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Information for Agricultural Research Managers

**Management Information for
National Agricultural
Research Systems in Asia**

Proceedings

The International Service for National Agricultural Research (ISNAR) began operating at its headquarters in The Hague, the Netherlands, on September 1, 1980. It was established by the Consultative Group on International Agricultural Research (CGIAR), on the basis of recommendations from an international task force, for the purpose of assisting governments of developing countries to strengthen their agricultural research. It is a nonprofit autonomous agency, international in character, and nonpolitical in management, staffing, and operations.

Of the 13 centers in the CGIAR network, ISNAR is the only one that focuses primarily on national agricultural research issues. It provides advice to governments, upon request, on research policy, organization, and management issues, thus complementing the activities of other assistance agencies.

ISNAR has active advisory service, research, and training programs.

ISNAR is supported by a number of the members of CGIAR, an informal group of donors that includes countries, development banks, international organizations, and foundations.

inform

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**Management Information for
National Agricultural
Research Systems in Asia**

ISNAR

International Service for National Agricultural Service

Proceedings

June 1991

These proceedings are the result of two workshops supported by the Asian Development Bank. They were organized and conducted by ISNAR; the National Academy of Agricultural Research Management (NAARM), Hyderabad, India; the SEAMEO Regional Center for Graduate Study and Research in Agriculture (SEARCA), Los Baños, Philippines; and the Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD), Los Baños, Philippines.

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AGROVOC Descriptors

information systems; management; organization of research; scientists; research projects; resource allocation; Asia

CABI Descriptors

agricultural research; management; information systems; organization of research; planning; Asia

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Foreword

ISNAR's work with national agricultural research systems (NARS) focuses on 12 critical factors within the broad areas of research policy, organization, and management. Six of those critical factors deal with research management:

- program formulation and budgeting;
- monitoring and evaluation;
- information management;
- development and management of human resources;
- development and management of physical resources;
- acquisition and management of financial resources.

All of these factors influence how well a NARS functions, how its resources are managed and used, and how well it develops effective programs. Good management requires the availability of adequate, timely information.

The basic products of research are new technologies, information, and knowledge. Thus, effective information management is essential to any research system — from the level of the research institute substation up to the national level. Without effective information management, there can be a lack of adequate coordination within the research system, duplication of effort, lack of continuity in building a knowledge base, and inefficiencies that organizations with limited resources cannot afford.

ISNAR determined that investing resources in strengthening information management could have a high payoff for NARS. ISNAR has become convinced that advances in microcomputer technology and the growing availability of microcomputers in NARS offer opportunities for providing NARS managers with improved information systems and better management tools.

During the period from 1988 to 1990, we worked with several NARS in Asia to develop and test tools for improved information management. ISNAR scientists collaborated with NARS managers to gather data on national research programs. Easy-to-use computer software was identified. Protocols for handling data were developed.

The result was a workable, effective, computerized management information (MIS) and program budgeting (PBS) system. That system was fully tested from the bottom up, and in full collaboration with national research managers at all levels, in Sri Lanka's agricultural research system during 1989. MIS/PBS work was also initiated in Bangladesh, India, and the Philippines.

In 1989, the Asian Development Bank provided funds for a special project "to strengthen agricultural research in Asia, with special emphasis on improving information systems." A major portion of the Bank's funding went toward developing training materials and guidelines for MIS/PBS and for supporting two workshops aimed at putting the MIS/PBS tool into the hands of NARS managers.

The first workshop was done in collaboration with the National Academy of Agricultural Research Management (NAARM), Hyderabad, India, and the other was in collaboration with the Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD) and the SEAMEO Regional Center for Graduate Study and Research in Agriculture (SEARCA), Los Baños, Philippines. Together they attracted some 60 participants from 13 countries.

These proceedings provide a look inside those workshops. They were truly workshops, with participants spending more than half their time using MIS/PBS and microcomputers to analyze data from NARS. Participants' enthusiasm was high. They worked long hours, often during their free time, to acquire MIS/PBS skills and to help ISNAR specialists improve the training materials used.

Based on evaluations and on participant suggestions during the workshops, we have since changed the name MIS/PBS to **INFORM** (*INFORMATION for agricultural Research Managers*). Guidelines for INFORM were revised and training manuals were improved. A set of four INFORM Guidelines and several INFORM Training Manuals are being published and are available for use by NARS worldwide.

The collaboration and close cooperation of scores of research managers and scientists in NARS have made INFORM what it is. The collaboration of NAARM, PCARRD, and SEARCA in organizing and running the workshops not only put INFORM skills in the hands of NARS specialists but

also served as the start of an INFORM network. And the financial support from the Asian Development Bank made it all possible. We gratefully acknowledge all their input.

For ISNAR, Byron Mook, Barry Nestel, and Govert Gijbbers developed and tested INFORM, presented the materials at the workshops, and wrote the INFORM guidelines and training manuals. Their work, and the input of the many ISNAR staff members who supported them, is gratefully acknowledged. The editorial efforts of Walt Rockwood and Kathleen Sheridan are also appreciated for their contribution to the final readability and appearance of this volume.

I believe INFORM will prove to be an invaluable tool for improved agricultural research management in the NARS. It will soon be adapted to the other regions, and ISNAR looks forward to the formation of an active network of INFORM users in NARS worldwide.

C. Bonte-Friedheim
Director General, ISNAR

1 **Information: The Key to Improved Management of Agricultural Research**

National agricultural research programs are often out of balance with national priorities. For example, although a food crop may be given highest priority at the national level, resources devoted to that crop at the research station level may rank well below those for other crops. Worse yet, from a management point of view, research managers may not even be able to tell national policymakers what resources are devoted to a particular crop at the station or national level.

Such shortcomings can often be traced to a lack of information — not only to provide answers to policymakers but upon which to base decisions within the national agricultural research system (NARS). That lack of information can usually be attributed to burgeoning national research systems that have grown so fast they have been unable to keep up with their information needs.

The rapid expansion of NARS worldwide is reflected in the numbers of agricultural researchers working in developing countries. They more than tripled between 1961-65 and 1981-85, and global spending on agricultural research increased at a similar rate. By 1990 the annual global cost of agricultural research in developing countries was about US\$ 3 billion.

Growth in the NARS has created increasing problems for research managers. More staff means more experiments, which, in turn, generate more information (data) to be handled by the management system. Managers often find themselves unable to tap the information at hand.

Managers at all levels within the NARS have also seen their budget requirements increase faster than the available funding. They have had to fight harder to justify support for research, often in the face of declining national economic resources and growing pressures to increase domestic food production.

NARS managers' requests for increased budgets are often stifled by the traditional budgetary system:

- Budgets are traditionally designed to provide financial control rather than to indicate objectives to be achieved from research. Precise information about research and researchers is not included in such budgets.
- Year-to-year budget increases are often biased toward on-going obligations and existing programs. Those tend to grow each year in a way that inhibits changes in resource allocation or the start of new activities. Moreover, appropriate information is usually not available to support requests for changes in allocations.

The microcomputer, which became increasingly available in the 1980s, has given NARS managers a tool that can, if used properly, let them handle large amounts of information about a research program. With a microcomputer and adequate software, managers can do the following:

- improve the management of inputs to research — personnel, funds, and facilities;
- improve the way those inputs are managed — the research program.

Thus, computerization of agricultural research information started, but many NARS created computerized databases that they either did not, or could not, use for research management. Their databases included personnel lists, payrolls, equipment lists, bibliographies, etc., but they did not provide the information needed for research management. For example:

- What were the costs within a given research program?
- What percentage of the NARS budget was used for nonresearch activities?

Management Information Systems

Good information is a major factor for effective management of research:

- Effective agricultural research policy cannot be set without good information on which to base decisions.
- Sound agricultural research management is impossible without good information on which to base programs.

Every research organization collects some form of information about inputs, activities, and outputs. A manager cannot **plan**, **monitor**, or **evaluate** re-

search without **information** on that research. Management must know who is employed, what funds are available, and what research is being done. Such information is usually recorded somewhere, although the records may be kept by different people in different places and used for totally different purposes.

At the national level, information can be a political weapon for research managers in a fight for more resources, policy changes, or reform. At the institute level, the use of a management information system (MIS) allows research managers to assemble diverse information and use it to improve planning, programming, monitoring, and evaluation of the research they manage.

Figure 1.1 helps define what an MIS is and what it can help the research manager do.

DECISIONS / INFORMATION	PLANNING AND PROGRAMMING	MONITORING AND EVALUATION
PROJECTS OR EXPERIMENTS	STRATEGY TACTICS	OUTPUT IMPACT
HUMAN RESOURCES	RECRUITMENT CAREERS TRAINING	PERFORMANCE
FINANCE	BUDGETING	ACCOUNTING AUDITING
EQUIPMENT FACILITIES SUPPLIES	UTILIZATION PROCUREMENT	STOCK CONTROL

Figure 1.1. The MIS/PBS matrix — Four categories of information are needed by research managers. The headings on the left are those of resources and their use (projects). Across the top are the main purposes for which the manager needs information.

The ISNAR Experience with MIS

In the mid 1980s, ISNAR started using the microcomputer as an agricultural research management tool. In terms of the phases of biological research (basic, applied, and adaptive) no basic research was required because of the mass of existing literature on MIS. Likewise, the private sector's use of MIS, had covered the applied research phase. Thus, ISNAR workers concentrated on adaptive research — applying existing MIS technology to agricultural research management.

Several NARS cooperated with ISNAR to evaluate existing databases and information systems. From those studies, ISNAR developed a methodology for gathering and using information about the experiments, people, and funds used in any agricultural research program.

Gathering information on the precise allocation of funds — the cost of an individual experiment, for example — was a new concept in most NARS. Because the ISNAR methodology provided a means of attributing costs to experiments (or programs), it was really a program budgeting system (PBS). Thus, the terminology became Management Information System/Program Budgeting System (MIS/PBS), with program budgeting at the heart of the system.

The ISNAR MIS/PBS was based on six criteria:

1. The output must be of value to a wide range of users: policymakers, national research managers, research station directors, research program leaders, and individual scientists.
2. Most of the information to be collected should already exist and be easily available. A minimum of new information should have to be collected.
3. The information collected should be selective, essential for specific management needs, and well adapted to local conditions.
4. The MIS approach developed should be suitable for a wide range of different agricultural systems, commodities, and sizes of research stations. Data from different stations should be readily consolidated for use at the national level.
5. The hardware (microcomputer and peripheral equipment) used should be reasonably easy to acquire by all but the smallest of research stations.
6. The software used should be simple, easy to use (especially for creating reports), and widely available.

During 1988-89 ISNAR worked with NARS in Bangladesh, India, Indonesia, the Philippines, Sri Lanka, and Sudan to test the potential of MIS/PBS for managing research at all levels. By 1989 a workable and effective MIS/PBS had been created for Sri Lanka, and it was fully operational for the 1991 research year.

Early in 1989 ISNAR submitted a special project proposal on MIS development for Asian agricultural research to the Asian Development Bank. The project envisioned three main outputs:

- A series of practical, result-oriented guidelines — really manuals — that would provide NARS research managers with general principles and specific procedures for implementing an MIS.
- Two regional workshops for Asian NARS managers, with a focus on specific MIS problems and practical solutions for them.
- A series of implementation activities to assist NARS that made commitments to move forward with their own MIS work.

The Asian Development Bank (ADB) approved the proposal in mid 1989.

ISNAR then discussed the MIS project with the National Academy of Agricultural Research Management (NAARM) in India, and in the Philippines, the SEAMEO Regional Center for Graduate Study and Research in Agriculture and the Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD). The result was that one ADB-funded workshop was developed and presented jointly by ISNAR and NAARM, and another one was developed and presented jointly by ISNAR, PCARRD, and the SEAMEO Regional Center for Graduate Study and Research in Agriculture.

The MIS/PBS Workshop Format

The objective of the workshops was to train key people from each Asian country and to encourage participants to fit what they learned into their own country situation. The workshop program (See Appendix 1) differed greatly from that of workshops normally associated with agricultural research, wherein papers reporting research progress are delivered and discussed.

Each workshop was oriented toward hands-on work with computers to give participants a chance to develop the skills required for creating an MIS/PBS. Participants spent nearly 50% of their workshop time working at computers,

and they enthusiastically took part in extra practice sessions. Emphasis was on learning and on problem solving.

MIS/PBS Name Change: INFORM

Participants' comments on the workshop revealed some confusion resulting from the use of the term *MIS/PBS*, from mixing general information for management with specific information for budgeting. Participants felt that the MIS/PBS terminology was misleading. Based on these criticisms by workshop participants, combined with ideas from ISNAR staff members, the name of the system was changed to **INFORM** (*INFORMATION* for agricultural *Research Managers*).

The INFORM Guidelines

The program for each workshop was built around the guidelines developed by ISNAR during ISNAR's ongoing MIS/PBS work in Asia. Most of the content of the guidelines had been field-tested during ISNAR's collaboration with Asian NARS.

Because the participants in the Asian workshops were the first users of the guidelines, emphasis throughout the workshops was on testing and improving the product. Daily panel discussions gave participants an opportunity to critique the guidelines and suggest improvements. Panel members addressed the questions: Are the guidelines easy to read and understand? Are the contents useful? Is the presentation too detailed — or not detailed enough? How can the guidelines be improved?

The workshop guidelines were revised to address participant comments, and the contents of each of the four guidelines are listed in Appendix 2. Practical exercises used at the workshops were also revised and have been published separately as training manuals for INFORM.

Copies of all guidelines and training manuals are available upon request from ISNAR.

2

Status of Management Information Systems for Agricultural Research in Asia

The primary objective of the Asian workshops was to create a trained cadre of people who could take the lead in implementing MIS/PBS work in national agricultural research systems. Another workshop objective was to encourage information sharing — networking — among those working with MIS/PBS and those interested in it.

During early 1990, ISNAR developed reports on the status of agricultural research databases and MIS/PBS work in Asian countries. Those reports were discussed with the respective country groups during each workshop. Following the workshop discussion, the reports were revised and approved by the groups. Bhutan was unable to send participants to a workshop and, therefore, no status paper is included for that country.

The status reports are presented here to provide ideas and information for persons interested in MIS/PBS work. The reports are not meant to be official detailed reports on MIS/PBS work in any country; rather, the intent is to provide a brief history, and some indicators of progress, for those national systems that have MIS/PBS work underway.

Contact addresses in each country are supplied to allow readers to request additional information. The addresses will also promote information sharing by a growing network of scientists interested in MIS/PBS.

Bangladesh

Most agricultural research in Bangladesh is concentrated in 10 institutes, whose work is coordinated by the Bangladesh Agricultural Research Council (BARC). Other research is scattered in 11 other institutes in several different ministries. BARC and its 10 constituent research institutes employ nearly 1,200 scientists. The Bangladesh Agricultural University also does research, some of which is supported by BARC.

MIS Developments

BARC has recently begun developing an MIS for itself and its constituent institutes.

It invited ISNAR to assist, and in 1989, pilot MIS work was undertaken at the Sugar Research and Training Institute (SRTI). BARC and ISNAR then used reports from SRTI at a seminar on MIS applications held in Dhaka in late 1989. More than 100 managers from throughout the NARS attended.

In 1990, BARC extended this MIS work. Databases on research projects, personnel, finances, and facilities were created at each constituent institute. The basis for the personnel database was an agricultural research manpower survey (ARMS). The survey form is reproduced in Figure 2.1.

For the initial work at SRTI, BARC used Reflex software. As the MIS expanded, it made a decision to switch to Paradox (a relational database program).

Printed reports will be available in early 1991.

The following databases are being created.

1. Research

- a. Location: BARC
- b. Objective: Improved coordination of research
Improved management of research at the institute level
- c. Content: Data on the content of research projects and on funding levels
- d. Updating: Annual
- e. Software: Paradox
- f. Manager: BARC
- g. Users: BARC, institute directors, and program leaders
- h. Comments: A similar database at the Bangladesh Rice Research Institute (BRRI) covers all rice research for the past five years.

1. File Number: _____
2. Do you conduct research: yes _____ no _____

PERSONNEL SURVEY

3. Your Name: _____
Last Name: _____
First Name: _____
4. Date of birth: day _____ mo. _____ year _____
5. Sex: M _____ F _____
6. Father's name: _____
Last _____
First _____
7. Degrees: year university country
PDoc _____
PhD _____
MSc _____
BSoc _____
8. Subject/Discipline: _____
PDoc _____
PhD _____
MSc _____
BSoc _____
9. Date of first position in gov't research: _____
day _____ mo. _____ year _____
10. Name your current position level: _____
11. Current base salary = t _____
12. Date appointed to present position level: _____
day _____ mo. _____ year _____
13. Where now posted: _____
Location _____
Institute _____
Division _____
Date posted: day _____ mo. _____ year _____
14. Last or previous posting: _____
Location _____
Institute _____
Division _____
Date posted: day _____ mo. _____ year _____

RESEARCH ACTIVITIES

15. What % time during this last year did you spend on:
_____ % research
_____ % teaching/training
_____ % extension education for farmers
_____ % administration/management
_____ % other (specify) _____
(100% = total)
16. What % research time last year did you spend on:
_____ % laboratory research
_____ % field research station
_____ % farming systems research
_____ % on-farm/applied research
_____ % library-related to research
_____ % other (specify) _____
(100% = total)
17. What % of your research time last year was on:
_____ % disciplinary research
_____ % multidisciplinary research

_____ % demonstration/OFT with DAR
(100% = total)

Do items in #17 above apply to you: work?

yes _____ no _____

18. What % of your research time last year was on:

_____ % farmers

_____ % extension people

(Total % need not = 100%)

Do the items in #18 above apply to your work?

yes _____ no _____

19. Current specialization/activity or discipline:

_____ plant breeding/genetics

_____ plant production/management

_____ horticulture

_____ entomology

_____ plant pathology

_____ plant physiology

_____ chem./biochem./microbiology

_____ seed technology

_____ soils

_____ water/irrigation management

_____ agric. engineering/mechanization

_____ animal/poultry-breeding/genetics

_____ animal/poultry-production/management

_____ animal/poultry-nutrition

_____ animal/poultry-economics

_____ animal pathology

_____ animal health

_____ jute products/processing

_____ fisheries/shrimp production

_____ fisheries products/processing

_____ forest products/processing

_____ forest production/management

_____ wildlife

_____ herbarium/taxonomy

_____ training

_____ library/inform./communications

_____ administration/finance

_____ research management/plan./eval.

20. Do you work on a specific species/ commodity:

yes _____ no _____

and/or process: yes _____ no _____

21. If yes, please record % of your research time spent on each commodity/species and/or product/process or research area:

Commodity/process/area:

_____ % rice

_____ % wheat

_____ % maize/sorghum/millet

_____ % other cereals

_____ % pulses

_____ % other forage crops

_____ % oilseeds

_____ % potatoes

_____ % other root/tuber crops

_____ % fruit crops

_____ % flowers/ornamental plants

_____ % nut crops

_____ % vegetable crops

Figure 2.1. The 1990 agricultural research manpower survey (ARMS) form used by the Bangladesh Agricultural Research Council

- _____ % sugar plants
- _____ % jute production/management
- _____ % jute products/processing
- _____ % cotton
- _____ % other fiber crops
- _____ % tea
- _____ % tobacco
- _____ % spices and medicinal crops
- _____ % forest production/management
- _____ % wildlife
- _____ % cattle
- _____ % buffalo
- _____ % goats/sheep
- _____ % poultry/fowl
- _____ % bees/honey
- _____ % silk
- _____ % lac
- _____ % fish/shrimp—marine/brackish
- _____ % fish/shrimp—freshwater
- _____ % other (specify)

(total % = 100)

22. Have you published/documentated research results during the last three years? yes _____ no _____

a. total number (3 yrs) _____

b. number during last year _____

23. Identify by the following categories the number of publications you have authored during the last three years: (Total below should equal same total recorded in question 22a.)

No. as senior author		No. as other author
_____	journals	_____
_____	books	_____
_____	book chapters	_____
_____	abstracts	_____
_____	other reports	_____

24. Identify the location where your articles were published: (Total below should equal same total recorded in questions 22a & 23.)

No.		No.
_____	International	_____
_____	Bangladesh	_____

TRAINING ACTIVITIES

Incountry Training:

25. Most recent training:

Year: _____

Institute: _____

Location: _____

Subject: _____

Duration (weeks): _____

Funding source: _____

26. Second most recent training:

Year: _____

Institute: _____

Location: _____

Subject: _____

Duration (weeks): _____

Funding source: _____

27. Third most recent training:

Year: _____

Institute: _____

Location: _____

Subject: _____

Duration (weeks): _____

Funding source: _____

Foreign Training:

28. Most recent training:

Year: _____

Institute: _____

Location: _____

Subject: _____

Duration (weeks): _____

Funding source: _____

29. Second most recent training:

Year: _____

Institute: _____

Location: _____

Subject: _____

Duration (weeks): _____

Funding source: _____

30. Third most recent training:

Year: _____

Institute: _____

Location: _____

Subject: _____

Duration (weeks): _____

Funding source: _____

Current or Ongoing Training

31. Organization/institute: _____

Location: _____

Subject: _____

Duration (weeks): _____

Funding source: _____

Proposed Training

What type of training do you need most?

Complete sections below:

32. Proposed Long-Term Training:

Work program (subject): _____

Institution: _____

Country: _____

Duration (weeks): _____

When/Year: _____

33. Proposed Short-Term Training:

Work program (subject): _____

Institution: _____

Country: _____

Duration (weeks): _____

When/Year: _____

Staff signature _____

Date completed: _____

Division head sig. _____

Date: _____

(As verification that all information on survey form is accurate for inclusion on the database of personnel records for your division.)

Conducted by PMACS, Ltd.

Figure 2.1. (continued)

- i. Contact person: Executive Vice Chairman
BARC
Farmgate, Dhaka-1215
Bangladesh

2. Research Budgets

- a. Location: BARC
- b. Objective: Improved budget and accounts management
- c. Content: Standard line-item budget categories
- d. Updating: Monthly
- e. Software: dBaseIII+
- f. Manager: BARC
- g. Users: BARC administrators
- h. Comments: Constituent databases contain information on salaries and operating expenses. A database on "contract research" has 400 records and 100 fields.
- i. Contact person: Executive Vice Chairman
BARC
Farmgate, Dhaka-1215
Bangladesh

3. Equipment

- a. Location: BARC
- b. Objective: Improved equipment management at the institute level
Inventory
- c. Content: Data on all equipment
- d. Updating: Still in start-up phase
- e. Software: dBaseIII+
- f. Manager: BARC
- g. Users: BARC and institute administrators
- h. Comments: implemented under contract with Checci and Company Consulting, Inc.

- i. Contact person: Executive Vice Chairman
BARC
Farmgate, Dhaka-1215
Bangladesh

4. Personnel

- a. Location: BARC
- b. Objective: Improved personnel planning and administration
- c. Content: Data on both scientific and management personnel
- d. Updating: Annual
- e. Software: Paradox
- f. Manager: BARC
- g. Users: BARC managers and administrators
- h. Comments: Still in early stages. The database for BRRI is complete. The one for the Jute Research Institute is being finished. BARC also maintains a database on training.
- i. Contact person: Executive Vice Chairman
BARC
Farmgate, Dhaka-1215
Bangladesh

5. Bibliography

- a. Location: Agricultural Information Centre (AIC) at BARC
- b. Objective: Establishment of a computerized national bibliography on agricultural research
- c. Content: Library holdings at BARC as well as at the constituent institutes
- d. Updating: Continuous
- e. Software: InMagic
- f. Manager: BARC
- g. Users: Scientists throughout the NARS
- h. Comments: Each institute inputs its own data. BARC is seeking CD-ROM capability.

- i. Contact Director AIC
person: BARC
Farmgate, Dhaka-1215
Bangladesh

General Comments

BARC has had a minicomputer system since 1983, with an IBM System 34 (mini) since 1986. Its computer center contains several IBM-compatible micros for computer training and general use.

An important challenge for BARC in its MIS work will be to strike an appropriate balance between centralization and decentralization. At the moment, its MIS is quite centralized because most institutes lack appropriate computer facilities. This equipment constraint will be overcome in the next one to two years, however, as more and more micros become available throughout the NARS.

A second important issue for BARC in its MIS work will be leadership. Different parts of BARC and different foreign advisors have played important roles so far. Which part of BARC will be responsible for overall direction and coordination in the future?

People's Republic of China

The NARS in the People's Republic of China is the largest in the world, organized from the national level down through provinces, prefectures, and counties. At the top of the NARS is the State Science and Technology Commission (SSTC). The SSTC sets national agricultural research policy, which is then implemented by different ministries and constituent research organizations.

The most important organization for agricultural research is the Chinese Academy of Agricultural Sciences (CAAS), which is part of the Ministry of Agriculture. CAAS has 36 research institutes and centers.

China has more than 100,000 people working in crops, fisheries, and forestry research. CAAS alone has 5,000 scientists and a total research staff of 10,000. For crop research, each of 29 provinces has its own academy of agricultural sciences with 10 or more institutes. Almost every prefecture and county has its own institute of agriculture. Similar provincial, prefectural, and county systems exist for fisheries and forestry.

Research is mainly funded by government, with limited funding by United Nations agencies and the CGIAR centers.

MIS Developments

Under the SSTC, each research organization at each level — ministry, national academy, university, province, prefecture, and county — maintains and updates management information.

CAAS initiated its own MIS work in 1986. Its Agricultural Research Management System (ARMS) includes several databases. The ARMS and the databases are organized in six subsystems (Figure 2.2).

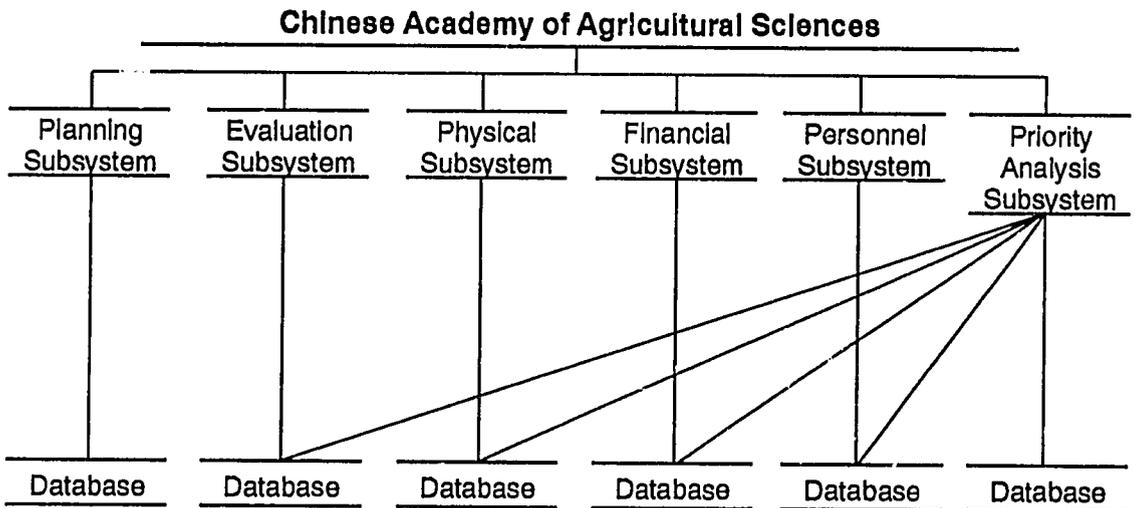


Figure 2.2 Organization and databases of the Chinese Academy of Agricultural Sciences, 1990

Table 2.1. Fields Included in the CAAS Institute Research Project Database

1. CAAS project code number:	10. Discipline:
2. Project contract number:	11. Name of institute in charge of project:
3. Type of contract:	12. Code of institute in charge of project:
4. Title of project:	13. Name of institute, if any, to take part in project:
5. Title of subproject, if any:	14. Code of institute, if any, to take part in project:
6. Duration	15. Name and post of principal investigators (up to 15):
Date of start:	16. Main equipment (value more than \$2,000) used in project:
Date of completion:	17. Project plan (maximum of 200 words):
7. Source of funds:	
8. Amount of project fund:	
9. Type of research (theoretical, applied, etc.):	

The following databases exist at CAAS.

1. Research Planning

- a. Location: CAAS
- b. Objective: Provision of information on the current status of all research projects in CAAS (see Table 2.1)
- c. Content: 800 new records/year since 1986
- d. Updating: Continuous
- e. Software: dBaseIII+
- f. Managers: Director General of CAAS, Director of the Department of Science Management (CAAS), and officials at CAAS institutes
- g. Users: CAAS and CAAS institutes
- h. Comments: Contains information on project content, progress, and scientists involved
- i. Contact person: Director
Department of Science Management
CAAS
No. 30 Baishiqiao Road
Beijing, P. R. China

2. Research Evaluation

- a. Location: CAAS
- b. Objective: Evaluation of research achievements
- c. Content: 2,400 records
- d. Updating: Annual
- e. Software: dBaseIII+
- f. Managers: Director of the Department of Science Management (CAAS) and officials at CAAS institutes
- g. Users: CAAS and CAAS institutes
- h. Comments: Provides basis for awards to researchers. Also assists managers in the monitoring and evaluation of research projects.

- i. **Contact person:** Director
Department of Science Management
CAAS
No. 30 Baishiqiao Road
Beijing, P. R. China

3. Physical Resources

- a. **Location:** CAAS
- b. **Objective:** Assistance to CAAS and institute managers in making decisions regarding purchase, maintenance, and/or scrapping of equipment
- c. **Content:** One record for each item with a value of more than US\$2,500
- d. **Updating:** Annual
- e. **Software:** dBaseIII+
- f. **Managers:** Director of the Department of Science Management (CAAS) and officials of CAAS institutes
- g. **Users:** CAAS and CAAS institutes
- h. **Comments:**
- i. **Contact person:** Director
Department of Science Management
CAAS
No. 30 Baishiqiao Road
Beijing, P. R. China

4. Finance

- a. **Location:** CAAS
- b. **Objective:** Improvement of budgeting and accounting
- c. **Content:** Financial information on 800 research projects
- d. **Updating:** Annual at the CAAS level; monthly at the institute level
- e. **Software:** dBaseIII+
- f. **Managers:** Director of the Department of Science Management (CAAS) and officials of CAAS institutes
- g. **Users:** CAAS and CAAS institutes
- h. **Comments:** Runs simultaneously with a manual system

- i. Contact person: Director
Department of Science Management
CAAS
No. 30 Baishiqiao Road
Beijing, P. R. China

5. Personnel

- a. Location: CAAS
- b. Objective: Improvement of personnel management of scientists — assignment, promotion, training, etc.
- c. Content: More than 10,000 records, each containing 25 fields
- d. Updating: Continuous
- e. Software: dBaseIII+
- f. Managers: Director of the Department of Science Management (CAAS) and officials at CAAS institutes
- g. Users: CAAS and CAAS institutes
- h. Comments: The Department of Personnel maintains another database which contains even more fields per scientist.
- i. Contact person: Director
Department of Science Management
CAAS
No. 30 Baishiqiao Road
Beijing, P. R. China

General Comments

The MIS at CAAS is headquarters-based. It runs on IBM-compatible XT and AT micros. Further development of the various databases is somewhat impeded by lack of sufficient computer equipment and training of staff in computer applications. Those databases that do exist are used more for record keeping than for active research management.

India

The Indian NARS is one of the world's largest. It has two major components: the Indian Council of Agricultural Research (ICAR), which is the main coordinating agency, and the State Agricultural Universities (SAUs). ICAR was established in 1921. It promotes, aids, and oversees research, education, and extension education in all areas of agriculture, including crops, horticul-

ture, animal science, fisheries, and agroforestry. ICAR alone has 6,400 professional scientists.

There are 27 SAUs; each state has at least one. The SAUs have regional responsibilities for agricultural research, education, and extension education. The pattern of ICAR funding for the SAUs varies considerably — from 18% to 55%, depending on the level of state support and stage of SAU development. The SAUs have about 24,000 professional staff members.

In addition, India is divided into 126 agroclimatic zones, each with at least one major regional research station plus several satellite stations to do zone- and location-specific research.

MIS Developments

A Computer Cell at ICAR headquarters has established six major databases to assist in research management.

One such database, on personnel, contains information on approximately 5,000 ICAR research staff members. Table 2.2 shows the fields included in the questionnaire used to gather data. Another database contains information on finances, personnel, and equipment at research institutes. Table 2.3 shows its fields. Other databases include information on cadre strength, aggregate manpower, the budgets of the SAUs, and finance.

Table 2.2. Fields Included in the ICAR Scientists' Biobdata Entry Form

I. Personnel particulars	4. Year
A. Name of scientist	5. Class/division
B. Date of birth	6. Grade
C. Father's/husband's name	a. GPA
D. Residential address:	b. Max GPA
1. Present	7. PhD awarded?
2. Permanent	B. Specialized training
E. Sex	1. Name of university/institute
F. Marital status	2. Subject
G. Number of children	3. Year
H. Whether belong to SC/ST	4. Duration
I. State	C. Knowledge of foreign languages other than English
J. Mother tongue	1. Language
II. Educational particulars	2. Speak
A. Academic qualifications	3. Read
1. Degree	4. Write
2. Main subjects	5. Diploma/degree
3. Name of university/institute	

Table 2.2. (continued)

-
- III. Service particulars
 - A. Organization
 - B. Destination
 - C. Pay scale
 - 1. Minimum
 - 2. Maximum
 - D. Date of joining
 - E. Date of leaving
 - F. Type of work
 - G. Date of initial entry into regular service
 - H. Date of joining ICAR
 - I. How appointed to ICAR
 - 1. Direct recruitment
 - a. Examination
 - b. Selection
 - 2. Induction
 - J. Date of appointment to ARS
 - K. Date of probation
 - L. Status of scientist
 - 1. Permanent
 - 2. Quasi-permanent
 - 3. Temporary
 - M. Grade of initial appointment
 - N. Present post held
 - O. Date of joining present post
 - P. If present post on tenure basis, date of expiry
 - Q. Present basic pay drawn in the scale
 - R. Name of the institute/AICRP where posted
 - S. Place of posting
 - T. Discipline in which selected by ASRB
 - U. Field of specialization in which working
 - IV. Particulars of visit abroad
 - A. Details of visits abroad including seminars, consultancy/assignments, etc.
 - 1. Total number of visits to date
 - 2. Details of visits in chronological order
 - a. Place/country
 - b. Purpose of visit
 - c. Period of visit
 - (1) From
 - (2) To
 - B. Willingness to be considered for assignment abroad
 - 1. Assignments
 - a. Any
 - b. US only
 - 2. Training
 - 3. Consultancy
 - 4. Fellowship
 - C. Duration of deputation for which you are willing to be considered
 - 1. Up to 3 months
 - 2. Up to 6 months
 - 3. Less than 12 months
 - 4. More than 12 months
 - 5. Any period
 - D. Is scientist presently on deputation
 - 1. India
 - 2. Abroad
 - E. Details of deputation
 - 1. Name of organization
 - 2. Place of posting
 - 3. Date of joining
 - 4. Date of termination
 - a. Initial order
 - b. Actual return
 - V. Published work
 - A. Number of research papers published in scientific journals
 - B. Number of popular articles
 - C. Number of book reviews
 - D. Number of professional communications to journals/monographs
 - E. Number of professional abstracts
 - F. Number of technical reports
 - VI. Other particulars
 - A. Presently bound by a bond
 - 1. Date of its expiry
 - 2. Reasons for bond
 - B. Subject to
 - 1. Disciplinary action/proceedings
 - 2. Disbarment from consideration/ applying for higher post on failure to comply with orders for posting to remote areas
 - C. Assessed for promotion
 - 1. Date of last review
 - 2. Which decision was taken
 - a. Merit promotion
 - b. Advance increments number
 - c. Not yet known
 - d. No benefits
-
-

Table 2.3. Fields Included in the ICAR Institute Information Database

1. Name and address of institute			
2. Number of regional stations			
3. Number of Divisions in institute			
4. Location of stations			
5. Particulars of director			
Name			
Pay scale			
Phone			
Office			
Residence			
6. Name and designation of the officer next to director			
Name			
Post			
7. Brief mandate of the institute			
8. Research projects			
Ongoing			
Completed			
9. Total outlay			
10. Budget			
	Plan	Nonplan	Year
Annual outlay	_____	_____	_____
Expenditure	_____	_____	_____

ICAR's Agricultural Research Information Centre (ARIC) also manages several databases, including one on research projects that are either ongoing or completed (Table 2.4). Other databases include information on Indian agricultural research scientists and on reports of foreign visits that they have made.

In addition, several institutes and stations maintain databases on research projects, but few such databases are oriented toward management.

The following databases exist now or are in an advanced stage of planning.

1. Personnel

a. Location: ICAR

b. Objective: Improvement of personnel management

Table 2.4. Fields Included in the ICAR Institute Research Project Database

1. ICAR Code No.	9. Key words
2. Name of institute	10. Principal investigator
3. Address	11. Associates (up to 3)
4. Division/section	12. Duration
5. Title of project	Date of start
6. Sub-project, if any	Date of completion
7. Project code number	13. Status of project (new/continuing/ extended/withdrawn)
8. Main objectives of project (maximum of 200 words)	

- c. Content: Approximately 5,000 records on research scientists
- d. Updating: Annual
- e. Software: Developed internally
- f. Manager: Director General, ICAR
- g. Users: Agricultural Scientists Recruitment Board and Personnel Division, ICAR
- h. Comments: Information on some scientists is not yet recorded. Database is on a mini-computer — not IBM-PC compatible.
- i. Contact person: Director of Personnel
ICAR
Krishi Bhavan
Dr. Rajendra Prasad Road
New Delhi – 110001, India

2. Institute Profiles

- a. Location: ICAR
- b. Objective: Improvement of personnel and financial management
- c. Content: Profiles of ICAR institutes
- d. Updating: Annual
- e. Software: Developed internally
- f. Managers: Director General, ICAR
- g. Users: ICAR managers and officials of ICAR institutes
- h. Comments: On a mini-computer. Not IBM-PC compatible.

- i. **Contact person:** Officer in Charge, Computer Cell
ICAR
Krishi Bhavan
Dr. Rajendra Prasad Road
New Delhi – 110001, India

3. Research Budgets

- a. **Location:** ICAR
- b. **Objective:** Improvement of budgeting and accounting
- c. **Content:** Monthly accounts of ICAR institutes
- d. **Updating:** Monthly
- e. **Software:** Developed internally
- f. **Manager:** Director (Finance), ICAR
- g. **Users:** ICAR managers and officials of ICAR institutes
- h. **Comments:** Currently in development stage
- i. **Contact person:** Director (Finance)
ICAR
Krishi Bhavan
Dr. Rajendra Prasad Road
New Delhi – 110001, India

4. Equipment

- a. **Location:** ICAR
- b. **Objective:** Assistance to ICAR and institute managers in making decisions regarding acquisition and deployment of equipment
- c. **Content:** 150 records — information on equipment costing more than US\$ 6,000
- d. **Updating:** Annual
- e. **Software:** Developed internally
- f. **Manager:** Director General, ICAR
- g. **Users:** ICAR managers
- h. **Comments:** On a mini-computer. Not IBM-PC compatible.

- i. Contact person: Director General
ICAR
Krishi Bhavan
Dr. Rajendra Prasad Road
New Delhi – 110001, India

5. Research

- a. Location: ARIC
- b. Objective: Information on the current status of all research projects
- c. Content: One record for each of 4,250 ongoing research projects in the ICAR system
- d. Updating: Continuous
- e. Software: Micro-CDS/ISIS, Ver. 2.3 from UNESCO
- f. Manager: Director of Publications and Information, ARIC
- g. Users: ICAR researchers and administrators
- h. Comments: This database ideally helps ICAR set research priorities and avoid duplication of research efforts.
- i. Contact person: Director (P&I)
ICAR
Krishi Anusandhan Bhavan
Dr. K. S. Krishnan Road
New Delhi – 110012, India

6. Bibliography

- a. Location: ARIC
- b. Objective: Provision of literature retrieval services to scientists
- c. Content: Bibliographical data; AGRIS and ICAR project documentation
- d. Updating: Continuous
- e. Software: Micro-CDS/ISIS, Ver. 2.3 from UNESCO
- f. Manager: Director of Publications and Information, ARIC
- g. Users: Researchers
- h. Comments: This database complements another one (#5 above) aimed at eliminating project duplication and improving coordination among project researchers.

- i. Contact person: Director (P&I)
ICAR
Krishi Anusandhan Bhavan
Dr. K. S. Krishnan Road
New Delhi – 110012, India

7. Scientists' Visits Abroad (Reports)

- a. Location: ARIC
- b. Objective: Provision of information on visits that ICAR scientists have made to research institutes outside India
- c. Content: Visits categorized by scientist, discipline, country, etc.
- d. Updating: Continuous
- e. Software: Developed locally using dBaseIII+
- f. Manager: Director of Publications and Information, ARIC
- g. Users: ICAR researchers and administrators
- h. Comments: This database is cross-referenced to hard-copy documentation regarding scientists' visits abroad.
- i. Contact person: Director (P&I)
ICAR
Krishi Anusandhan Bhavan
Dr. K. S. Krishnan Road
New Delhi – 110012, India

General Comments

The Computer Cell in ICAR uses mainly non-IBM-compatible computers. It has recently added some IBM-compatible micros, but most databases have been developed on the older equipment.

These databases are now quite centralized, created in New Delhi from data sent in by institutes and SAUs. A significant challenge for ICAR in the future will be to ensure that these institutes and SAUs become users as well as simply suppliers of data. Such decentralization and wider participation will probably mean an accelerated move to micros. Only if research managers and scientists throughout the country are involved is it likely that an MIS will become viable.

Another challenge for ICAR will be to set priorities for MIS development and to eliminate data duplication. There may be a need to reconsider the

organizational arrangements now in place, particularly in and between ICAR Headquarters and ARIC.

And most important, the uses and users of all the different databases may need to be made more explicit. The size and complexity of the Indian NARS would seem to make a major commitment to improved information management a high priority.

Indonesia

The Agency for Agricultural Research and Development (AARD) was formed in 1974 and is part of the Ministry of Agriculture. The AARD mandate includes most agricultural research in Indonesia. It does not have responsibility for research on estate crops, sugar, and forestry — although the Director General of AARD is the Chairman of the management boards for estate crops and sugar.

AARD has five coordinating centers for commodities research. These five centers are organized into 16 research institutes, 40 subinstitutes, and 108 experiment stations. In 1990, AARD employed nearly 9,000 full-time staff, of which about 1,000 were classified as research scientists.

MIS Developments

The Ministry of Agriculture started to develop an MIS in the early 1980s. Its objective was to have information on finance, personnel, programs, and facilities available to all ministry agencies at all levels. Plans for a centralized MIS were completed but were never implemented due to lack of funding and computer capacity.

In 1986, AARD began work on its own MIS as part of a donor-funded project. ISNAR agreed to provide technical assistance. In 1989, the Director General of AARD signed a decree creating MIS teams in each of the research centers and institutes. At AARD headquarters in Jakarta, the Center for Agricultural Research Planning (CARP) was given responsibility for the coordination of MIS work.

The AARD MIS consists of databases on program, finance, personnel, and physical facilities. Two more databases — on research collaboration and research results — will be added in 1991.

All are being implemented in dBaseIII+. All are in Bahasa Indonesia and are menu-driven.

The program database provides information on all research in progress, as well as on all research anticipated during the current five-year plan. Data have been entered on about 1,700 research activities. Outputs are being used to create a master plan for research, for planning and programming, and for routine reporting.

The databases on finances, personnel, and physical facilities have replaced hard-copy records and have greatly streamlined AARD's management and reporting.

When all six subsystems are operational, CARP will have 18 MIS staff members in Jakarta. In addition, as noted above, each research institute already has a four-person MIS team in place. Data collected at the institute level are aggregated at the center level first and later at the national level.

Presented below are the details of the six AARD databases.

1. Programs

- a. Location: AARD headquarters, research centers, research institutes
- b. Objective: Complete information on all ongoing and planned research
- c. Content: About 1,700 records, each with 259 fields
- d. Updating: Semi-annual
- e. Software: dBaseIII+
- f. Manager: CARP (at AARD headquarters), directors of centers and institutes
- g. Users: Managers and scientists throughout AARD
- h. Comments:
- i. Contact person: Director General
Agency for Agricultural Research and Development
Jln Rangunan 29, Pasarminggu
Jakarta 12540, Indonesia

2. Budgets

- a. Location: AARD headquarters, research centers, research institutes
- b. Objective: Establishment of a complete financial planning and reporting system

- c. Content: Data on the routine budget (salaries, supplies, maintenance, and travel), as well as on the development budget (project administration, extension of research results, and development costs)
- d. Updating: Monthly
- e. Software: dBaseIII+
- f. Manager: Director General AARD; center and institute directors
- g. Users: AARD managers at all levels
- h. Comments: This database replaces a hard-copy system.
- i. Contact person: Director General
Agency for Agricultural Research and Development
Jln Ranganan 29, Pasarminggu
Jakarta 12540, Indonesia

3. Equipment and Facilities

- a. Location: AARD, research centers, research institutes
- b. Objective: Improvement of inventory management
- c. Content: Data on nondisposable equipment and physical facilities
- d. Updating: Semi-annual
- e. Software: dBaseIII+
- f. Manager: Director General, AARD
- g. Users: AARD administrators at all levels
- h. Comments:
- i. Contact person: Director General
Agency for Agricultural Research and Development
Jln Ranganan 29, Pasarminggu
Jakarta 12540, Indonesia

4. Personnel

- a. Location: AARD, research centers, research institutes
- b. Objective: Improvement of personnel management; streamlined reporting procedures
- c. Content: Approximately 9,000 records with 125 fields each
- d. Updating: Semi-annual

- e. Software: dBaseIII+
- f. Manager: Director General, AARD
- g. Users: Directors, administrators, and planners at all levels of AARD
- h. Comments: This database replaces a hard-copy system. Formats for 23 standard reports required by various government agencies have been developed.
- i. Contact person: Director General
Agency for Agricultural Research and Development
Jln Rangunan 29, Pasarminggu
Jakarta 12540, Indonesia

5. Research Cooperation and Collaboration

- a. Location: AARD
- b. Objective: Improvement of record keeping on cooperative and collaborative research projects
- c. Content: Data on all cooperative and collaborative research projects (including those funded by international agencies)
- d. Updating: Semi-annual
- e. Software: dBaseIII+
- f. Manager: CARP
- g. Users: Directors, administrators, and planners at all levels of AARD
- h. Comments: In the planning stage — start-up is anticipated for 1991.
- i. Contact person: Director General
Agency for Agricultural Research and Development
Jln Rangunan 29, Pasarminggu
Jakarta 12540, Indonesia

6. Research Results

- a. Location: AARD
- b. Objective: Monitoring and evaluation of all AARD research projects
- c. Content: Reports on all completed research

- d. Updating: Monthly
- e. Software: dBaseIII+
- f. Manager: CARP
- g. Users: Directors, administrators, and planners at all levels of AARD
- h. Comments: In the planning stage — start-up is anticipated in 1991.
- i. Contact person: Director General
Agency for Agricultural Research and Development
Jln Rangunan 29, Pasarminggu
Jakarta 12540, Indonesia

General Comments

The four databases developed to date have been used mainly as replacements for hard-copy systems. There has been one major and immediate benefit to AARD: routine reports for government and international agencies have become much easier to produce. Senior officials say that they now have much more time to manage.

One challenge for the future will be to link the databases. When links do become established, information on personnel, for example, will be able to be related to information on programs.

A second challenge will be to place a value on the time people spend on specific research activities, so that total activity budgets can be developed.

Three features of the AARD MIS work to date are worth noting:

- Responsibility for such work has been assigned to a clearly defined unit in national headquarters.
- Teams have been identified and trained for each research institute.
- Microcomputers are available at each institute so that data are inputted at the level at which they are collected.

Lao People's Democratic Republic

Agriculture is the dominant economic activity in the Lao PDR. The government has two main projects in the agriculture and forestry sectors: a food and

food-crop development project and an environmental protection project to mitigate slash-and-burn agriculture.

Formal agricultural research in the Lao PDR has a relatively short history. Early efforts were somewhat intermittent because of lack of research staff and resources. Program coordination was difficult. The first research organizations were the Salakham Rice Research Station (8 hectares, 1954) and the Hat Dok Keo Agricultural Station (10 hectares, 1964).

The Naphok Agricultural Research Station (30 hectares, 1984) has recently been designated by the government as the National Agricultural Research Center (NARC). NARC has a mandate to plan, coordinate, and supervise all agricultural research in the country. NARC and its three main stations have a staff of 75, including 30 university graduates (two with PhDs). Fifteen staff members have had some university training and 19 are agrotechnicians with secondary school qualifications.

MIS Developments

NARC is just beginning its MIS work. It has recently established a Monitoring and Evaluation Unit (MEU) to review research activities and to provide reports on progress, funding, and personnel.

NARC has some microcomputers, which scientists use mainly for the statistical analysis of research results. It has not yet established formal databases to hold management information, although it expects that the MEU will take the lead in such work.

General Comments

NARC and ISNAR are working together on several research management activities. NARC officials hope to use the experience gained at the Los Baños workshop in their early MIS work.

Malaysia

The Malaysian Agricultural Research and Development Institute (MARDI) was established in 1969 within the Ministry of Agriculture. Its mandate is to do research on all crops except rubber and oil palm. MARDI's organization is shown in Figure 2.3.

Other institutes in the Ministry are responsible for fisheries and livestock research. The Ministry of Primary Industries does research on rubber, oil palm, and forestry. Research at seven universities comes under the Ministry

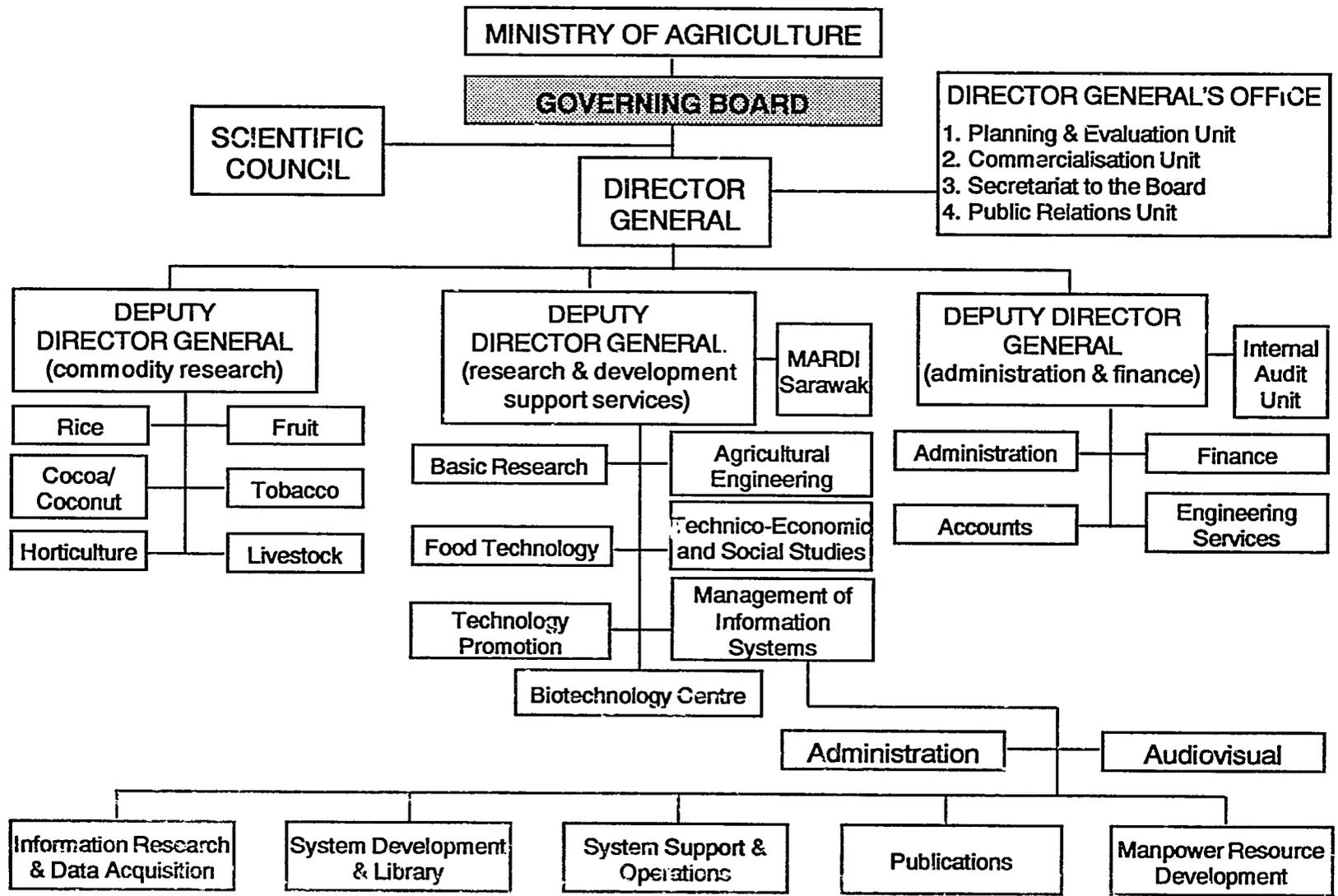


Figure 2.3. MARDI organizational structure

of Education, and some research is also done under the auspices of the Ministry of Science and Technology.

MARDI has 31 research stations throughout Malaysia. It employs a staff of about 4,000 people, including 468 designated as scientists. Of those, 79 have a PhD, 278 have an MSc, and 100 have a BSc. MARDI researchers collaborate with researchers in universities, in agencies in other ministries, and in the private sector. MARDI also works with international and regional research centers from 22 countries.

MIS Developments

MARDI began to use computers in 1971. It first worked with facilities at the Prime Ministry and the University of Technology Malaysia (UTM). In 1982, an IBM mainframe was installed at MARDI headquarters.

In 1990, a Management of Information Systems Division was established. Its organization and functions are shown in Figure 2.3.

Nine major computerized information systems, consisting of 23 subsystems, have been developed.

1. Research Management

- a. Location: MARDI Headquarters
- b. Objective: To develop an information system for the planning, management, and evaluation of research programs
- c. Content: Information on research projects, including budget, personnel, and project status
- d. Updating: Daily
- e. Software: DbaseIV, SQL
- f. Manager: Head of Planning and Evaluation Unit, MARDI
- g. Users: Research managers and research officers
- h. Comments: Operates on PCs
- i. Contact person: Director of MIS Division
MARDI
P. O. Box 12301
Pejabat Besar Pos
50774 Kuala Lumpur, Malaysia

2. Crop/Commodity Information

- a. Location: MARDI Headquarters
- b. Objective: To provide comprehensive information on all agricultural commodities in Malaysia
- c. Content: Statistics on production, import/export, agronomy, etc.
- d. Updating: Daily
- e. Software: SQL
- f. Manager: Head of Systems Development and Library, MARDI
- g. Users: Research managers and general public
- h. Comments: Operates on an IBM mainframe
- i. Contact person: Director of MIS Division
MARDI
P. O. Box 12301
Pejabat Besar Pos
50774 Kuala Lumpur, Malaysia

3. Agriculture Technology Information

- a. Location: MARDI Headquarters
- b. Objective: To provide information support on package technologies developed by MARDI
- c. Content: Commodity, type of technology, date released, customers, etc.
- d. Updating: Daily
- e. Software: DbaseIV, SQL
- f. Manager: Head of Systems Development and Library, MARDI
- g. Users: Research managers and general public
- h. Comments:
- i. Contact person: Director of MIS Division
MARDI
P. O. Box 12301
Pejabat Besar Pos
50774 Kuala Lumpur, Malaysia

4. Research Information

- a. Location: MARDI Headquarters
- b. Objective: Storage and retrieval of current and past records on experiments carried out at MARDI
- c. Content: Experiment data
- d. Updating: Daily
- e. Software: SQL
- f. Manager: Chief Statistician
- g. Users: Statisticians and researchers
- h. Comments: Operates on an IBM mainframe
- i. Contact person: Director of MIS Division
MARDI
P. O. Box 12301
Pejabat Besar Pos
50774 Kuala Lumpur, Malaysia

5. Personnel

- a. Location: MARDI Headquarters
- b. Objective: To provide integrated information-processing support for personnel management at MARDI
- c. Content: Biodata
- d. Updating: Daily
- e. Software: SQL
- f. Manager: Director of Personnel, MARDI
- g. Users: Administrators, research managers, and researchers
- h. Comments: Operates on an IBM mainframe
- i. Contact person: Director of MIS Division
MARDI
P. O. Box 12301
Pejabat Besar Pos
50774 Kuala Lumpur, Malaysia

6. Fixed Assets (Including Equipment)

- a. Location: MARDI Headquarters

- b. Objective: To provide information support for the management of material resources at MARDI
- c. Content: Date of purchase, location, capacity/range, functions, users
- d. Updating: Daily
- e. Software: SQL
- f. Manager: Head of Systems Development and Library
- g. Users: Administrators, research managers, and researchers
- h. Comments: Operates on an IBM mainframe
- i. Contact person: Director of MIS Division
MARDI
P. O. Box 12301
Pejabat Besar Pos
50774 Kuala Lumpur, Malaysia

7. Financial Management (Including Equipment)

- a. Location: MARDI Headquarters
- b. Objective: A computerized financial and accounting system to help in the management of operating, development, and other funds received by MARDI
- c. Content: Data on purchases, payments, and fund allocations
- d. Updating: Daily
- e. Software: DbaseIV, SQL
- f. Manager: Head of Systems Development and Library
- g. Users: Administrators and managers
- h. Comments: Operates on PCs and IBM mainframe
- i. Contact person: Director of MIS Division
MARDI
P. O. Box 12301
Pejabat Besar Pos
50774 Kuala Lumpur, Malaysia

8. Modeling, Simulation, and Expert Systems

- a. Location: MARDI Headquarters

- b. Objective: To develop models and expert systems as tools for agricultural research
- c. Content: Various crop and biological models
- d. Updating:
- e. Software: Fortran, PL/L, Basic
- f. Manager: Head of Systems Development and Library
- g. Users: Researchers
- h. Comments:
- i. Contact person: Director of MIS Division
MARDI
P. O. Box 12301
Pejabat Besar Pos
50774 Kuala Lumpur, Malaysia

9. Library

- a. Location: MARDI Headquarters
- b. Objective: To provide bibliography and searches of scientific literature to the research community
- c. Content: Title, author, abstract, commodity, discipline, etc.
- d. Updating: Daily
- e. Software: Storage and Information Retrieval System (STAIRS)
- f. Manager: Head of Systems Development and Library
- g. Users: Researchers
- h. Comments: Operates on IBM mainframe
- i. Contact person: Director of MIS Division
MARDI
P. O. Box 12301
Pejabat Besar Pos
50774 Kuala Lumpur, Malaysia

General Comments

Other research institutions in Malaysia are actively developing MISs tailored to their needs. Common databases and information systems will soon be linked nationwide.

Myanmar

The Ministry of Agriculture and Forests (MAF) in Myanmar is responsible for all development work on crops and forests in the country (Figure 2.4). Responsibility for livestock and fisheries is with another ministry.

Within the MAF, the Myanma Agriculture Service (MAS) is the lead agency for research. The Research Division of the MAS, also called the Agricultural Research Institute (ARI), has 14 crop and disciplinary subdivisions. ARI itself does most of the MAS research, although the seed, extension, and land-use divisions have their own experiments. MAS research in 1989-90 included 228 variety trials for 12 crops, as well as 286 agrotechnology experiments on 10 crops. Of the variety trials, 100 were on rice, 44 on food legumes, 21 on maize, and 38 on nonfood crops. Of the agrotechnology experiments, 85 were on rice, 70 on food legumes, 19 on maize, and 60 on nonfood crops.

In 1990, the MAS Research Division had 105 research officers and 946 other staff members. Total staffing for the MAS was 879 officers and 17,579 other staff members.

MIS Developments

The Research and Technology Main Committee of the MAS has a working group for each crop and discipline. Most Committee and working group members come from ARI. ARI plans research, assigns researchers to experiments, and allocates budgets.

Data collection and analysis of experimental results are done by hand. Information on the cost of each experiment is not readily available.

A personnel database is computerized but information on allocation of researchers' time has not yet been collected.

The following databases exist or are planned.

1. Research (Planned)

- a. Location: MAS
- b. Objective: Improvement in the monitoring of research progress
- c. Content: Results of experiments
- d. Updating: Semi-annual

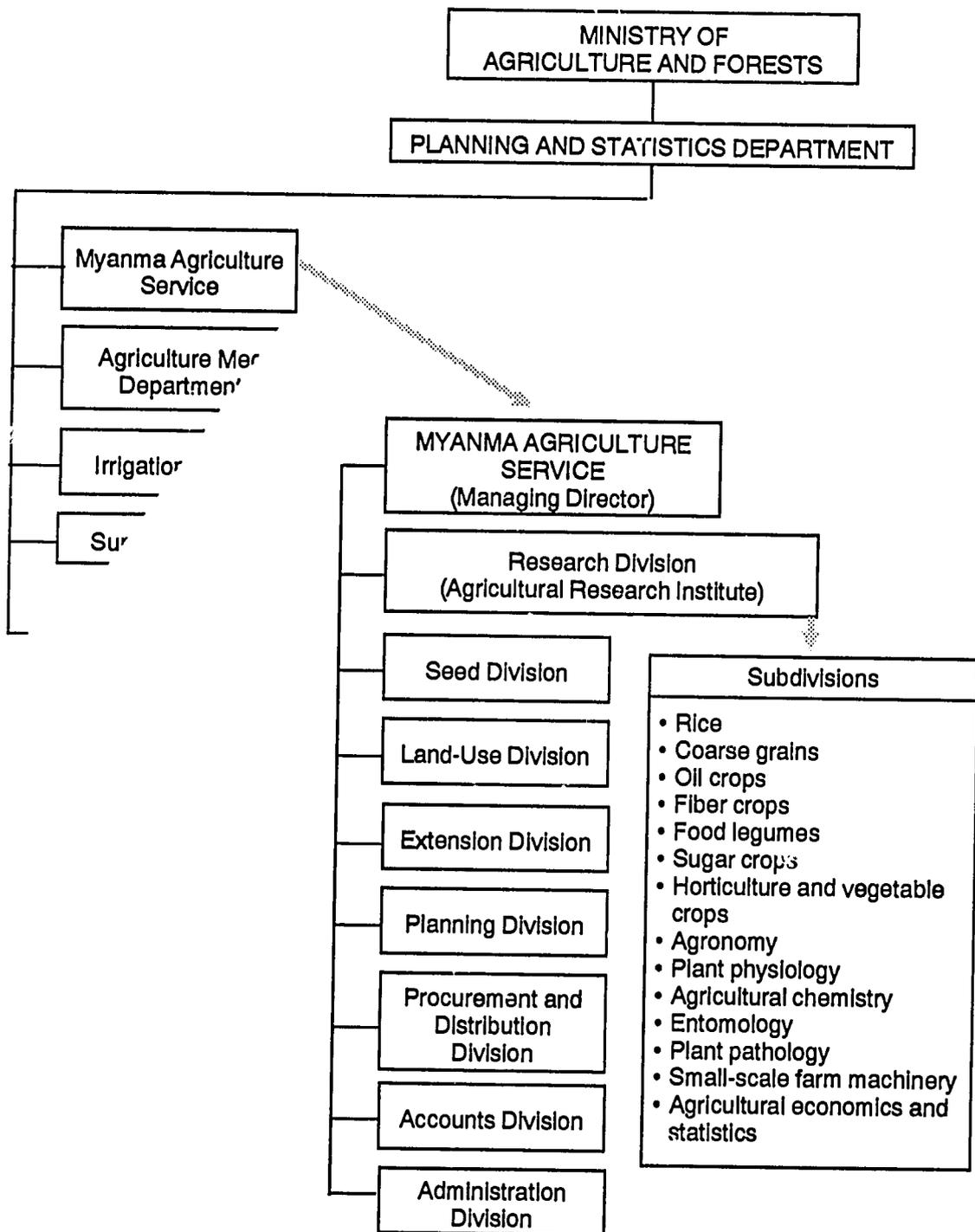


Figure 2.4. Organization of the Myanmar Agricultural Service (MAS), 1990

- e. Software: Reflex
- f. Manager: General Manager, ARI
- g. Users: Research managers
- h. Comments: The database will provide only summaries of research results
- i. Contact person: Managing Director
Myanma Agriculture Service
74 Shwedagon Pagoda Road
Yangon, Myanmar

2. Research Budget (Planned)

- a. Location: MAS
- b. Objective: Improvement in the allocation of research budget and monitoring of research expenditures
- c. Content: Budgets for experiments in ARI, by subdivision
- d. Updating: Semi-annual
- e. Software: Reflex
- f. Manager: General Manager, Accounts
- g. Users: Research managers, MAS
- h. Comments: Will report only budget summaries.
- i. Contact person: Managing Director
Myanma Agriculture Service
74 Shwedagon Pagoda Road
Yangon, Myanmar

3. Personnel

- a. Location: MAS
- b. Objective: Improvement in the management of human resources
- c. Content: Biodata on all researchers
- d. Updating: Quarterly
- e. Software: dBaseIV
- f. Manager: General Manager, Planning
- g. Users: Research managers

h. Comments:

i. Contact Managing Director
person: Myanmar Agriculture Service
 74 Shwedagon Pagoda Road
 Yangon, Myanmar

General Comments

The Planning Division of the MAS is likely to take the lead in MIS/PBS development, but it faces two constraints on this work: a shortage of computer facilities and a shortage of persons trained in MIS/PBS techniques. These constraints will have to be overcome if information systems are to be built from the bottom up. One possible first step is a national MIS/PBS workshop for MAS managers and scientists.

Nepal

The first formal agricultural research organization in Nepal was an experimental farm, established in 1922.

The focal point of the current structure is the National Agricultural Research Center (NARC), founded in 1987. NARC's mandate is for crop, livestock, and socioeconomic research. It has 429 research officers and a total staff of nearly 2000.

The National Agricultural Research Board (NARB), which has overall responsibility for NARC, formulates policy and sets priorities for agricultural research. It does so through workshops, working group meetings, and joint research-extension meetings in which research programs are reviewed and future projects considered. Annual research programs are based on goals set in five-year plans.

A research proposal goes through three stages:

- It is prepared by a NARC scientist or by a team of scientists.
- It is then reviewed by one of several technical panels at NARC.
- Finally, NARC submits a summary of it to NARB for approval.

NARC Planning Form 01 (Figure 2.5) includes almost all the basic information an MIS would require. For each project, data on location, funding

agencies, dates, and costs (broken down) are collected. The major piece of information missing is the time scientists propose to spend on the project.

At the present time, the information from Form 01 is not used directly as a basis for funding allocations. NARC funds go to organizations (institutes, stations) rather than to projects. Cost data from Form 01 are therefore used only to determine overall institute or station allocations. Plans are underway, however, to begin to allocate funds on a project basis.

MIS Developments

Considerable information on agricultural research projects, personnel, and funds already exists. As noted above, Form 01, particularly when coupled with personnel records, can provide the foundation for an MIS.

Microcomputers are just beginning to appear in Nepali public organizations in significant numbers. NARC has eight. At headquarters, as well as at some research institutes and stations, scientists and managers have started work on computerized databases. At the moment, however, there is still little coordination between them. Horizontal links are usually weak (i.e., between information sources on projects, personnel, finance, and facilities), and vertical links tend to be still weaker (i.e., between information managed at NARC and information managed at institutes/stations).

The challenge now is to organize this information so that managers can get access to it quickly and use it easily.

Several databases are in the early stages of development or are planned.

1. Research

- a. Location: NARC Headquarters
- b. Objective: To maintain basic information on approximately 700 research projects
- c. Content: Projects approved on NARC Planning Form 01
- d. Updating: Annual
- e. Software: dBaseIII+ — NARC plans to change to Reflex
- f. Manager: Planning, Monitoring and Evaluation Cell, NARC
- g. Users: NARC and NARB
- h. Comments: Does not include the names of all scientists who participate in each project.

Research Proposal Format

(For NARC use only)	
Sector :	Subsector :
Line Code :	Code :

- 01 Project Title :
- 02 Objectives :
- 03 Methodology :
- 04 Locations :
- 05 Proposing Agency :
- 06 Collaborating Agency :
- 07 Duration :
- a. Date of Start :
- b. Date of Termination :
- 08a Principle Researcher(s) :
- 08b Supervisor(s) :
- 09 Cost estimate :

a. Labour Cost

No. of man-days: _____ Rate: _____ Cost: _____

b. Material Cost

Material	Unit	Qty.	Cost
----------	------	------	------

c. Other Cost

Particular	Unit	Qty.	Cost
------------	------	------	------

d. Total Cost

(For Panel's Use)	
Approved: _____	Disapproved: _____
Remarks: _____	
Signature: _____	Date: _____

Figure 2.5. Nepal National Agricultural Research Center Planning Form 01

- i. Contact person: Chief of Planning, Monitoring and Evaluation Cell
NARC
Khumaltar, Latipur
Nepal

2. Research Budgets

- a. Location: NARC headquarters
- b. Objective: To maintain budget information for all institutes and stations
- c. Content: Basic line-item budget categories, data for the past four years, partially organized by project
- d. Updating: Annual
- e. Software: Lotus 123, dBaseIII+
- f. Manager: Planning, Monitoring and Evaluation Cell, NARC
- g. Users: NARC, Ministry of Finance
- h. Comments: The hardware, software and materials to establish this database have come from the USAID-funded Agriculture Research and Production Project.
- i. Contact person: Chief of Planning, Monitoring and Evaluation Cell
NARC
Khumaltar, Latipur
Nepal

3. Physical Resources

- a. Location: NARC headquarters
- b. Objective: To maintain an inventory of all physical resources owned by and assigned to NARC
- c. Content: Equipment and supplies ranging from land to office calculators
- d. Updating: Under discussion
- e. Software: dBaseIII+
- f. Manager: Planning, Monitoring and Evaluation Cell, NARC
- g. Users: NARC
- h. Comments: Developed in 1985 with support from the USAID-funded Agriculture Research and Production Project.

- i. Contact person: Chief of Planning, Monitoring and Evaluation Cell
NARC
Khumaltar, Latipur
Nepal

4. Personnel

- a. Location: NARC headquarters
- b. Objective: To provide a basis for personnel planning and administration
- c. Content:
- d. Updating: Annual
- e. Software: dBaseIII+
- f. Manager: General Administrative Cell, NARC
- g. Users: NARC
- h. Comments: To be completed in 1990.
- i. Contact person: Chief of Planning, Monitoring and Evaluation Cell
NARC
Khumaltar, Latipur
Nepal

General Comments

MIS development in NARC has been limited by the availability of microcomputers. Most of the micros in operation now are being used for routine administrative or statistical work.

Issues

- NARC has some flexibility with regard to its budget now and hopes to have more in the near future. An important corollary of this move toward more autonomy is the development of self-contained management procedures. NARC managers will need the information in the databases described above. An important challenge is to establish a schedule to develop them.
- Planning Form 01 provides the basis for a PBS. The issue is one of a change from a budget-by-source to a budget-by-use system. The objective is improved management rather than simply improved administration. Subjects to be dealt with include the following:

- identification of a small team within NARC to coordinate the MIS/PBS work;
- selection of an easy-to-use microcomputer program or programs that all NARC scientists and managers can use.
- In an organization the size of NARC, management information cannot be organized efficiently and used effectively without microcomputers. A plan that deals with hardware and software standardization as well as organizational arrangements is required.

Pakistan

The agricultural research system in Pakistan is large and complex. There are 24 research institutions at the national level and 70 at the provincial level. Several ministries share responsibility for agricultural research — the Ministry of Food, Agriculture and Cooperatives; the Ministry of Commerce; the Ministry of Education; the Ministry of Power; the Atomic Energy Commission; and others.

The Pakistan Agricultural Research Council (PARC) operates as an autonomous unit within the Ministry of Food, Agriculture and Cooperatives. Its mandate is to coordinate agricultural research throughout the country. It does research itself through the National Agricultural Research Centre (NARC), and it works closely with provincial research institutions, including universities.

Most basic, long-term research is carried out by national institutions, while adaptive research is done mostly by provincial institutions.

MIS Developments

PARC has begun to develop several components of an MIS. Some of these components include similar information, although they were developed for different purposes. Several different software programs are in use, and in some cases, there are even different computer operating systems.

MIS activities in PARC can be divided into the following categories:

- Six databases are in the Finance Division. Five of these six are still in the planning stage. Only the general ledger database is operational.

- There are five databases that are used primarily by the Director of Personnel, the Director of Training, and the Director of Scientific Information. These five include a Personnel Information System, a Training Programs Management System, a Research Projects Information System, and a Computerized Library System. The Personnel Information System was established in 1987 and is restricted to use by the staff of the Director of Personnel.
- There is a Manpower Inventory database.
- An Agricultural Experts database and an Agricultural Statistics databank are maintained by PARC at its Central Computer Unit.
- The Information Unit at NARC subscribes to three international databases: AGRIS, AGRICOLA, and CABI. This unit maintains a large bibliographic database on Pakistani agricultural research — now containing 13,000 records — which it uses to add local references to the international databases. For this database, it uses InMagic software.

The following paragraphs are short summaries of these various databases.

1. Agricultural Statistics

- a. Location: PARC Headquarters
- b. Objective: To collect, organize, compile, and store current statistics on Pakistani agriculture
- c. Content: Data on crops, inputs, livestock, land, and population
- d. Updating: Annual
- e. Software: dBaseIII+
- f. Manager: PARC Computer Unit
- g. Users: Research scientists
- h. Comments: This database was developed in collaboration with FAO.
- i. Contact person: In-charge
Central Computer Unit, PARC
P. O. Box 1031
Islamabad, Pakistan

2. Research

- a. Location: NARC Headquarters

- b. Objective: To provide a means of rapid access to information about Pakistani agricultural research
- c. Content: Data on approximately 200 projects
- d. Updating: Annual
- e. Software: InMagic
- f. Manager: PARC Information Unit
- g. Users: PARC Chairman, division heads within PARC
- h. Comments:
- i. Contact person: In charge
Information Unit, PARC
P. O. Box 1031
Islamabad, Pakistan

3. Finance

- a. Location: Finance Division, PARC
- b. Objective: To maintain payroll and accounts
- c. Content: Six subsystems for payroll, accounts, and inventory that can generate up to 34 daily and/or monthly reports
- d. Updating: Continuous
- e. Software: COBOL
- f. Manager: Director (Accounts) and Director (Finance)
- g. Users: Finance Division, PARC
- h. Comments: Developed by Peat Marwick.
- i. Contact person: Director (Accounts)
PARC
P. O. Box 1031
Islamabad, Pakistan

4. Agricultural Experts

- a. Location: PARC Headquarters
- b. Objective: To provide information on agricultural experts in Pakistan
- c. Content: Biodata and current work status
- d. Updating: Annual

- e. Software: dBaseIV
- f. Manager: PARC Computer Unit
- g. Users: PARC management
- h. Comments: Data are provided by directors of research institutes.
- i. Contact person: In-charge
Central Computer Unit, PARC
P. O. Box 1031
Islamabad, Pakistan

5. Personnel Information System

- a. Location: PARC
- b. Objective: To improve personnel planning and administration
- c. Content: Data on PARC employees, 17 fields
- d. Updating: Continuous
- e. Software: dBaseIII+, Foxbase
- f. Manager: Director of Personnel Administration
- g. Users: Director of Personnel Administration and Chairman, PARC
- h. Comments: Restricted to use by staff in the Personnel Division
- i. Contact person: Director of Personnel Administration
PARC
P. O. Box 1032
Islamabad, Pakistan

6. Manpower Inventory

- a. Location: PARC
- b. Objective: To improve the making of agricultural research policy and the planning of projects
- c. Content: Data on manpower at agricultural research institutes
- d. Updating: Annual
- e. Software: dBaseIII+, SPSS PC+
- f. Manager: Chief of Party, MART/USAID/WINROCK project
- g. Users: PARC and USAID

- h. **Comments:** Use restricted to PARC chairman and senior PARC officials.
- i. **Contact person:** Chief of Party
MART/USAID/WINROCK
PARC
P. O. Box 1032
Islamabad, Pakistan

7. Training Management Program

- a. **Location:** PARC
- b. **Objectives:** To monitor local and foreign training sponsored by donor agencies through PARC
- c. **Content:** Data on overseas degree and short-term training, overseas visits, and local degree training
- d. **Updating:** Semi-annual
- e. **Software:** dBaseIII+
- f. **Manager:** Director of Training
- g. **Users:** PARC management
- h. **Comments:** This database allows managers to monitor the progress of trainees from selection, through training, to placement following training.
- i. **Contact person:** Director of Training
PARC
P. O. Box 1032
Islamabad, Pakistan

8. Computerized Library

- a. **Location:** NARC Headquarters
- b. **Objectives:** To provide rapid access to information about Pakistani agricultural research
- c. **Content:** Data on library holdings at NARC, on the Union List of Journals, and on documents delivered to research managers, scientists, and students
- d. **Updating:** Continuous
- e. **Software:** dBaseIII+
- f. **Manager:** Librarian, NARC

- g. Users: Scientists and students
- h. Comments:
- i. Contact person: Director, Scientific Information Unit
National Agricultural Research Centre
P. O. NARC
Islamabad, Pakistan

9. Bibliography

- a. Location: NARC Headquarters.
- b. Objectives: To provide bibliographic information to Pakistani agricultural researchers
- c. Content: AGRIS, AGRICOLA, and CABI plus about 13,000 local entries
- d. Updating: Continuous
- e. Software: InMagic
- f. Manager: Librarian, NARC
- g. Users: Researchers and students
- h. Comments: The Scientific Information Unit at NARC is the AGRIS liaison unit in Pakistan.
- i. Contact person: Director, Scientific Information Unit
National Agricultural Research Centre
P. O. NARC
Islamabad, Pakistan

General Comments

MIS work for Pakistani agricultural research began only recently. PARC has one IBM-400 minicomputer and 130 microcomputers at various institutes around the country. Eighty-eight of these microcomputers are IBM-compatible, and 40 are at the provincial level.

Issues

- Considerable information exists on manpower, but it is scattered through several different databases.

Is it possible to create a single integrated database on manpower? PARC is working on a proposal for a Local Area Network (LAN).

- Several different software programs are in use—many developed locally.

What is the best way to ensure compatibility and to utilize the advantages of these different programs? PARC has decided to use only software programs that are compatible with each other — or that can at least exchange data (e.g., via ASCII).

- Links should be established between national and provincial information bases.

How might such links best be organized? What national information do provincial institutions need, and vice versa? What types of technology will be most appropriate for the creation of a country-wide MIS for agricultural research?

Papua New Guinea

Papua New Guinea gained its independence in 1975. Most of the population (about 3.5 million) lives off some form of agricultural enterprise, which gives the agricultural sector high priority in overall development plans.

The Department of Agriculture and Livestock (DAL) has six divisions, one of which is the Research Division. Some of the other divisions also have research activities, as does the private sector. DAL's Agricultural Protection Division has plant pathology, entomology, and chemistry units, which provide services to the Research Division.

Three semiautonomous research institutes — the Coffee Research Institute (CRI), the Cocoa and Coconut Research Institute (CCRI), and the Oil Palm Research Institute (OPRI) — have programs funded through a levy on exports of their respective products.

The total PNG research budget for 1989 was about US\$ 10.8 million; the DAL budget was US\$ 2.5 million.

The Research Division has two lowland and three highland research stations. There are approximately 95 staff members, of whom 30 are scientists. The budgets and scientist staffing levels of DAL and the three semiautonomous institutes are presented in Table 2.5.

MIS Developments

Within the DAL, the Policy and Planning Division has a Monitoring and Evaluation Unit (MEU), which is responsible for monitoring and evaluation

Table 2.5. Budget of DAL and Semiautonomous Institutes

	Scientists	Budget (US\$ million)
DAL/ARD	30	2.5
CCRI	14	3.8
CRI	12	3.0
OPRI	8	1.8

work across all divisions. In 1988, the MEU initiated a reporting system — the Physical Implementation and Review Summary (PIRS) — to cover all programs in DAL. Data are collected at the research station level, but the full potential of PIRS as a management resource is still to be fully exploited.

The following databases exist or are planned.

1. Research

- a. Location: DAL Headquarters
- b. Objective: To improve the monitoring of research progress
- c. Content: Data on the achievements of various research programs
- d. Updating: Quarterly
- e. Software: WordStar
- f. Manager: MEU
- g. Users: DAL division directors
- h. Comment: Reports do not include information on individual experiments (but only on programs).
- i. Contact person: Director
Department of Agriculture and Livestock
P. O. Box 417, Konedobu NCD
Port Moresby, Papua New Guinea

2. Research Budgets

- a. Location: DAL Headquarters
- b. Objective: To provide estimates of revenue and expenditures
- c. Content: Data on all research costs
- d. Updating: Quarterly

- e. Software: dBaseIII+
- f. Manager: Finance Division
- g. Users: DAL Director, Finance Director
- h. Comments:
- i. Contact person: Director
Department of Agriculture and Livestock
P. O. Box 417, Konedobu NCD
Port Moresby, Papua New Guinea

3. Personnel

- a. Location: DAL Headquarters
- b. Objective: To provide managers with information on personnel
- c. Content: Routine personnel information
- d. Updating: Monthly
- e. Software: Knowledge Man
- f. Manager: Manpower Planning Section, Policy and Planning Unit
- g. Users: Managers of all DAL divisions
- h. Comments:
- i. Contact person: Senior Manpower Planner/Chief Resource Planner
Policy and Planning Unit
Department of Agriculture and Livestock
P. O. Box 417, Konedobu NCD
Port Moresby, Papua New Guinea

4. Bibliography

- a. Location: DAL Library
- b. Objective: To provide improved library and documentation service for DAL researchers
- c. Content: Data on all library holdings
- d. Updating: Continuous
- e. Software: CDS/ISIS
- f. Manager: Director, Training Division
- g. Users: DAL staff

h. Comments:

- i. Contact person: Director, Training Division
Department of Agriculture and Livestock
P. O. Box 417, Konedobu NCD
Port Moresby, Papua New Guinea

General Comments

DAL research stations have recently used "logical framework analysis" for budget development. This analysis results in a simple matrix that gives goals, objectives, inputs, and outputs for each research activity. Verifiable indicators of results are also listed.

On the basis of this analysis, each station submits its budget to the Research Division. This budget, rather than programs or projects, then becomes the basis for evaluation.

The first steps of a program budgeting system were taken in fiscal year 1990.

Issues

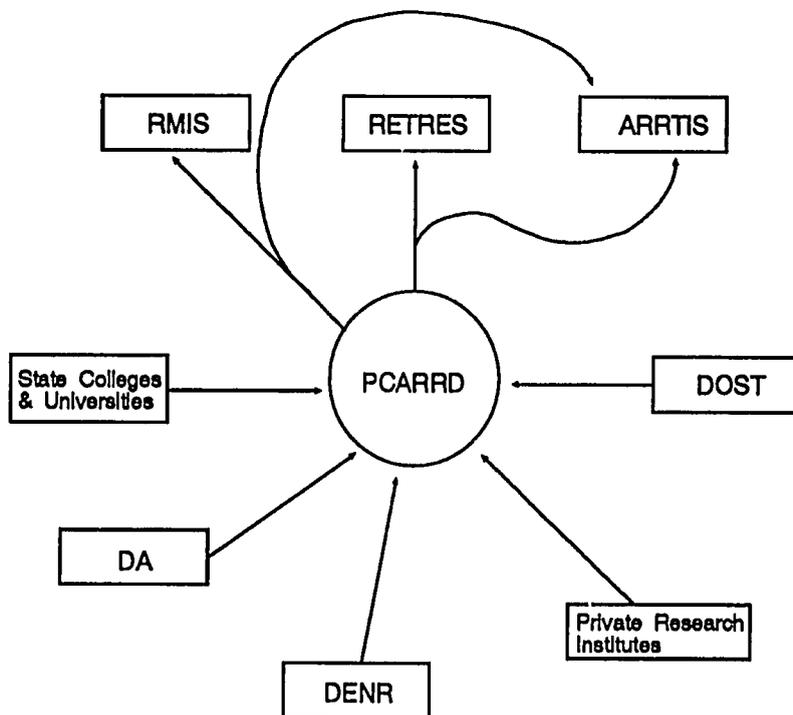
What kind of an MIS is appropriate for a small but growing research system? Does the Research Division need its own MIS, or should MIS activities in the Division be integrated with those of the DAL?

Philippines

Four government departments are involved in agriculture and natural resources research and development in the Philippines: the Department of Agriculture (DA), the Department of Environment and Natural Resources (DENR), the Department of Science and Technology (DOST), and the Department of Education, Culture and Sports (DECS).

The Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD), organized under DOST, coordinates research and development activities.

PCARRD links existing research agencies, stations, and institutions in a National Agriculture and Resources Research and Development Network (NARRDN). This network is composed of 94 research centers and stations representing DA, DENR, and DOST; state colleges and universities (SCUs) representing DECS; commodity institutes; and nongovernment organizations. The flow of information within NARRDN is indicated in Figure 2.6.



NARRDN links all research in the Philippines. Data flow from research agencies into the three main databases at PCARRD — RMIS, RETRES, and ARRTIS.

Figure 2.6. The National Agricultural and Resources Research and Development Network (NARRDN)

PCARRD introduced the concept of regional consortia in 1978, whereby research institutions in each region have joined together under a single lead agency. A network of regional research and development consortia was organized to promote sharing of resources among contiguous consortia.

MIS Developments

PCARRD initiated development of an MIS in 1974 to support the administration of its secretariat and to process information for research and development management. Some of the national information systems presently maintained by PCARRD are listed below:

- the Research Management Information System (RMIS), a computer-based system that supports program planning, evaluation and monitoring;
- the Research Information Storage and Retrieval System (RETRES), a computer-based bibliographic database that facilitates literature searches and supports scientific literature dissemination;

- the Agriculture and Resources Regional Technology Information System (ARRTIS), which holds information on technology generated in agriculture and natural resources;
- the Equipment Infrastructure and Manpower Management Information System (EIMMS), which consists of a computer-assisted inventory of all equipment, infrastructure, and manpower resources in the NARRDN and supports the institutional development functions of PCARRD;
- the Financial Management System (FMS), which provides financial indicators for agency budgets, operating plans, and financial control.

Regional Consortia

The regional consortia play a vital role in maintaining the PCARRD databases. Updates of ongoing research are provided for RMIS during annual in-house reviews. Inputs to ARRTIS are discussed during annual symposia. The consortia coordinate data collection for both databases, as well as providing reports of completed research for RETRES.

Each consortium plans to establish its own MIS, both for its own use and as a means of inputting to the PCARRD databases. They will emphasize hard copy initially, although plans are already being made to use more advanced telecommunications facilities. PCARRD provides leadership and training through the lead agencies of the consortia.

Department of Agriculture Databases

The Bureau of Agriculture Research (DA-BAR) maintains several national-level databases. Summary information on five of them is presented below.

Department of Environment and Natural Resources Database

The Ecosystems Research and Development Bureau (DENR-ERDB) began work on a research and development database in 1990. When completed, this system will generate profiles and statistical reports on ongoing, completed, and proposed projects by region, type, and status for use in research planning, monitoring, and evaluation.

DENR-ERDB also has a tree species information database that provides clients with up-to-date information on the potential of different tree species for reforestation and plantation establishment.

DENR-ERDB feeds data into the NARRDN (Figure 2.6).

National Databases at State Colleges and Universities

The Philippine Root Crops Information Service (PRIS) is managed by the Visayas State College of Agriculture (ViSCA). This database is a national one on root and tuber crops. Several similar databases for other crops exist at other SCUs.

Many national-level databases of interest to agricultural researchers already exist in the Philippines or are planned. Brief descriptions of the most important ones follow.

1. Research

- a. Location: PCARRD (RMIS) Headquarters
- b. Objective: To monitor all current research
- c. Content: For each research study: title, objective, researcher, budget, location and duration
- d. Updating: Semi-annual
- e. Software: Developed internally using COBOL, to be converted to INFORMIX.
- f. Manager: MIS Division
- g. Users: PCARRD and NARRDN administrators
- h. Comments: Mostly used internally by PCARRD. Includes dictionaries for looking up coded entries.
- i. Contact person: Director, MIS Division
PCARRD
Los Baños, Laguna 3772
Philippines

2. Research

- a. Location: PCARRD (ARRTIS) Headquarters
- b. Objective: To document technology generated by the national agricultural research system
- c. Content: Information on all technology that has resulted from research in agriculture, forestry, and natural resources from all regions
- d. Updating: Semi-annual

- e. Software: Developed internally using CDS/ISIS
- f. Manager: MIS Division
- g. Users: All PCARRD scientists, researchers, development agents
- h. Comments: Newly designed database.
- i. Contact person: Director, MIS Division
PCARRD
Los Baños, Laguna 3772
Philippines

3. Bibliography

- a. Location: PCARRD (RETRES) Headquarters
- b. Objective: To provide access to research information
- c. Content: Information on research publications
- d. Updating: Continuous
- e. Software: Developed internally using COBOL
- f. Manager: MIS Division
- g. Users: All PCARRD scientists, researchers
- h. Comments: Information on current research is moved from the RMIS database at the end of each fiscal year.
- i. Contact person: Director, MIS Division
PCARRD
Los Baños, Laguna 3772
Philippines

4. Research Facilities

- a. Location: PCARRD (EIMMS) Headquarters
- b. Objective: To provide information on all equipment, infrastructure, and manpower resources related to agricultural research and development
- c. Content: Inventory of all equipment, land, buildings, and manpower in NARRDN
- d. Updating: Continuous
- e. Software: Developed internally using COBOL

- f. Manager: MIS Division
- g. Users: Research managers
- h. Comments:
- i. Contact person: Director, IDD
PCARRD
Los Baños, Laguna 3772
Philippines

5. Research Budget

- a. Location: PCARRD (FMS) Headquarters
- b. Objective: To provide financial indicators for formulation of agency budgets and operating plans, as well as for financial control
- c. Content: Fund allocations, releases, and disbursements for on-going research
- d. Updating: Continuous
- e. Software: Developed internally using COBOL
- f. Manager: MIS Division
- g. Users: Research managers
- h. Comments: This system will be redeveloped and merged with other systems when PCARRD gets new computers.
- i. Contact person: Director, MIS Division
PCARRD
Los Baños, Laguna 3772
Philippines

6. Research

- a. Location: PCARRD (SPDB) Headquarters
- b. Objective: To assist in research planning and priority setting
- c. Content: Data on research budgets
- d. Updating: Continuous
- e. Software: Foxbase, Quattro
- f. Manager: MIS Division
- g. Users: Research managers

h. Comments: Financial data derived from RMIS

i. Contact person: Director, MIS Division
PCARRD
Los Baños, Laguna 3772
Philippines

7. Research

a. Location: DENR/ERDB

b. Objective: To improve research planning and reporting

c. Content: Data on (1) completed research, (2) ongoing and new research studies, and (3) research proposals

d. Updating: Quarterly

e. Software: dBaseIII+, CDS/ISIS

f. Manager: Planning and Management Information Services Unit,
ERDB

g. Users: ERDB research managers and scientists

h. Comments: Development of this database was started in January 1990. Ongoing and new research data are in in eight files with 6-17 fields each. These files cover details of travel, supplies, in-house reviews, etc.

i. Contact person: Director
Ecosystems Research and Development Bureau
College, Laguna, 4031
Philippines

8. Bibliography

a. Location: ViSCA (PRIS)

b. Objective: To provide information for root-crop researchers and technology users

c. Content: Data on all completed root crop research

d. Updating: Continuous

e. Software: CDS/ISIS

f. Manager: PRIS, ViSCA Library

g. Users: All root-crop scientists and extension workers

h. Comments: Developed with donor (IDRC) support.

- i. Contact person: Director
Philippine Root Crops Research and Training Center
ViSCA, Leyte, Philippines

9. Technology

- a. Location: DA-BAR
- b. Objective: To provide information on appropriate technology
- c. Content: Results of applied agroindustrial technology by agroecological zone
- d. Updating: Continuous
- e. Software: ARC-INFO
- f. Manager: Research Coordination Division
- g. Users: Researchers, research managers
- h. Comments: This database is still in the design stage.
- i. Contact person: Division Chief
Research Coordination Division
Bureau of Agricultural Research
Department of Agriculture
Diliman, Quezon City
Philippines

10. Research Abstracts

- a. Location: DA-BAR
- b. Objective: To determine the nature and methodology of proposed, ongoing and completed research
- c. Content: Abstracts of research proposals, ongoing research, and reports of completed research
- d. Updating: Three times per year
- e. Software: CDS/ISIS
- f. Manager: Program Development Division (PDD)
- g. Users: Researchers, research managers
- h. Comments: Converted and entered in CDS/ISIS to be compatible with the Philippine library system.

- i. Contact person: Division Chief
Program Development Division
Bureau of Agricultural Research
Department of Agriculture
Diliman, Quezon City
Philippines

11. Research Budget

- a. Location: DA-BAR
- b. Objective: To provide information on the use of funds to insure proper research programming
- c. Content: Fund allocations, releases, and disbursements
- d. Updating: Quarterly
- e. Software: dBAseIII+
- f. Manager: Program Development Division (PDD)
- g. Users: Research managers, budget analysts
- h. Comments: Will be linked to the DA research monitoring system.
- i. Contact person: Division Chief
Program Development Division
Bureau of Agricultural Research
Department of Agriculture
Diliman, Quezon City
Philippines

12. Research

- a. Location: DA-BAR
- b. Objective: To determine the relevance of existing projects to sustainable agricultural development
- c. Content: Progress reports ongoing and completed research
- d. Updating: Three times per year
- e. Software: dBAseIII+
- f. Manager: Research Coordination Division
- g. Users: Researchers, research managers
- h. Comments: This database is still in the design stage. When completed, it will highlight the effects of research on socioeconomic conditions, by agroecological zone.

- i. Contact person: Division Chief
Research Coordination Division
Bureau of Agricultural Research
Department of Agriculture
Diliman, Quezon City
Philippines

13. Research Priorities

- a. Location: DA-BAR
- b. Objective: To provide information to identify research priorities
- c. Content: Data on agroecological zones, socioeconomic conditions, and agricultural commodities
- d. Updating: Continuous
- e. Software: dBaseIII+
- f. Managers: Director and Assistant Director of DA-BAR and Chief of Program Development Division (PDD)
- g. Users: Researchers, research managers
- h. Comments:
- i. Contact person: Director
Bureau of Agricultural Research
Department of Agriculture
Diliman, Quezon City
Philippines

General Comments

Among Asian NARS, the Philippines has the most experience with MIS development. Computerization of hard-copy records began in 1972.

PCARRD hopes to extend its MIS to each regional consortium. In 1989, it organized a national MIS workshop, during which each consortium was given the task of designing its own MIS. PCARRD itself is considering installation of a multi-terminal minicomputer system at headquarters, and it is encouraging regional consortia to acquire their own microcomputers.

Issues

- The various databases described above contain considerable information on research activities. This information is not well integrated, however, with that on finance, personnel, and inventory. Data on these latter

subjects are primarily used for "administration" rather than for "management." How can such integration be encouraged?

- There appears to be some duplication of information in different databases (particularly with databases located in different organizations). What is the extent of such duplication? Would it be desirable to try to reduce it?

Sri Lanka

Agricultural research in Sri Lanka is carried out mainly in the Ministry of Agriculture and Agricultural Research (MAAR). Smaller amounts of research also occur in four other ministries: Fisheries, Forestry, Higher Education, and Plantation Industries. Most research is done in 19 research centers/institutes and four universities (with faculties of agriculture).

MAAR has eight regional research centers and three special centers (for rice, plant genetics, and land/water). Below the regional centers are 14 substations and 24 adaptive research units.

The Council for Agricultural Research Policy (CARP) was formed in 1987 to provide overall coordination of the research system. Although CARP has no administrative control over its various constituent units, it is expected to do the following:

- develop a national agricultural research plan;
- develop broad priorities for agricultural research;
- make comments and recommendations on the programs and budgets of agricultural research centers/institutes.

In 1989, the estimated budget for all agricultural research was US\$ 6 million. In 1990, constituent units of CARP employed 448 scientists, 1,704 support staff, and 2,587 laborers.

MIS Developments

The earliest database related to agricultural research in Sri Lanka was developed by the Natural Resources, Energy and Science Authority (NARESA) to track the progress of projects it funded. NARESA continues to maintain this database, as well as one containing bibliographic references. It also coordinates an agricultural network containing information on periodicals and other publications from 24 libraries throughout the country.

Soon after CARP was established, CARP officials recognized that the organization needed more information on research resources and activities if it was to fulfill its mandate. With funding from the World Bank and GTZ, it made a commitment to develop an MIS. ISNAR provided technical assistance.

This MIS is based on relatively limited key information about research personnel, projects, and finance. The research center/institute is seen as both the primary supplier of information and one of the primary users of it. The philosophy is one of "bottom-up" development. Table 2.6 shows the personnel information gathered, while Figure 2.7 shows the information being gathered on research projects (items H-J for Department of Agriculture only).

Data collection is done at the center/institute level, and plans for 1991 call for data entry to be done there also. CARP is responsible for the aggregation of these various center/institute databases into a national database. The 1991 databases will be used for program budgeting.

The following databases exist or are planned.

1. Research

- a. Location: In all CARP constituent institutes
- b. Objective: To improve research management
- c. Content: Data on all current research projects
- d. Updating: Annual
- e. Software: Reflex
- f. Managers: CARP, center/institute directors and program leaders
- g. Users: CARP, Center/Institute Directors
- h. Comments:
- i. Contact person: MIS Coordinator
CARP
State Mortgage Bank Building
269, Galle Road
Colombo 3, Sri Lanka
or
Planning Cell
Department of Agriculture
P. O. Box 5
Peradeniya, Sri Lanka

Centre/Station: _____

a. Programme: _____

b. Name of the Research Project: _____

c. Season(s): _____ d. Location: _____

e. Crop: _____ f. Discipline: _____

g. Scientists involved:

Researcher's Name(s)	Percentage Time of Researcher
1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____

h. Support Staff Involved:

Name(s) of Technical Support Staff	Designation	Percentage Time
1. _____	_____	_____
2. _____	_____	_____
3. _____	_____	_____
4. _____	_____	_____

i. Cost of Inputs & Subsistence:

Item	Value (Rs)
1. Agrochemicals	_____
2. Chemicals	_____
3. Fertilizers	_____
4. Fuel	_____
5. Subsistence	_____
6. Other	_____

j. Labor Requirement (man-days):

Labor	Man-days
_____	_____

k. Source of Funding: _____

Figure 2.7. Form for data entry of research programme for 1991

2. Personnel

- a. Location: CARP, centers/institutes
- b. Objective: To improve personnel management
- c. Content: Basic biographical, educational, experience, and activity data for all research personnel
- d. Updating: Annual
- e. Software: Reflex
- f. Managers: CARP Executive Secretary, institute directors
- g. Users: CARP, center/institute directors
- h. Comments:
- i. Contact person: Executive Secretary
CARP
State Mortgage Bank Building
269, Galle Road
Colombo 3, Sri Lanka

3. Research Budgets

- a. Location: CARP Headquarters
- b. Objective: To improve research budgeting
- c. Content: All research costs
- d. Updating: Annual
- e. Software: Lotus 123, Quattro
- f. Manager: Executive Secretary, CARP
- g. Users: CARP members, CARP Executive Secretary
- h. Comments:
- i. Contact person: Executive Secretary
CARP
State Mortgage Bank Building
269, Galle Road
Colombo 3, Sri Lanka

4. Equipment

- a. Location: NARESA

- b. Objective: To improve the use and maintenance of equipment
- c. Content: Data on nonexpendable equipment
- d. Updating: Annual
- e. Software: dBaseIII+
- f. Managers: Director General, NARESA
- g. Users: NARESA, institute directors
- h. Comments: This database is still in the development stage.
- i. Contact person: Director General
NARESA
47/5 Vidya Mawatha
Colombo 7, Sri Lanka

5. Bibliography

- a. Location: NARESA
- b. Objective: To provide bibliographic references to all scientific researchers
- c. Content: Materials from 24 Sri Lankan libraries
- d. Updating: Annual
- e. Software: CDS/ISIS
- f. Manager: Director of Information, NARESA
- g. Users: Researchers
- h. Comments: Serves all sciences
- i. Contact person: Director of Information
NARESA
47/5 Vidya Mawatha
Colombo 7, Sri Lanka

General Comments

During development of the MIS, ISNAR worked with senior research institute staff members on interpretation of the data being collected. Center/institute staff were encouraged to feel that the approach was "bottom-up," and that they were full participants in the process.

Issues

- The MIS was developed in close collaboration with CARP and its constituent centers/institutes. Staff members from each center/institute have received training in inputting data. Procedures for updating the system are now in place. But resources will be required (for personnel, equipment, and operating expenses). Where will these resources come from?
- Universities are an important part of the Sri Lankan agricultural research system, but they are not now included in the CARP MIS. The Agricultural Faculty at the university in Peradeniya is exploring such a link. What problems are likely to be encountered in integrating university and ministry MISs?

Thailand

The Ministry of Agriculture and Cooperatives (MOAC) is responsible for most agricultural research in Thailand. Within the MOAC, the Department of Agriculture (DOA) carries out research on crops, while the Departments of Fisheries, Livestock, and Forestry do research in their respective sectors. Some research also occurs in the Royal Irrigation Department, and considerable research is done in universities.

The DOA has about 1600 scientists (BSc degree or higher) and about 3600 total staff.

MIS Development

Most MIS development in DOA has occurred as part of the National Agricultural Research Project (NARP, World Bank funded). The Data Processing Unit of the Planning and Technical Division is responsible for this work. The emphasis has been, first, on a financial reporting system and, second, on personnel and research information databases.

An IBM System 36 at DOA headquarters is the hub of the MIS. Each of the regional research centers has its own microcomputer system for data entry and transfer to the System 36.

The financial reporting system (on the System 36) includes three subsystems:

- Revenue collection, under the direction of the Accounts Section, Finance Division, which replaced a manual system for recording data on revenue collections (quarantine fees, licensing fees, etc.).

- Budget control and expenditure reporting, under the direction of the Budget Section, Finance Division, which is an accounting system, used to prepare monthly and quarterly reports. Sources of funds are included, divided according to the program and project descriptions of the Bureau of the Budget, with appropriate location and line-item expense headings.

Accounting data for both central and provincial levels is entered at DOA headquarters. Provincial data are sent to the DOA on diskette, so these data are usually a month behind central data.

- The NARP accounting system, under the direction of the Planning and Technical Division, which records and reports all NARP project expenditures. This database was developed by NARP to report project expenditures to the Royal Thai Government.

The personnel management database, also on the System 36, was designed around a manual system that was already in place. It includes data on position, location, job classification, and place of assignment for all permanent DOA staff members. Data entry is controlled by the Personnel Division and access is limited to ensure confidentiality of information.

The research information database is in the process of development. Its objective is to provide a ready source of information on research within the DOA. It includes all the information given in a normal research proposal. The database fields are shown in Table 2.7.

Only 15 of these fields are used at the national level, so they are the only fields transferred to the System 36.

Some research institutes have started their own MISs to serve specific needs. For example, the Field Crops Research Institute (FCRI) has developed personnel and research databases. One personnel database includes data on about 500 staff members; another has data on more than 800 laborers. The research database includes basic information on about 300 research projects and subprojects at the FCRI and at its seven regional centers.

The following databases exist or are planned:

1. Research

- a. Location: DOA Headquarters
- b. Objective: To provide a ready source of information on research projects within DOA

Table 2.7. Database Fields (Entered in Quick Basic or WordStar) for Subproject Research Proposals

Database Field	Transferred to System 36	
1. Crop		Yes
2. Project title		Yes
3. Discipline/subdiscipline	Yes	
4. Subproject title	Yes	
5. Type of research	Yes	
6. Status of research	Yes	
7. Priority of research		Yes
8. Personnel		Yes
9. Background to research	No	
10. Objective of research	No	
11. Target of research		No
12. Materials		No
13. Experimental design		Yes
14. Methodology		Yes
15. Data collection		Yes
16. Expected research output		No
17. Location of experiment	Yes	
18. Period of research		Yes
19. Budget code		Yes
20. Source of funding		Yes

- c. Content: 20 fields for each subproject
- d. Updating: Continuous
- e. Software: Developed internally for the IBM System 36 (See Table 2.6)
- f. Manager: Director, Planning and Technical Division
- g. Users: DOA management, committees within the DOA
- h. Comments: This database was initially developed in the 1970s for manual use.
- i. Contact person: Supervisor
Information Center, Planning and Technical Division
Department of Agriculture
Phaholythin Road
Bangkok 10900, Thailand

2. Personnel

- a. Location: Personnel Division, DOA Headquarters
- b. Objective: To improve personnel management
- c. Content: Data on all permanent staff members
- d. Updating: Continuous
- e. Software: Internally developed for IBM System 36
- f. Manager: Head, Personnel Records and Pension Section, Personnel Division
- g. Users: Personnel Division
- h. Comments:
- i. Contact person: Director
Personnel Division
Department of Agriculture
Phaholythin Road
Bangkok 10900, Thailand

3. Equipment

- a. Location: Finance Division, DOA Headquarters
- b. Objective: To improve management and procurement of vehicles
- c. Content: Data on motorized vehicles procured by DOA
- d. Updating: Continuous
- e. Software: Developed internally for IBM System 36
- f. Manager: Procurement Section, Finance Division
- g. Users: Director of Finance, directors of institutes and divisions
- h. Comments: Contains information on motorized vehicles only, including tractors and motorcycles.
- i. Contact person: Director
Finance Division, Budget Section
Department of Agriculture
Phaholythin Road
Bangkok 10900, Thailand

4. Land and Buildings

- a. Location: Finance Division, DOA Headquarters

- b. Objective: To improve management of land and buildings
- c. Content: Data on all land and buildings held by DOA
- d. Updating: Annual
- e. Software: Developed internally for IBM System 36
- f. Managers: Data Processing Section, Planning and Technical Division
- g. Users: Director of Finance, institute directors
- h. Comments:
- i. Contact person: Director
Finance Division, Budget Section
Department of Agriculture
Phaholythin Road
Bangkok 10900, Thailand

5. Bibliography

- a. Location: Information Center, DOA Headquarters
- b. Objective: To improve accessibility to research information
- c. Content: All DOA research reports and relevant bibliographic references
- d. Updating: Continuous
- e. Software: CDS/ISIS
- f. Manager: Supervisor, Information Center, Planning and Technical Division
- g. Users: All DOA scientists.
- h. Comments: This database is also used by researchers outside DOA, including university students.
- i. Contact person: Supervisor
Information Center
Planning and Technical Division
Department of Agriculture
Phaholythin Road
Bangkok 10900, Thailand

Issues

- Use of the IBM System 36 minicomputer at the headquarters level is well established. Research institutes and divisions are getting microcomputers.

The IBM 36 (a minicomputer) requires specialized programming skills. Microcomputers do not require equally specialized skills, and several Thai-language database and spreadsheet programs are available off-the-shelf for microcomputers. What should be the place of the IBM 36 in future MIS development? What is the best way to exchange data between micros and the IBM 36?

3 Background and Evaluation of the Workshops

Staffing and Supporting the Workshops

ISNAR researchers and NARS colleagues developed and tested MIS/PBS procedures at all levels of research management in Asian NARS during 1989-90. Drafts of the guidelines were tested in national-level MIS/PBS training courses in Bangladesh, Philippines, and Sri Lanka.

The experience gained by ISNAR staff in developing national training sessions, as well as in writing and testing the guidelines, was brought to bear on organizing and conducting the regional workshops. The same staff members presented and discussed the MIS/PBS materials and supervised practical work during the workshops. They were assisted by key resource people from NAARM, PCAARD, and Sri Lanka's Council for Agricultural Research Policy and its Department of Agriculture. Resource staffing for the workshops is listed at the end of Appendix 3.

Participants' Backgrounds

One of the goals of the workshop was to train people who would be in a position to influence decisions on MIS/PBS in their respective NARS and who could follow through on MIS/PBS organization and training in their own research systems.

The 59 participants, plus national program resource persons, provided a broad background of MIS/PBS experience and responsibility, ranging from directors of national research programs to personnel-administration officers. Universities doing research in India, Philippines, and Sri Lanka were represented. Some countries sent teams already experienced in MIS work; other teams had limited knowledge of MIS.

Participants' names and addresses are provided in Appendix 3.

Proceedings of the Workshop on MIS/PBS

A Different Kind of Workshop

As pointed out in Chapter 1, workshop planners and organizers built on the premise that MIS/PBS called for a *different kind* of workshop. ISNAR was at an adaptive research stage with MIS/PBS and felt there was no need for a traditional workshop to present papers and discuss research results. It was time for practical workshops where research managers could learn INFORM — and start using it.

The workshop participants immediately realized they were involved in a different kind of workshop. Emphasis from the first day was on practical, microcomputer-oriented exercises and on developing skills in MIS/PBS. Lectures by ISNAR specialists were kept to the minimum essential to support practical exercises. Two local guest lecturers at each workshop presented host-country background on research management and development of human resources.

Participants were assigned to daily panels to critique the guidelines ISNAR developed for the workshops (Fig. 3.1). A high percentage of participant panelists pinpointed shortcomings in the guidelines. Those were noted by ISNAR specialists and are reflected in the published guidelines.

Practical exercises dealing with MIS/PBS were designed to have participants spend more than 50% of their time working in teams to solve specific MIS/PBS problems. They had evening assignments and gave up their free time on the weekend to complete exercises on MIS/PBS. They were also anxious to develop skills for using microcomputers and special software to analyze research data and create reports.

The Ghosa Case Study

During the second week of the workshops, all participants worked in teams to apply their MIS/PBS skills to analyzing the agricultural research situation in the fictitious nation of *Ghosa* (see Appendix 4).

During the final sessions of the workshops, the participants used their MIS/PBS analysis to recommend changes in personnel and research emphasis for Ghosa's agricultural research institute. Each group reported its recommendations for Ghosa to the Ghosan Minister of Agriculture (fully as fictitious as the nation he represented — he was an ISNAR senior research officer), who attended the final sessions of each workshop.

PANEL DISCUSSIONS

During the next two weeks we will have several panels discuss the draft MIS Guidelines. You received copies of the Guidelines in your workshop bags.

The purpose of the panels will be to generate comments and critical suggestions regarding the Guidelines. Such feedback is important because it will provide the basis for later revisions of the Guidelines.

Each of you will serve on one such panel.

Remember: The audience for the Guidelines is research managers such as yourself. In preparing your comments, you may wish to deal with some or all of the following questions:

1. Did I find the part or chapter of the Guidelines my panel received easy to read?
2. Did I find its contents useful?
3. Do I think that the presentation is too detailed—or not detailed enough?
4. What two or three suggestions do I have for improvement of the Guideline discussed?

Figure 3.1. Background for discussion of the ISNAR MIS/PBS Guidelines was given to each participant. Every participant took part, with four to six people from different countries on daily panels at each workshop.

The Computer Software for MIS/PBS

ISNAR designed the workshops based on experience in Asia, where many NARS research managers have had limited experience with program budgeting, with computers, or in the use of information databases for management. That called for an MIS/PBS that is easy to understand and easy to use—one that fills the six criteria listed in Chapter 1. It also called for microcomputer software that offered the following:

- ease of learning: do it in a day;
- completeness: ready to run off the store shelf;
- flexibility: display data in different ways;

- compatibility: able to convert from, or export to, database programs already used in a NARS.

Evaluation of the Workshops

Was this kind of workshop effective?

Each participant was asked to evaluate the workshop at the end of the second week. Questionnaires covered participants' expectations, organization and content, facilities and logistics, workshop materials and their presentation, and need for follow-up.

A senior officer from a national research program made the following comment: "I expected the workshop would be similar to those which are organized very often but are not conducted properly. Such workshops end up in total failure. Completely opposite to my expectations, I have really found a new direction towards the development of MIS/PBS. Contents of the workshop were perfectly all right."

Another noted that he expected "to learn about MIS and PBS for agricultural research and that the workshop would enable me to make a better contribution toward agricultural research management. My expectations were surely met. I achieved skills to actually develop an MIS/PBS."

Lectures and Guidelines

Workshop lectures covered the materials in the MIS/PBS guidelines (see Appendix 2). Sixty-two participants and resource persons evaluated the lectures and guidelines. Not every participant chose to answer all questions, but of those replying:

- Forty-eight rated their understanding of the lectures as *good* or *excellent*. Only one rating of *poor* was given. *Fair* and *poor* ratings appeared to be related to difficulty with the English language.
- Forty-two rated the guidelines as "easy to understand"; 19 felt the guidelines "required much concentration to understand." No participant rated the guidelines as "difficult to understand"

Nevertheless, from a learning standpoint, the lectures and guidelines rated well below the computer exercises and Ghosa case. Only 12 participants "learned the most" from the lectures; 20 reported they "learned the least" from lectures. Thirty-one participants "learned the most" from the Ghosa

case and 27 “learned the most” from the computer exercises. Work on the Ghosa case was almost completely on computer.

Participants were asked how the guidelines would be read in their country:

- Part 1 of the guidelines, aimed at directors of national research systems and institute directors, got 40 affirmative answers for “likely to be read by the director of the national research system” and 41 as “likely to be read by heads of research institutes.” All but four participants felt that Part 1 was likely to be read by “people responsible for MIS/PBS.”
- The same general ratings were given to rest of the guidelines. The participants saw the guidelines as most likely to be read by the people working with MIS/PBS. Scientists were generally judged as least likely to read the guidelines.
- Only four participants felt the guidelines were too complicated; 53 thought they were “about right for me” and six felt they were “too simple.”

Computer Skills and Software

The workshop participants ranged from highly skilled to unskilled in terms of computer use. At the start of the workshop, eight participants felt their computer skills were “very good,” 25 felt their skills were “good,” and 29 felt their skills were “limited.” Of the 29 with “limited” skills, most had never touched a computer keyboard. At the end of the workshop, 28 participants thought their computer skills had advanced one notch.

The workshop introduced Reflex,* an easy-to-use software program for database management on a microcomputer. Few of the participants with “very good” computer skills had ever seen Reflex, and some of them initially expressed skepticism about Reflex being any better than software they were already using.

At the end of the workshop, 44 participants rated Reflex as “good software for my organization” and 14 rated Reflex as “excellent for my organization.” Only five participants rated Reflex as “poor software for my organization.”

Follow-up Activities

As part of the workshop evaluation, participants indicated their preference for follow-up activities for the MIS/PBS workshop:

*Reflex (version 2.0), Borland International, Inc., 1989.

- Fifty-three felt that there should be “a national workshop like this one in my country.”
- Forty-three wanted “another international workshop like this one to which some of my colleagues could come.”
- Forty-four participants indicated they would like to see development of an Asian MIS/PBS network with a semiannual newsletter.

Each country team of participants also prepared and presented a follow-up action plan for MIS/PBS work. These were also to include a schedule of MIS/PBS activities they would like to accomplish during the next two years. The action plans are included in Chapter 4.

4

Country Action Plans

The main objective of the MIS/PBS workshops was to lay a foundation for development of MIS/PBS in the participating countries. At each workshop, country teams prepared a plan that included actions and targets for MIS/PBS activities during the next 12 to 24 months.

The country action plans are a workshop product, developed and written by participants and presented during the final plenary session of each workshop. Thus, these plans indicate the thinking of each country's group of participants, but they **should not be considered as official documents** for government action.

Action plans for the 13 countries represented at the workshops follow.

Bangladesh

The Bangladesh Agricultural Research Council (BARC), in collaboration with ISNAR, started development of an MIS for agricultural research in 1989. Data from all research institutes under BARC were collected and Reflex/Paradox software was used to create databases. The first MIS report will be completed by early 1991.

A 1989 MIS workshop at BARC, using data from the Sugar Research and Training Institute, introduced MIS to directors and department heads from BARC's member institutes.

The five participants from Bangladesh at the workshop in Hyderabad will work with an ISNAR staff member posted at BARC to become more familiar with ongoing MIS work.

Actions

Each of BARC's constituent institutes will further organize MIS training to involve at least two participants from each BARC research institute.

- Participants will use data from their own institute. One participant must have a good computer background; the other should be from his or her institute's planning cell.

- The training will be three weeks in duration, with participants from the ISNAR/NAARM workshop serving as resource persons. Course content will be similar to that for the ISNAR/NAARM workshop.
- The ISNAR staff member in Bangladesh will be asked to help organize the training.
- After the training, BARC will hand over MIS databases to the respective institutes for management by the trainees.
- Each database will be updated annually at the institute level and a copy of the updated database sent to BARC for updating the national MIS.
- Critical evaluation of MIS work will be done at all institutes and recommendations will be made for needed improvements.

Targets

- By April 1991: All training should be completed and institutes should be working on their MIS databases.
- By October 1991: Critical evaluation of MIS databases should be completed.

People's Republic of China

China has made great progress in agricultural research, and MIS/PBS already plays a key role in agricultural research management. The lead in further development of MIS/PBS work will be taken by the Chinese Academy of Agricultural Sciences (CAAS) and the National Center for Rural Technology Development (NCRTD).

Actions

The six Chinese participants in the ISNAR/NAARM workshop will do the following:

- collect data from the Institute for Application of Atomic Energy and the Institute of Plant Protection to serve as MIS/PBS case studies;
- adapt and improve the MIS/PBS procedures developed by ISNAR to fit China's conditions and translate the modified ISNAR MIS/PBS materials into Chinese;

- develop MIS/PBS for the Institute for Application of Atomic Energy and the Institute of Plant Protection to use in planning, budgeting, monitoring, and evaluating research and bring them into China's Five-Year Plan (1991-95);
- organize MIS/PBS training of research managers from various research institutes. Training will be in Beijing. ISNAR or NAARM guidance is hoped for.

Targets

- By April 1991: An MIS/PBS for the Institute for Application of Atomic Energy and the Institute of Plant Protection will be in place.
- By October 1991: Both institutes will be successfully using their MIS/PBS.
- By November 1991: An MIS/PBS training course will be held in Beijing.
- By January 1992: A report on MIS/PBS progress in China will be sent to ISNAR.

India

The Indian team that participated in the ISNAR/NAARM training will initiate a series of training sessions on MIS/PBS for staff from the Indian Council of Agricultural Research (ICAR), ICAR institutes, and the state agricultural universities. NAARM staff and facilities will be used. ISNAR's assistance in the organization of case studies for use in this training will be welcomed.

Actions

- The Indian team from the ISNAR/NAARM training will organize the training program. ISNAR materials will serve as the major reference for preparation of training materials.
- Databases and case studies from selected institutes and universities will be included in the training.

A national-level case study for ICAR will be completed after experience has been gained in MIS/PBS at institute levels.

Targets

- By mid-October 1991: Three workshops will be completed, based on three sets of data and case studies related to a crop institute, a livestock institute, and a fisheries institute.

Indonesia

The Agency for Agricultural Research and Development (AARD) began to develop an MIS in 1986 and has conducted MIS training at all levels. Four MIS subsystems — on research programs and personnel, finance, and research facilities — have contributed to the formulation of AARD's research master plan.

Actions

A first step will be continuation of MIS training. Staff from all levels of AARD will be included.

- For staff members below the institute level, one-week training courses will be conducted by the MIS staff.
- A three-month training course for staff from research centers and research institutes will be offered in Jakarta.
- Techniques learned during work with the Ghosa case study will be used for data analysis and to plan and evaluate AARD research programs.

Targets

- By April 1991:
 - Data for AARD's four existing MIS subsystems will be completely updated.
 - A PBS for livestock research (one center and two research institutes) will have been developed.
 - A workshop for AARD managers on the use of MIS for decision making will have been conducted.
 - Training on data collection and processing will be continuing.

- An MIS subsystem for research progress reporting will have been developed.
- By October 1991:
 - All MIS data for 1991-92 will be completely updated.
 - A PBS for all of AARD, based on 1991-92 data, will have been developed.
 - Planning for fiscal year 1992-93 will have been started using 1991-92 data.
 - An MIS subsystem for research cooperation will have been developed.
 - Training in advanced computer programs will be underway.

Lao People's Democratic Republic

The Lao People's Democratic Republic recently received ISNAR assistance in establishing a National Agricultural Research System within the Ministry of Agriculture and Forestry. The ISNAR mission provided expertise in the area of research management. Hopefully, this is the beginning of a long-lasting relationship that will create a viable national research program.

The ISNAR/SEARCA/PCARRD workshop provided an understanding of the potential of MIS/PBS for strengthening research.

Actions

- A report to the Minister of Agriculture and Forestry will recommend implementation of an MIS/PBS in the NARS.
- MIS/PBS materials from the ISNAR/SEARCA/PCARRD workshop will be translated into the Lao language for use in MIS/PBS training of junior researchers (with computer skills) at the National Agricultural Research Center (NARC).
- Data will be collected within NARC and establishment of an MIS/PBS with Reflex will be attempted. ISNAR assistance will be needed.

Targets

No target dates have been established.

Malaysia

The Malaysian Agricultural Research and Development Institute (MARDI) has used several different computer software programs to develop various MIS-related databases — library, personnel management, financial management, fixed-asset inventory, expert systems and modeling, and commodities. MARDI is still working on its research MIS, on an MIS to inventory agricultural technology, and on an MIS for training management.

Actions

MARDI established a Management Information Systems Division in 1990 and work has started on a centralized database.

- With the concurrence of MARDI management, a standardized MIS system will be adopted by MARDI with Reflex as the potential software. If another software package is chosen for the database, Reflex will be used to create reports. Another alternative will be to use Reflex on the subsystems, perhaps at the directorate level.
- MARDI has six commodity research divisions and seven supportive, noncommodity research divisions. Key computer personnel and program coordinators will have to be trained if Reflex is to be adopted. One division will be used as a case study.
- If the case study and training approach is followed, the involvement of ISNAR consultants will be sought, either for the whole MIS or for one of the subsystems.

Targets

- By April 1991: A PBS for the MARDI research and development budget will have been adopted and will be workable.
- By December 1991: Various analyses from a centralized MIS will be available for use by MARDI's directorates.

Myanmar

Agricultural research in Myanmar is done by the Agricultural Research Institute (ARI), which is the research division of the Myanmar Agriculture Service (MAS). ARI has 14 crop and disciplinary research subdivisions.

MIS activity in MAS consists of a personnel database. Databases for research programs and research budgets are planned.

Actions

The starting point for an MIS/PBS will be the development of a case study of ARI's Rice Subdivision.

- The case study will be used for MIS/PBS training of all managers, supervisors, and researchers within the Rice Subdivision. People from the Divisions of Planning, Accounts, and Administration of MAS will also be trained.
- MAS researchers already collaborate with IRRI, CIMMYT, ICRISAT, and IITA. Collaboration with ISNAR will be sought for development of an MIS/PBS.

Targets

- By April 1991: Work on the case study of the Rice Subdivision will be complete and training will have started.
- By October 1991: MIS/PBS training will have been started at the division level.
- By October 1991: Planned MIS/PBS databases will be completed for all of ARI.

Nepal

The National Agricultural Research Center (NARC) is the focal point for agricultural research in Nepal. Above NARC, the National Agricultural Research Board (NARB) formulates research policy and sets research priorities. Annual research programs are based on goals set in five-year plans.

NARC has a microcomputer-based MIS with a three-year-old database for 700 projects and 429 staff members. The system is used primarily by NARB for allocation of funds and for project approval and monitoring.

The current NARC MIS does not provide information on allocation of scientist time, and project costs do not include support staff costs, which are included under the fixed costs of an institution.

Actions

There is need to put MIS/PBS work within NARC on a firmer foundation and to create a national MIS/PBS network.

- Priority will be given to case studies followed by training. Khumalson Research Complex, which is Nepal's largest research center (12 national-level disciplinary departments, two national-level commodity programs, and one research station) and which also houses NARC, will provide case studies for use in training.
- NARC will be totally involved in the case studies and training. Training will be for division heads, program coordinators, senior scientists, administrators, and planners.
- ISNAR technical assistance will be sought to complete the case studies. ISNAR and NAARM will be asked to provide resource persons for MIS/PBS training.

Targets

- By November 1990: Existing project and personnel databases will have been updated and completed.
- By January 1991: Reports on updated databases will have been prepared and discussed with administrators, planners, and policymakers.
- By February 1991: MIS procedures and outputs will be discussed at the annual NARB and NARC planning meetings, and a course of action on MIS/PBS will be decided.
- By March 1991: The actions recommended at the annual meeting will begin to be implemented.

- During May-September 1991: Case studies will be organized and conducted.
- By October 1991: National MIS/PBS training workshops will have been held.

Pakistan

The Pakistan Agricultural Research Council (PARC), which coordinates agricultural research at all levels of government, has three on-going MIS development activities. The five-person team that participated in the ISNAR/NAARM workshop will attempt to build on those activities.

The Deputy Director of the Agriculture Information Section, Ayub Agricultural Research Institute (AARI), will coordinate MIS/PBS work.

Actions

- A trip report (from the ISNAR/NAARM workshop) regarding the nature and importance of an MIS for agricultural research will be submitted to the Director General of AARI, Faisalabad. This report will emphasize that an MIS/PBS is a useful and applicable tool for increasing the effectiveness and efficiency of research management for AARI by providing an in-depth look into the work of research managers and individual scientists.
- The Cotton Research Institute (CRI), AARI, will be selected as the pilot institute for an MIS/PBS case study. ISNAR technical assistance will be sought for data collection and analysis.
- The Agriculture Economic Research Unit (AERU), AARI, will modify data-collection questionnaires from the ISNAR/NAARM workshop for use by CRI.
- Two scientists from PARC will collaborate on CRI data collection.
- The results of the case study will be presented to senior researchers, administrators, and planners from other AARI institutes in Punjab, and the procedure for setting up MIS/PBS to fit the specific needs of Punjab will be discussed.

Targets

- By November 1990: PARC scientists and the Deputy Director of Agriculture Information will finish data collection. Data will include the CRI payroll for 1989-90, the CRI budget for 1989-90, CRI personnel, and CRI project activities and achievements.
- By December 1, 1990: An MIS/PBS report will have been presented to the Director of CRI.
- By early 1991: An MIS/PBS seminar will have been organized to sell the concept to all research managers in PARC.

Papua New Guinea

The national agricultural research system of Papua New Guinea (PNG) is small compared to many of the systems in Asian countries. Among research systems in the South Pacific, however, the PNG system is by far the largest.

The Department of Agriculture and Livestock's Agricultural Research Division (DAL/ARD) concentrates on research on food crops and livestock. The Cocoa and Coconut Research Institute (CCRI), the Coffee Research Institute (CRI), and the Oil Palm Research Institute (OPRI) concentrate on their respective export crops. About 30 other scientists associated with nongovernment organizations do agricultural research in various provinces.

Actions

Although DAL has computerized databases in place, there is no MIS/PBS. There is an immediate need for such a system, and actions will concentrate on establishing one in three phases:

- Phase 1 will be a case study of ARD for 1990-91. Because ARD plans to expand its research in 1991, it is imperative that 1990 activities serve as the base for the initial MIS.
- Phase 2 will be a national seminar on the concepts of MIS/PBS and how they relate to research management. The seminar will provide overviews of the current situation and determine national requirements for an MIS.
- Phase 3 will be a national MIS/PBS training workshop. It will use the format of the ISNAR/SEARCA/PCARRD workshop. Proposed attendance includes the following:

- DAL/ARD two senior research officers and three planners from the Divisions of Policy and Planning or Finance;
- CCRI director/deputy director or financial controller;
- CRI director/deputy director or financial controller;
- OPRI director/deputy director or financial controller.

ISNAR assistance and participation will be sought for Phases 2 and 3.

Targets

- By March 1991: The case study of ARD will be complete.
- During July 1991: A national MIS/PBS seminar will be held.
- During September 1991: A national MIS/PBS training workshop will be held.

Philippines

The Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD) maintains several major MIS databases. MIS databases dealing with agricultural research are also maintained by the Department of Agriculture's Bureau of Agricultural Research (DA-BAR), the Department of Environment and Natural Resources' Ecosystems Research and Development Bureau (DENR-ERDB), and by several state colleges and universities.

PCARRD coordinates national research and development activities through the National Agriculture and Resources Research and Development Network (NARRDN), which is composed of 94 research centers and stations representing DA, DENR, the Department of Science and Technology, state colleges and universities, and nongovernment organizations.

A network of 15 regional research and development consortia has been organized by PCARRD to promote sharing of resources among research stations within the consortia and to manage research and development activities within the respective regions.

MIS work at the time of the workshop had been mainly centralized at the national level. However, PCARRD organized a national MIS workshop on agricultural research in 1989, during which each regional consortium started

to design its own MIS, and PCARRD plans to convene an interagency working group on MIS to promote information sharing among the agencies in NARRDN.

Actions

- MIS work will be decentralized through bottom-up activities during 1990-92, with the goal of establishing a nationwide stand-alone MIS/PBS network that will be operational by January 1992.

Targets

PCARRD will take the lead in achieving the following:

- December 1990–February 1991: Orientation to MIS/PBS. A planning workshop will have been held during December 1990, with orientation meetings during January and February 1991.
- February–April 1991: Analysis and design of the MIS/PBS system will be carried out.
- April–July 1991: The system will be tested.
- August–October 1991: A trial run of the new MIS/PBS system will be made.
- November–December 1991: The system will be evaluated.
- January 1992: The system will be implemented nationwide.
- April 1992: Post-implementation review and evaluation of the system will be carried out.

Sri Lanka

Sri Lanka implemented a national MIS/PBS program in 1989. A report for 1989-90 is complete, and a consolidated report for 1991 is being prepared by The Council for Agricultural Research Policy (CARP).

Actions

- Training in MIS/PBS will be organized by CARP for two people from each regional research center of the Department of Agriculture and each research institute.
 - Trainees will be nominated by the heads of their respective institutes or centers. They will be responsible for data collection at their institute or center. All trainees should have some experience with computers, databases, and spreadsheets. One trainee from each organization must be a scientist.
 - All participants in the ISNAR/NAARM workshop will be active in the training program. Training sessions will be from eight to 10 days.
 - Those who complete the training will be able to collect, enter, and analyze their institute's data and send it to CARP for use in the overall country report.
- MIS will be extended to Sri Lanka's universities. PBS will not be included because of problems in divided funding. University data will be made available to CARP.
- A national MIS/PBS workshop will be organized by CARP for all institute directors. Problems in MIS/PBS will be discussed. ISNAR and NAARM participation will be sought.

Targets

- By mid-December 1990: The CARP report on MIS/PBS for 1991 will be completed.
- By February 1991: MIS/PBS training will have been completed.
- By March 1991: A national workshop will be held; university data will have been collected.
- By May 1991: Data from all scientists will have been collected.
- By June 1991: CARP will have received data from each institute or center.
- By October 1991: Consolidated report for 1992 will be completed.

- By January 1992: The university MIS report will be completed.

Thailand

Management information systems, with data handled manually, have been present in the Department of Agriculture since 1972. Computerized databases for research, personnel, and finances now exist at the national level, but access for planning and budgeting purposes is difficult.

An MIS/PBS using Reflex would improve access to information in the existing databases, but modification and merging would be required. Consensus for a change to a Reflex-based MIS/PBS would have to be reached among the directors of research centers and among key personnel in the Department of Agriculture. Such consensus building will be time consuming.

Actions

The first step in achieving consensus for a change to a Reflex-based MIS/PBS will be discussion with the Department of Agriculture's Research and Development Committee.

- With the committee's endorsement, MIS/PBS training at the department level will be organized for key managers and computer specialists from institutes, divisions, and research centers.
- A case study of one or two research centers will be developed to show researchers and research managers what an MIS/PBS can achieve.
- Technical assistance from ISNAR and funding through ADB will be sought to complete the case studies and training.

Targets

- June 1991: Discussion of, and orientation to, a Reflex-based MIS/PBS will be completed. Reflex will have been distributed to institutes, divisions, and research centers for familiarization and feedback.
- September 1991: Case studies on two research centers will be completed.
- January 1992: Decision will be made on shifting to a Reflex-based MIS/PBS that will link existing databases.

Appendix 1 Workshop Program

Workshop Program

Note: This is a generic version of the workshop program. The main difference between the two workshops was location and the fact that at Hyderabad the workshop was based on a six-day week, while at Los Baños it was based on a five-day week. Workshop content was nearly identical.

Week 1			
Time	Monday	Time	Tuesday
09:00	Formal opening	08:30	<i>Panel discussion:</i> Comments and suggestions on Part 1 of the guidelines
09:45	The Importance of good management information		
10:15	An overview of a program budgeting system (PBS)	09:15	Sources of Information for PBS
11:30	Themes and structure of the workshop	10:30	<i>Data collection for PBS:</i> Scientists' time allocations
12:00	<i>Lunch</i>	11:30	Data quality and data management
13:30	<i>Computer Laboratory work:</i> What is a database? Introduction to Reflex, Part 1 Use of sample databases (India, Sri Lanka)	12:15	<i>Lunch</i>
		13:30	<i>Computer laboratory work:</i> Introduction to Reflex, Part 2 PBS exercises Microcomputer practice
20:00	Microcomputer practice	18:00	Welcome dinner by hosts

Time	Wednesday	Time	Thursday
08:30	<i>Panel discussion:</i> Part 2 of guidelines	08:30	<i>Panel discussion:</i> Part 2 of guidelines
09:30	Revenue and cost codes for program budgeting	09:15	Alternative approaches to program planning and evaluation
10:30	<i>Preparing financial information for a program budget:</i> Information on people, program, and finance	10:30	Information requirements for research program analysis
12:00	<i>Lunch</i>	11:15	Use of keywords
13:30	<i>Computer laboratory work:</i> What is a spreadsheet? Introduction to Quattro and Lotus Problem solving with a sample research institute budget	12:15	<i>Lunch</i>
20:00	Country meeting on status of MIS (one country)	13:30	Visit to a local research organization
		20:00	Country meeting on status of MIS
Time	Friday	Saturday	
08:30	<i>Panel discussion:</i> Part 2 of guidelines	Computer Laboratory open for individual or group practice.	
09:15	<i>The project database:</i> Putting together information on people, program, and finances	Free time for local outings	
10:30	Human resource management		
12:00	<i>Lunch</i>		
13:30	Introduction to the Ghosa project		
14:00	<i>Computer laboratory:</i> Work in teams on the Ghosa MIS/PBS analysis		
20:00	Country meeting on status of MIS		

Week 2

Time	Monday	Time	Tuesday
08:30	<i>Panel discussion:</i> Part 2 of guidelines	08:30	<i>Panel discussion:</i> Part 2 of guidelines
09:15	<i>Hyderabad workshop:</i> Discussion of lessons from first 2 years of MIS/PBS in Sri Lanka <i>Los Baños workshop:</i> Work on the Ghosa project	09:15	Work on the Ghosa project
12:00	<i>Lunch</i>	12:00	<i>Lunch</i>
13:30	Work on the Ghosa project	13:30	Checking consistency of Ghosa project data
20:00	Country meeting on status of MIS	20:00	Country meeting on status of MIS
Time	Wednesday	Time	Thursday
08:30	Visit to an international agricultural research center	08:30	Final analysis of Ghosa data and preparation of reports
12:00	<i>Lunch</i>	12:00	<i>Lunch</i>
13:30	Preliminary analysis of Ghosa data	13:30	Reports of teams on Ghosa project
20:00	Country meeting on status of MIS	16:00	Issues raised in Ghosa project reports
		18:00	Awards dinner for teamwork on Ghosa project
Time	Friday		
08:30	<i>Introduction to preparation of follow-up action plans:</i> What will each country team do following the workshop?		
09:00	Groups work on follow-up action plans		
12:00	<i>Lunch</i>		
13:30	Presentation of country follow-up action plans		
15:30	<i>Workshop overviews and reactions:</i> Participant evaluations of the workshop		
16:00	Closing of the workshop		

Appendix 2 Contents of the INFORM Guidelines

INFORM Guidelines, Part 1 An Overview of INFORM, an Information Management System

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Acknowledgements

Chapter 1 The Need for Management Information

- 1.1 Modernizing Management to Cope with Growth
- 1.2 Management Information Systems
- 1.3 Program Budgeting Systems
- 1.4 The Development of INFORM

Chapter 2 How to Set up Inform

- 2.1 Commitment
- 2.2 Location
- 2.3 Data Content
- 2.4 Data Collection
 - 2.4.1 Personnel database
 - 2.4.2 Project database
- 2.5 Resources required
 - 2.5.1 Staffing
 - 2.5.2 Equipment
 - 2.5.3 Costs

Chapter 3 What Products Can Be Expected From Inform?

- 3.1 Finance
- 3.2 Personnel
- 3.3 Facilities
- 3.4 Programs
- 3.5 Program Evaluation

Chapter 4 How Can Managers Use Inform?

- 4.1 Policy-Making and Planning
- 4.2 National Research Management
- 4.3 Research Institute Management
- 4.4 Multiple-User Information

INFORM Guidelines, Part 2

Methods and Procedures for the Development of INFORM

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Acknowledgements

Chapter 1 Managing Agricultural Research

1.1 INFORM Characteristics

1.2 The INFORM Process

Chapter 2 Secondary Data Collection

2.1 List of Researchers and Support Staff

2.1.1 Researcher or Support Staff?

2.1.2 Activity and Payroll Status

2.1.3 Types of Support Staff

2.1.4 Labor

2.1.5 The Time Dimension

2.2 The Payroll

2.3 List of Experiments

2.3.1 Definition of Research Activity

2.3.2 Time Parameters of Research Activities

2.4 The Research Budget

Chapter 3 Researchers and Their Activities

3.1 Researcher Biodata

3.1.1 Basic Information on Human Resources

3.1.2 Optional Information

3.2 Researcher Activities

3.2.1 Why the Use of Researchers' Time Matters

3.2.2 Time Allocation

3.2.3 Data Quality Issues

3.3 Time Allocation and Program Formulation

3.3.1 List of Planned Research Activities

3.3.2 Researchers' Planned Time Allocation

Chapter 4 Research Program Analysis

4.1 Information Collection and Structuring

4.1.1 Information to Be Collected

4.1.2 Structuring the Information

4.2 Scientific Aspects

4.3 Administrative Aspects

4.4 Location of Research

4.5 A Note on Priority Setting, Monitoring,
and Evaluation

- 4.5.1 Priority Setting
- 4.5.2 Monitoring
- 4.5.3 Evaluation

Chapter 5 Research Costs

- 5.1 INFORM Cost Codes
- 5.2 Direct and Indirect Costs
- 5.3 Personnel
 - 5.3.1 The Cost of Researchers
 - 5.3.2 Administrative and General Service Support Staff
 - 5.3.3 Technical Support Staff
 - 5.3.4 Labor
- 5.4 Materials and Supplies
- 5.5 Travel and Transport
- 5.6 Repairs and Maintenance
- 5.7 Technology Transfer
- 5.8 Management and Administration
- 5.9 Utilities and Facilities
- 5.10 Miscellaneous

Chapter 6 Database Formats

- 6.1 INFORM Databases
- 6.2 The Personnel Database
- 6.3 The Project (Experiment) Database

Chapter 7 Answering Research Managers' Questions

- 7.1 Information on Personnel
- 7.2 Information on the Research Program

Appendixes

Appendix 1 Commodity Groups and Crops

Appendix 2 List of Major Disciplines

Appendix 3 CARIS Primary and
Secondary Research Themes

Glossary

Selected Readings

INFORM Guidelines, Part 3

Revenue and Cost Codes for Use with INFORM

Preface

Acknowledgements

Chapter 1 Managing Funds Allocated to Research

Chapter 2 Revenue Codes

Chapter 3 Cost Codes

3.1 Personnel Costs

3.2 Donor Costs

3.3 Primary and Secondary Codes

3.4 Primary Code 100 — Research Personnel

3.4.1 Secondary Code 110 — Scientists

3.4.2 Secondary Code 120 —
Technical Support Staff

3.4.3 Secondary Code 130 —
Administrative Support Staff

3.4.4 Secondary Code 140 — Labor

3.4.5 Secondary Code 150 —
Personnel Costs to Be Reallocated

3.4.6 Reallocating Personnel Costs

3.5 Primary Code 200 — Materials/Supplies

3.6 Primary Code 300 — Transport/Travel

3.7 Primary Code 400 — Repairs/Maintenance

3.8 Primary Code 500 — Technology Transfer

3.9 Primary Code 600 — Management/Administration

3.10 Primary Code 700 — Utilities/Facilities

3.11 Primary Code 800 — Miscellaneous

3.12 Primary Code 900 — Nonoperating Costs

Chapter 4 Sample Budget Layout

INFORM Guidelines, Part 4

A Minithesaurus of Keywords for Use with INFORM

Preface

Acknowledgements

Chapter 1 Background Note: The Use of Keywords

- 1.1 AGRIS/CARIS
- 1.2 Program and Subject Area Keywords
- 1.3 Technical and Economics Keywords
- 1.4 Commodity Group Keywords
- 1.5 Main Crop Keywords
- 1.6 Other Crop Keywords
- 1.7 Pest Disease Keywords
- 1.8 Linkages Keywords
- 1.9 Country-Specific Keywords

Chapter 2 How to Select Keywords for Inputting to the Database

Chapter 3 Categorization Scheme

- 3.1 Program Areas and Subject Groupings

Chapter 4 Lists of Core Keywords

- E/ Agricultural Economics
- F/ Crop Production
- H/ Crop Protection
- J/ Postharvest Technology
- K/ Forestry
- L/ Animal Science
- M/ Fisheries
- N/ Agricultural Engineering
- P/ Natural Resources
- Q/ Food Processing and Preservation
- T/ Pollution
- U/ Methodology
- Linkages

Chapter 5 Alphabetical Master List

Chapter 6 Unique Keywords from a Specific Country NARS

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Appendix 4 An Introduction to Ghosa

The island province of Ghosa declared its independence from the Republic of Mau in 1968. At that time Ghosa had a population of about half a million people and a largely subsistence economy in which the basic staples were rice and fish, the latter often consumed in a curry enriched by hot chillies. There was a small but rapidly growing tourist industry during the winter dry season, and there were limited exports of fish, mangoes, and chillies. A foreign-aid mission had suggested that the island had an ideal climate for growing okra, and there was some interest in this crop as an export commodity.

At the time of independence, the island had small research stations for crops and fisheries. The crop research station was renamed as the Agricultural Research Institute (ARI) in 1970 when an FAO/UNDP project was mounted to help strengthen research. At that time ARI had six scientists doing research on 13 projects involving rice, mangoes, chillies, and okra.

The rice research program was associated with an FAO international network and with multilocational trials that had previously been linked to similar trials in Mau. All of the research was agronomic except for some vegetable projects that dealt with insects and diseases. No plant breeding was done because no scientist was qualified in that field. Two ARI scientists spent half of their time on extension activities, and the director combined his management role with a small amount of research.

From 1970 to 1990, ARI grew considerably and acquired two small substations in different agroecological zones. By 1990 it had 17 scientists, and the number of support staff had grown from 12 to 23. New scientists were generally recruited as Research Officers Class III (but PhDs joined at Class II), and they were promoted to Class II after 10 years or Class I after 20 years of satisfactory service.

In the 1980s new research programs were established for grain legumes and agroforestry. The involvement in extension was considerably reduced because of a general trend toward privatization. But because private extension services are still relatively underdeveloped, ARI still provides some assistance in the extension field. Two staff members also spend a limited amount of time in some teaching activities at Ghosa's new agricultural technical college.

Of the original staff of six, Mr. Da Silva resigned and Dr. Rao has succeeded Director Lal, who reached retirement age (60) in 1988. The number of research projects has expanded to a total of 32 divided among seven crops: chilies, rice, and mangoes are still the most important, okra has been dropped following the failure of the export program, and some new research on bananas, passion fruit, groundnuts, and soybeans has started. Work is just starting on additional vegetables such as tomatoes and lettuce, following a strong demand for these products from the growing tourist industry. An agroforestry program has also been started to try to produce more fuelwood and to improve soil fertility without increasing fertilizer imports.

There is still not much work on plant breeding, although this is expected to grow in importance when Mr. Subramanian returns shortly with a PhD in this subject. Tissue culture and related new techniques are not yet being used at the institute.

During the past 20 years, agriculture's share of the GNP has fallen from 48% to 28% due mainly to a large increase in funds remitted to Ghosa by its citizens working abroad. The average inflation rate has been a little less than 10% and ARI's overall budget has increased at a similar rate, being, in current terms, 5.7 times as high as it was in 1970. Total salary costs have increased at a slightly higher rate, although, in current terms, scientists' salaries are now only about 2.5 times as great as they were 20 years ago, and labor rates are about four times as high.

Most of the staff have an MSc degree, four have a PhD, and one is about to return from overseas with a PhD. He is the only staff member currently on study leave.

In December 1990 Director Rao will retire. His deputy, Mr. Chaudry, will retire in March 1991. Of the two remaining Class I scientists from whom a new director might be chosen, Ms. Soetopo has made it clear that she wishes to remain as a researcher, and Mr. Liu is unacceptable to the Minister of Agriculture. Because of that, ARI has recruited you from the University of Mau to be its new director.

The institute that you are about to take over has a staff of 17 scientists, recruited from throughout the Asian region, working on the crops already noted.

You decide that you will, as your first task, conduct an in-depth review of the institute. To do this, you decide that you need to know what information is already available and what information you will need to seek. Luckily, in 1970, when the FAO project started, an effort was made to apply a management information system (MIS) to the institute, although it was not main-

tained in subsequent years. The information, databases, and report formats developed for this 1970 exercise will serve as the basis of your new 1990 MIS.

What to do:

The most efficient way to approach this exercise is to take advantage of the work done in 1970 and use the reports, report formats, and databases as templates upon which to build your MIS for 1990.

The MIS was based on four sources of data, the payroll, the budget, the research program, and questionnaires completed by the scientists.

Copies of all of these and of a set of computer printouts based on incorporating this information into the databases are available. In section 3 of the training document, is a complete list of all source data files and reports necessary for completing this exercise. Floppy disks containing the personnel and project databases and the spreadsheets for budgets and scientists costs in 1970 are also available. (Note: the first week of the Workshop includes lectures and practical work that cover the preparation of all of this material).

There are nine tasks you must carry out to successfully complete this exercise. These tasks can be built into six work modules, each of which will take two to four hours to complete, depending on your familiarity with computers and experience with Lotus 1-2-3[®] and Reflex[®]. The six work modules and associated tasks are listed below.

When you have completed Tasks 1 thru 8 above, you will need to write a report that will answer specific questions. These questions should be addressed in terms of where you feel ARI needs to make changes and how you propose to do this. Given that the institute is a hypothetical one, it is recognized that your report will contain a number of subjective assessments based on your own biases and experience. There are, however, certain

Modules and Tasks

Work Module	Tasks to Complete
Module I:	Task 1. Update the 1970 payroll and produce a report of 1990 payroll. Task 2. Update 1970 personnel database.
Module II:	Task 3. Produce 2 key personnel reports <ul style="list-style-type: none">• Scientists' time allocation to activities and cost at ARI 1990 (Table 1)• Personnel sheets for each scientist (17)
Module III:	Task 4. Update 1970 budget database and produce a report of the 1990 budget. <ul style="list-style-type: none">• ARI 1990 Budget Report Task 5. Update 1970 project database with technical data, personnel data, and cost data and produce key reports on <ul style="list-style-type: none">• Scientists' time allocation to projects (Table 2)• Project costs (Table 3)
Module IV:	Task 6. Use keywords to describe projects and produce a report on <ul style="list-style-type: none">• Individual project reports (32)
Module V:	Task 7. Produce special graphs Task 8. Produce advanced graphs
Module VI:	Task 9. Analyze key reports and produce a report to the minister. Task 9. Analyze key reports and produce a report to the minister

features of the situation that call for specific comment, irrespective of the way that you wish to move the institute in the future.

Define these questions in three areas: human resources, financial resources, and program structure. Some of the issues you should address are listed below:

Human Resources

- How relevant are the current human resources to the research program that you wish to carry out?

- Do you have an appropriate disciplinary mix, and are there sufficient scientists with higher qualifications?
- In terms of age and experience, who might be considered to succeed you? (You will retire in 1995 and will need to examine whether there are appropriate candidates.)
- What training is needed? In what crops or disciplinary specialities? (When Dr. Subramanian returns, none of the staff will be away undergoing further training.)
- How realistic is the work load of individual scientists in terms of the number of experiments that they are working on and the degree of interdisciplinary collaboration that is taking place?
- Is the relative time devoted to research and to other activities appropriate?

Note: Given that an expansion in real funding is considered unlikely, you should do your manpower planning based upon a constant staff of 17 professionals.

Financial Resources

- Can a case be made for domestic funding increases?

You note that the ARI budget has increased during the past two decades at about the same rate as inflation. However, while scientists' salaries have fallen behind this rate, an increase in staff size suggests that the budget for personnel now represents a higher share of the total budget than it did 20 years ago.

You will need to review this in the context of the funds available for the various types of operating costs in order to prepare a carefully argued brief if you wish to request greater funding.

- Is there a chance for acquisition of external funding?

You also note that although the island is receiving considerable foreign aid for other purposes, none is flowing into agricultural research and you may wish to identify where such aid would be most appropriate and to outline a strategy for obtaining it.

Research Program

Given the fact that the seven research crops in the ARI program are strongly supported by your minister and by the planning ministry and that they represent national priorities so far as they have been defined, you need to consider the balance of activities between these various crops.

- Is there any coherence in the research program of the institute?
- What are the relationships between the research projects?
- Is everyone working on his or her own interests, or do scientists cooperate in an effective manner?
- While the choice of research programs seems appropriate, is the emphasis within each program correct?
- Is there a need for a more innovative type of program? (Consider the human resources available and opportunities for eliminating some of the less-promising projects.)

The Agricultural Economy of Ghosa, 1990

Population:	903,000	GNP per capita:	US\$ 186
GNP:	US\$ 170 million	GNP from agriculture:	28%
Exchange Rate:	1G = 1.1 US\$		

Agricultural Production

Commodity	Production (tons)	Value (Million US\$)	Unit cost (US\$/t)
Rice	145,000	21.7	150
Fish	28,000	11.2	500
Chilies	3,000	3.0	1000
Meat	4,000	4.0	1000
Fruit	36,000	1.8	500
Vegetables	90,000	2.7	300
Other		3.2	
Total		47.6	

Agricultural Exports (million US\$)

Mangoes	0.8
Chilies	1.0
Total	1.8

Food Consumption

Commodity	Kg/Capita per Year	Calories/Day	Protein/Day
Rice	160	1600	30
Fish	31	85	11
Livestock	4	12	2
Fruit	40	50	1
Vegetables	100	60	3
Other		250	10*
Total		2057	57

* Includes imports

Expenditure in Agricultural Research

	Ghosa G	US\$
Agricultural Research Institute	116,400	128,040
Fish/Livestock Research Institute	98,000	107,800
Total	214,400	235,840

Note: Agricultural research expenditure as percent of agricultural contribution to GNP = 0.50%