covered by the project) have decentralized the collection of annual dues from members and as much as 90% of such dues are now retained at the TSA level as seed money for TSA activities. On the average, each TSA stands to collect about ₱ 250.00 (US $ 10.00) per year, the amount of which is very meager to cover anticipated expenses. Another action towards increasing funds is to intensify ISF collection effort by systematizing collection procedures and by providing higher incentive pay for IA collectors.

Feedback from the President of the IA attests that the information system will serve as basis for farmer-leaders in providing direction for the organization as a whole. However, IA Officials are pressured to act on problems that are supposed to be within the NIA's realm of responsibility, in order to maintain the feedback mechanism instituted at the farm level. Because of farmers' increasing awareness of the condition of their irrigation system, they have become very "demanding" for the NIA to fulfill its part in the IA-NIA partnership for operating and maintaining the system.

The constant reference to inaction of NIA on problems that surfaced during the participatory assessment process conducted in 1991 was a learning experience in itself. Henceforth, farmers were encouraged to identify workable areas given their organization's limited resources and to pin less hope on the NIA fulfilling its part on the O & M contract due to the agency's present financial condition. The researchers observed that leveling out with farmers on the NIA's present handicap to meet its O & M obligations triggered positive response among farmer-leaders to act on problems even if they are under the agencies' legal responsibilities. However, the IAs at the moment do not have enough financial resources to undertake major maintenance and repair works required by existing structures. Turn-out gates which had no lock was seen by farmer-leaders as critical repairs that should be undertaken to have control over water releases and to impose penalties on undisciplined water-users (through suspension of water delivery). Meanwhile, the IA has come up with a list of rules and regulations with accompanying sanctions for violations to protect the structures and irrigation facilities.

IA officials are seeking the conversion of IA policies into Barangay (a political subdivision smaller than but within the Municipal boundaries) or Municipal Councils' ordinances or laws as a measure to elicit higher compliance.

On NIA's part, it is therefore recommended that periodic assessment of its capability to fulfill its obligations as stipulated in O & M contract with the farmers organization be undertaken and resulting information should be matched with the physical rehabilitation demands of the water-users, to quash unrealistic expectations of farmers and at the same time to trigger the farmer organizations to develop their own capability of resolving their operation and maintenance requirements such as going into marketing functions.

## CONCLUDING REMARKS

The basic intervention activity employed by the project team is the evolvement of a management information system within the IA that utilizes the self-assessment of performance as primary input. For this system to effectively work, it would need several ingredients as follows:

Firstly, TSA Leaders who recognize the sensitive role they play in the information flow within the organization; who care enough to act on issues and improve their performance for the betterment of service delivery.

Secondly, IA officials who have the vision to set higher goals and steer the organization towards attainment of those goals through sound judgment based on adequate and reliable information.

Finally, an honest assessment of existing capabilities in order to establish a clear-cut role between the agency and the IA as basis for defining areas for action-planning and decision-making is called for.

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Lauraya, F.M., Sala, A.R., and Wijayaratna, C.M., 1991. Self-assessment of Performance by Irrigators' Associations (Philippines). Paper presented at the Third International Workshop of the FMIS Network on Performance Measurement Farmer-Managed-Irrigation Systems, Mendoza, Argentina, 12-15 November 1991

ANNEX 1. Sample Self-Assessment Form



Block B. PAG-MANIHAR KAN TUBIG (WATER MANAGEMENT)

| | July | to | June |
|---|---|---|---|
| **A. Water Distribution** | | | |
| A.1 Pira tabi an parcela nin dagang pigtatanuman sa turn-out an nakakakua nin tamang supply/bastanteng supply nin tubig? (Number of farmlots or parcels of land with sufficient water supply) | | | |
| **B. Komunikasyon (Communication)** | | | |
| B.1 Pirang para-oma an aram kun nuarin maabot an saindang tubig? (Number of farmers who know when irrigation water is coming) | | | |
| B.2 Pira an dai nagsunod sa cropping calendar? (Number of farmers who fail to comply with cropping calendar) | | | |
| **C. Rotation (Kun pinag-guiguibo)** | | | |
| C.1 Pirang para-oma an nagtatabang sa rotation lalo kun an turn-out nagkukulang o nagtitipid sa tubig? (Number of farmers who participate in rotation when there is insufficient supply of water) | | | |
| **D. Pag-resolvir ki Iwal (Conflict Management)** | | | |
| D.1 Pira an total na bilang nin mga iwal/dai pagkasinarabutan manongod sa tubig sa laog kan bulan na ini? (Total number of conflicts over water experienced this month) | | | |

| | July | to | June |
|---|---|---|---|
| D.2 Pira an total na bilang nin mga iriwal/dai pagkasinara-butan manongod sa tubig an naresolbir tolos o natawan nin solusyon sa marhay na paagi? (Total number of conflicts over irrigation water that has been easily resolved) | | | |
| E. Pag-distribuir ki Trabaho (Task Distribution) | | | |
| E.1 Pirang mga paraoma sa laog kan TSA ang pigtawan mo nin trabaho/gigibohon ngonyan na bulan? (Number of farmers given specific tasks this month) | | | |

Block C. PAGPLANO KAN MGA AKTIBIDAD SA ORGANISASYON (PLANNING OF ORGANIZATIONAL ACTIVITIES)

| | July | to | June |
|---|---|---|---|
| A. Presensya sa mga Miting (Attendance in Meetings) | | | |
| A.1 Bilang kan TSA meeting na guinibo sa bulan na ini? (Number of TSA meetings held this month) | | | |
| A.2 Pirang mga para-oma sa TSA an nag-atindir ki meeting? (Number of farmers who attended the meetings) | | | |
| A.3 Pirang small group an nagkaigwa ki pamiting sa bulan na ini? (Number of small groups who conducted meetings this month) | | | |
| A.4 Pirang mga para-oma sa small group an nag-atinder ki meeting? (Number of farmers in the small group who attended meetings) | | | |
| Group 1 | | | |
| Group 2 | | | |
| Group 3 | | | |

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ANNEX 2. Sample Form: Ditch Tender Performance Monitoring Form

NAME OF TSA ____________________

| | B-LINE DATA | Jul | Aug | Sept | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|
| **BLOCK A. FARM DATA** | Number of Farm Lots | | | | | | |
| A. 1 Stage of Farming Activities (Indicate number of farmlots engaged in:) | | | | | | | |
| a. land soaking and land preparation | | | | | | | |
| b. planting | | | | | | | |
| c. crop maintenance | | | | | | | |
| d. terminal drainage | | | | | | | |
| e. harvesting | | | | | | | |
| A. 2 Area Planted To date (hectares) | Total Area | | | | | | |
| A. 3 Status of Crops | | | | | | | |
| a. hectares damaged | | | | | | | |
| b. hectares in satisfactory condition | | | | | | | |
| A. 4 Extent of Harvested Area To Date (Hectares) | | | | | | | |
| **BLOCK B. WATER DISTRIBUTION** | | | | | | | |
| B. 1 No. of farmlots with sufficient supply of water | | | | | | | |
| B. 2 In equivalent hectares | | | | | | | |
| B. 3 No. of farm lots without water from irrigation | | | | | | | |
| B. 4 In equivalent hectares | | | | | | | |

| BLOCK C. MAINTENANCE OF FARM DITCHES | B-LINE DATA | Jul | Aug | Sept | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|
| | Canal Lgth | | | | | | |
| C.1 Status of MFDs | | | | | | | |
| 1 - very clean | | | | | | | |
| 2 - fairly clean | | | | | | | |
| 3 - dirty | | | | | | | |
| C.2 Status of SFDs | | | | | | | |
| 1 - very clean | | | | | | | |
| 2 - fairly clean | | | | | | | |
| 3 - dirty | | | | | | | |
| C.3 Status of Laterals | | | | | | | |
| 1 - very clean | | | | | | | |
| 2 - fairly clean | | | | | | | |
| 3 - dirty | | | | | | | |
| C.4 Status of Main Canals | | | | | | | |
| 1 - very clean | | | | | | | |
| 2 - fairly clean | | | | | | | |
| 3 - dirty | | | | | | | |
| C.5 Status of Structures | | | | | | | |
| a. Div. Box | | | | | | | |
| 1 - damaged | | | | | | | |
| 2 - moderately good | | | | | | | |
| 3 - in good condition | | | | | | | |
| b. Steel Gate | | | | | | | |
| 1 - damaged | | | | | | | |
| 2 - moderately good | | | | | | | |
| 3 - in good condition | | | | | | | |

c. Foot Bridge
   1 - damaged
   2 - moderately good
   3 - in good condition

d. Others
   1 - damaged
   2 - moderately good
   3 - in good condition

BLOCK D. FINANCIAL ASPECT

D. 1 No. of hectares that have paid ISF to date.
   a. to IA
   b. to NIA Collector

Certified Correct by: __________; TSA Leader

Validated by: ________________; Water Master

| B-LINE DATA | Jul | Aug | Sept | Oct | Nov | Dec |
|---|---|---|---|---|---|---|
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## Problems Observed/Reported by TSAL

| Problems<br>Date ____________ | Action | Problems<br>Date ____________ | Action | Problems<br>Date ____________ | Action |
|---|---|---|---|---|---|
| | | | | | |
| **Problems<br>Date ____________** | **Action** | **Problems<br>Date ____________** | **Action** | **Problems<br>Date ____________** | **Action** |
| | | | | | |
| **Problems<br>Date ____________** | **Action** | **Problems<br>Date ____________** | **Action** | **Problems<br>Date ____________** | **Action** |
| | | | | | |

# PILOT INVENTORY OF COMMUNAL IRRIGATION SYSTEMS IN THE PROVINCE OF CAPIZ

by

Rudy R. Ibabao[1]

## I. INTRODUCTION

This report is an account and a presentation of the result of the pilot inventory of all existing National Irrigation Administration (NIA) Communal Irrigation Systems (CIS) in the province of Capiz. The inventory was conducted in June, 1988, by a NIA inter-disciplinary team composed of three technical personnel and four institutional workers, guided by two staff of the Provincial Irrigation Office (PIO) of Capiz, and assisted by two support personnel (Appendix B).

The inventory was first implemented in the province of Capiz as a pilot activity preparatory for its supposed regionwide implementation. As a whole, the inventory of all communal irrigation systems in Region VI was initiated to be conducted by the Planning Section of NIA, Region VI in order to:

1) make a realistic field level assessment and evaluation of the status, both technical and institutional, of all CIS constructed by NIA in Region VI,

2) verify monitoring data such as area, number of farmer beneficiaries, number of structures, etc. on all these CIS,

3) establish benchmark information for these systems.

This report will therefore, attempt to:

1) describe the process and procedures in the conduct of the inventory,

2) identify and assess salient lessons from experiences during the pilot inventory, and,

3) present in summary the highlights of the findings and observations per the inventory.

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## II. METHODOLOGY

### A. Identification of Capiz as Pilot Area

Of the five provinces in Region VI, Capiz shown in Figure I, was selected as pilot area for the conduct of the CIS inventory. The selection was based on the discretion of the Regional Irrigation Office (RIO) management as per recommendation by the Planning Section of the office.

There were no official guidelines set for the selection of the pilot area but some basic factors relative to conduciveness to the learning from the pilot activity were, nevertheless considered. These factors include:

1) Proximity of the CIS to the Capiz PIO.

2) Fewer existing systems in the province as compared with the other four provinces of the Region.

3) Wide range of Irrigators Aassociation's (IA) viability status.

4) Security considerations.

### B. Formulation of Questionnaire

A questionnaire for the inventory (Appendix A) was prepared one week before the pilot inventory activity, by the Planning Section and the Isntitutional Development Division staff of the RIO. The questionnaire covered two main areas of concern, the technical and the institutional. The technical aspect centered on the CIS's physical profile and functionality, while the institutional aspect focused on the organizational, CIS management, and financial status of the IA.

The questionnaire was first presented to the inventory team during an orientation session on the mornming of June 14, 1988. During that session the questionnaire was thoroughly discussed by the group and some revisions were made.

<u>Technical</u>

No significant revisions on the technical portion of the questionnaire was made during the orientation session. Basically, only a levelling of interpretations of terms was facilitated in order for members of the inventory team to have a common understanding of the data required in filling up the questionnaire.

Institutional

Some changes in the institutional portion of the questionnaire were made during the orientation session. The changes were the inclusion of additional items in the format designed to further highlight certain viability indicators in IA organization and system management. The insitituional questionnaire format was finalized on the second day of the session.

C. Pre-Testing

Pre-testing of the inventory questionnaire was conducted at Salcedo CIS - the first system visited by the team. The pre-testing made way for the further refinement in the format of the questionnaire and also served as insight for the team in estimating the time to be alloted in the actual inventory (walkthrough and interview) as well as other factors to be considered in the conduct of field work.

D. Respondents

Except for non-operational systems, the respondents during the actual inventory were the farmer-users of the systems being surveyed. In most cases, these farmers were officers of the irrigators associations.

No scientific sampling method was used in the selection of respondents for the inventory. Basically, all IA members (and in some cases other barangay residents) available for interview were tapped as source of information.

Technical

For the technical inventory, the main respondent was identified to serve as guide for the system's walkthrough. This respondent was usually the IA water tender or the IA President, or any IA officer who has knowledge of the system's physical layout and characteristics. During the walkthrough, members of the technical team also interviewed farmers whom they met to further validate their observations and findings.

Institutional

Generally, the respondents for the institutional inventory were key officials of the system's irrigators' association like the IA President, Vice President, Secretary, Treasurer, Auditor and members of the Board of Directors (BOD) who were knowledgeable of the organizational profile and system management policies and practices of the association. Other IA members were tapped primarily for validation of data and observations.

## III. INVENTORY PROCESS

### A. Schedule of Field Work

To serve as schedule for field work, the inventory team made a listing of all existing CIS in the province of Capiz, arranged by municipality. As decided by the group (Appendix C), the schedule of field work was made municipality based. Systems within a particular munipality were scheduled for visitation on the same day except when access from one system to another was not practicable. No specific dates were, however, designated per municipality/project in order to give way for flexibility in scheduling.

As the team progressed in the inventory of the systems, the names of the systems already visited were deleted from the list by simple cancellation method.

### B. Procedure

In the actual conduct of the inventory field work, a general pattern of procedure had been established, viz:

1) Advance notice - whenever possible, the inventory team, through the Senior Irrigation Community Organizers (ICO) or the Irrigators Organization Worker (IOW), gave advance notice to the IA regarding the arrival of the team.

2) Courtesy call - Upon arrival at the system, the inventory team first made a courtesy call with the IA President or the next higher IA officer when the president was not around.

3) Briefing - After introducing each member of the team, the IA President and other IA officers/members present is then briefed on the purpose of the team's visit. The Sr. ICO or IOW of the system was usually made responsible in introducing the members of the team while the briefing was done by any member of the team.

4) Identification of guide for the technical walkthrough and respondents for the institutional interview.

5) Conduct of system's walkthrough and group interview - these activities were undertaken simultaneously except for non-operational systems where institutional interviews were not conducted and also in the case of San Roque CIS where only the IA President was present.

a) Technical Walkthrough - The physical/technical inventory of the system was conducted by walkthrough with the assistance of a guide (usually IA water tender or IA President). During the walkthrough, conducted upstream to downstream or vice-versa, the technical team made an ocular inspection of all the system's facilities - canals and structures. A member of the team listed the different existing structures and canal lines, observed and made notations as to their physical status and functionality. Another member of the team, noted down these existing structures and facilities with the use of a layout map, indicating their locations (stationing) as well as their physical status and functionality.

Diversion discharge calibrations and soil analyses (upstream, midstream and downstream portions) were also conducted during the walkthrough. These were undertaken by one technical member of the team along with the ocular geological analysis of the terrain within the vicinity of major structures and facilities (e.g., damsite).

b) Institutional Interview - The institutional aspect of the inventory was undertaken by group interview and actual inspection of IA records and documents. The group interview was conducted by either of the two institutional members of the team as main interviewer while the other assisted by giving follow-up questions for clarifications. The main interviewer was asssigned to fill-up the interview questionnaire and was, therefore, responsible for the continuity in asking the main questions per the questionnaire. Follow-up questions were asked in cases when the answers of respondents were not clear or when there was need to probe for more accurate responses.

The interview was followed by actual inspection of IA records and documents (financial and organizational). This was done with the consent and in the presence of the IA officer responsible for the records - IA Secretary, Treasurer, Auditor, etc. Observations in this regard were noted down in the questionnaire.

6) Collation of data/observations - After field work and upon arrival at the Capiz PIO, members of each group (technical and institutional) compared and discussed their respective observations regarding the CIS and the IAs which were visited that day. Each group then came up with a common finalized report per system.

Upon finalization of the groups' reports, these were then tabulated by one of the team members.

7) Non-operational Systems - For non-operational systems, only physical/technical inventory were undertaken and the inspection of these systems only focused on the dam and its immediate vicinity. Measurements/dimensions of these structures were taken and whenever possible, the water discharge of the water source was determined.

The insitutional aspect of the inventory of these systems were not taken into consideration since the IAs managing these systems were already non-existent.

## IV. SUMMARY OF FINDINGS/OBSERVATIONS

### 1) Salcedo CIS

a) Technical - The system had just been rehabilitated in 1987. Except for two tailend structures, siphons at Station (Sta.) 2 + 203 and Sta. 2 + 273, which were observed to have been abandoned, the whole system was found to be fully operational and well maintained.

b) Institutional - The irrigators' association managing the system manifested indications of viability. It has system management plans which are being strictly followed by members, except for the cropping calendar which is still being studied by the IA. The IA also has a revolving fund which it uses to assist members in the procurement of farm inputs. The IA, however, has not acquired water permit.

### 2) Codingle CIS

a) Technical - The system needs major repairs on its dam, canal structures and canal lines. It is scheduled for rehabilitation within 1988. Seepages along the system's canal lines were most evident.

b) Institutional - The irrigators' association has no record nor document being maintained. It likewise has no system management plans. Farmers alleged that since the system's original construction in 1975, it was only sometime in June, 1988, that the system was able to partially operate. The system was rehabilitated in 1984, and was then, temporarily turned over to the irrigators' association.

### 3) Sta. Rita CIS

a) Technical - From its original construction design whereby the system was served by a main diversion dam, the system presently utilizes a series of three check structures, constructed along the same creek per rehabilitation in1987. Because of this, most of the system's original facilities had been abandoned. The original main dam, in particular, presently serves an area of only 10-20 hectares (ha) from the original design area of more than 100 ha.

b) Institutional - The IA has no record or document being maintained. Likewise, it has no system management plans. IA members and officers had been observed to be inactive. The rehabilitation of the system in 1987 was not turned-over. Farmers alleged that the said rehabilitation was not yet completed.

4) San Roque CIS

a) Technical - The system was observed to be fully operational and well maintained. It has a concrete-lined main canal and lateral canal. No notable defect of the system was observed.

b) Institutional - The association has incomplete records. It has no water permit and has not yet registered with the SEC. The IA also has no system management plan. The operation and management of the system was observed to be solely handled by the IA President. Other IA officers had no evident involvement in the management of the system.

5) Alipasyawan CIS

a) Technical - The system is scheduled for rehabilitation in 1988. Two major technical concerns were identified. The first and foremost was the diversion dam which need strengthening of the left guidebank and the second was regarding the main canal railroad crossing structure which need restoration/modification in order for the system to generate its designed area.

b) Institutional - The IA has no water permit and has incomplete financial records. It has system management plans but these plans had not been generally observed by the members. Officers cite the non-operational railroad crossing structure as the major cause for deviations in the implementation of their system management plans. There is a need to firm-up membership of the association upon repair of the railroad crossing structure or even before the scheduled rehabilitation of the system.

6) Nagba CIS

a) Technical - The system is scheduled for rehabilitation in 1988. Aside from repair and improvement of the system's facilities, desilting of canal and repair of structures, there is a need to construct drainage canal in order to drain excess water run-off.

b) Institutional - The IA has no SEC registration and water permit. It likewise has incomplete organizational and financial records and documents. The IA has system management plans which are being implemented by officers and members. Membership of the association need to be firmed-up considering that less than half of its potential members are registered with the IA.

7) Malonoy CIS

a) Technical - The system had just been rehabilitated and there are still additional works being undertaken. The diversion dam of the system need to be provided with a protection dike along the right upstream embankment.

b) Instituional - A partial turn-over for the 1987 rehabilitation had been facilitated. The IA, however, has no water permit and has incomplete financial records. It likewise, has no system management plans. An additional 16 has. irrigable area may be generated upon completion of ongoing additional rehabilitation works. This area comprise sector V of the system.

8) Ilas CIS

a) Technical - The system is presently still undergoing minor rehabilitation and extension works. Lateral A canal of the system had been temporarily abandoned due to alleged right-of-way problems. These problems are presently being negotiated by the association. Although generally operational, some portions of the system's facilities need minor repair, such as raising of canal embankments, desilting and clearing.

b) Institutional - Although the 1983 rehabilitation of the system was already turned-over, its original construction in 1981, as alleged was not accepted by the farmers. The IA has no water permit and has incomplete financial records. However, it has system management plans, except for cropping calendar, which is being adhered to by members.

9) Mianay CIS

a) Technical - Some facilities and structures of the system had deteriorated causing reduction in its irrigable area. The canal lines are succeptible to seepage due to soil type and therefore need concrete lining. A closed conduit at Sta. 0+800 - 0+902, has a relatively small diameter posing problems in maintnenance/desilting.

b) Institutional - The IA is presently not yet registered with the SEC nor does it possess a water permit to their source. The IA has incomplete organizational and financial records and documents. It likewise has no system management plans.

10) Sinabsaban CIS

a) Technical - the system had just been rehabilitated in 1986-87. Although, generally operational, the system's facilities and structures were observed to be not well maintained. Some canal structures had already deteriorated. Some hresher crossings had also been constructed without inlet and outlet transistions and collars.

b) Institutional - The assocation is not registered with the SEC and has no water permit for their source. The IA has no financial records and has an incomplete organizational records and documents. It likewise has no system management plans formulated.

11) Quiasan CIS

a) Technical - The system had been observed to have severely deteriorated and require rehabilitation. Most of its structures are still operational.

b) Institutional - The IA of the system had been obsered to be inactive. Only the IA President exercises his functions and has also assumed the functions of the other IA officers. The IA started to become inactive since 1983, when the ICO of the system was pulled out. The IA President maintains a limited number of records and documents of the association but these were not properly classified and organized.

12) Jolongahog CIS

a) Technical - The system had just been rehabilitated in 1987. Generally, the whole system is operational and well maintained except for the steel gate stem which was cut-off thereby curtailing control of water diversion.

b) Institutional - The IA is registered with SEC, but has no water permit. The IA is generally active, but has yet no accomplished financial records. It has a system management plan, but no cropping calendar.

13) Bating CIS

a) Technical - The system is non-operational due to insufficient water supply and low dam crest elevation, making it difficult to divert water to the irrigable area.

b) Insitutional - There is no existing IA. The system was not able to operate since its completion in 1978.

14) Balucuan CIS

a) Technical - The system was rehabilitated in 1987. Although generally operational, some structures of the system were not yet completed. A portion of the main canal which was designed with concrete lining has not been finished. Only the flooring with side bars had been completed. Some thresher crossings have no inlet, outlet and collar.

b) Insitutional - The IA is not registered with the SEC, nor does it possess a water permit for their water source. Organizational records of the IA are incomplete and no financial records/documents are available. The IA has, however, system management plans formulated which are implemented at varying levels. The IA has an impending organizational problem regarding the turn-over of documents from the old to the newly elected officers. Several issues regarding the rehabilitation of the project in 1987 were also manifested.

15) Cala-agus CIS

a) Technical - The system had been observed to be operational and well maintained. Portions of the main canal is proposed for concrete lining due to inherent seepage as most of these canal lines traverse side hills.

b) Institutional - The IA is not yet registered with SEC and has no water permit. IA organizational and financial records, although incomplete, are fairly maintained and oranized. The IA has also system management plans which are strictly implemented and observed by the members.

16) Malocloc CIS

a) Technical - The system has a well maintained network of canal and canal structures. The downstream, tailend

C. Weather, Accessibility and Terrain

In five instances within the inventory period, activities of the team had been hampered by heavy rains. This has led to the postponement of the first scheduled field work of the team.

In the other four instances heavy rains occured while the team was already on field work. Most especially affected by the rains were members of the technical team who, by the nature of their concern, had to conduct walkthrough of all the systems visited. Some members of the team became ill due to overexposure to the weather condition.

Specifically, heavy rains directly affected technical activities like water discharge calibration, measurement of the dam and even ocular inspection of structures and facilities. For the institutional survey, the rain had also in one way or another, affected the interviews in terms of farmer's availability and interruptions in the interview process most expecially at times when changes in venue were needed and at instances when normal conversations were no longer audible.

The prevalence of the rainy season had also posed problems in the conduct of the inventory in terms of its effect to accessibility and terrain of projects visited. There were instances that travel time were significantly extended due to accessibility problems and poor road conditions.

D. Time Constraints

The pressure due to limited time in the conduct of the inventory had been most notable in all projects visited (Appendix D & E). Basically, the said problem was due to the delayed start of the conduct of field work on the first three days. The circumstance made the inventory team to request for a four day extension of the field work.

It may be noted that the actual inventory of the systems were undertaken at an average of about eighty-eight minutes per project for the institutional interview and about seventy nine minutes per project for the technical walkthrough.

E. Transportation

During the first three days of the inventory period, the inventory team was not able to immediately undertake actual field visitation/survey due to lack of transportation. The service vehicle which was used to conduct the team from the RIO to Capiz PIO immediately returned per instruction from the regional management, with the expectation that another service vehicle would be provided by Capiz PIO.

However, due to poor condition of the Capiz PIO service vehicle assigned to the team, the scheduled inventory did not proceed smoothly until after a vehicle from the RIO, arranged by the Planning Engineer, arrived on June 20.