

REPORT ON
AN IDRC CONSULTANCY
ON
EVALUATION OF CARIS-SEA
(Current Agricultural Research Information System-
Southeast Asia)

IDRC Project 3-P-81-0021
8 January - 28 February 1989
by
Hedwig Anuar

Singapore, April, 1989

<u>Contents</u>	<u>Page</u>	<u>Paras</u>
INTRODUCTION	1 - 3	1 - 4
BACKGROUND	4 - 5	5 - 9
MALAYSIA		
Organisation of agricultural research	7 - 8	10 - 14
National CARIS Centre	8 - 11	15 - 19
Collection of Data	12 - 13	20 - 26
Dissemination and usage of CARIS data	13 - 17	27 - 38
Communication with Regional Centre	18 - 19	39 - 44
Perceived benefits of CARIS	20 - 21	45 - 47
Trends in management of research	21 - 22	48 - 51
THAILAND		
Organisation of agricultural research	23 - 27	52 - 65
National CARIS Centre	27 - 28	66 - 69
Collection of Data	28 - 32	70 - 78
Dissemination and usage of CARIS data	32 - 35	79 - 88
Communication with Regional Centre	35 - 37	89 - 95
Perceived benefits of CARIS	37 - 38	96 - 97
Trends in management of research	38	98
PHILIPPINES		
Organisation of agricultural research	39 - 44	99 - 108
National CARIS Centre	44 - 45	109 - 111
Collection of Data	45 - 48	112 - 120
Dissemination and usage of CARIS data	49 - 57	121 - 141
Communication with Regional Centre	57 - 59	142 - 149
Perceived benefits of CARIS	59	150 - 152
Trends in management of research	60	153 - 154

<u>Contents</u>	<u>Page</u>	<u>Paras</u>
INDONESIA		
Organisation of agricultural research	61 - 66	155 - 163
National CARIS Centre	66 - 67	164 - 168
Collection of Data	67 - 69	169 - 173
Dissemination and usage of CARIS data	69 - 72	174 - 183
Communication with Regional Centre	72 - 73	184 - 189
Perceived benefits of CARIS	73 - 75	190 - 191
Trends in management of research	75 - 76	192 - 195
SINGAPORE		
Organisation of agricultural research	77 - 80	196 - 204
National CARIS Centre	80 - 82	205 - 209
Collection of Data	82	210
Dissemination and usage of CARIS data	82 - 84	211 - 217
Communication with Regional Centre	84 - 85	218 - 221
Perceived benefits of CARIS	85 - 86	222 - 228
Trends in management of research	86 - 87	229 - 230
CONCLUSION and RECOMMENDATIONS		
	88 - 94	231 - 236
APPENDIX I		
Itinerary and Schedule of Meetings	1 - 8	-
APPENDIX II		
Publications and documents received	9 - 12	-

INTRODUCTION

I was appointed by the International Development Research Centre on 19 December 1988 as a consultant on the CARIS-SEA Network for the period between 8 January 1989 and 28 February 1989 with the following terms of reference:

to visit national centres and the regional centre participating in the CARIS-SEA network for the purpose of ascertaining:

1) at the national level:

the appropriateness of the designated centre for carrying out its activities; institutional support provided for the program including personnel, infrastructure and funds;

the scale of activities at the national level and circumstances affecting the performance of the centre including methodologies applied in the data collection, organization, and communication with the regional centre;

the experience of the centre in the dissemination and promotion of CARIS outputs and services including appropriateness and usefulness of these;

the degree of effectiveness of each national centre, focussing on the reasons for success or the problems that hinder effectiveness, including proposals on how such problems may be addressed.

2) at the regional level:

the extent of the need of the national centres for, and their interest and commitment in participating and continuing with CARIS-SEA activities (whether in the existing or new forms) at the regional level;

the nature of the problems, if any, that may be hindering effective participation at the regional level, including proposals on how such problems may be addressed;

the benefits perceived by the national centres and the regional centre for participating in the CARIS-SEA network.

2 My programme of visits and interviews in each the five member countries of CARIS-SEA was arranged by the Heads of the CARIS National Centres in Malaysia, Thailand, the Philippines and Indonesia and coordinated by the Project Officer, AIBA, which serves as the CARIS Regional Centre, while the final programme in Singapore was arranged by the IDRC. The Head of the CARIS National Centre or her representative accompanied me on all my visits in Malaysia, Thailand and Indonesia, while in the Philippines I was accompanied by either the Head of the CARIS National Centre or the Project Officer, AIBA. The details of my programme in each country are given at Appendix I.

3 I would like to express my grateful appreciation to the Heads of the CARIS National Centres: Mrs Jariah Jais (Malaysia), Mrs Piboonsin Watanapongse (Thailand), Dr. Teresea H. Stuart (Philippines), Dr Prabowo Tjitropranoto (Indonesia), Mrs Peggy Hochstadt (Singapore) and Mrs. Josephine C. Sisson, Project Officer, AIBA and members of their staff for their unstinted cooperation and assistance. I would also like to thank all those whom I met for their valuable and frank exchange of views and information and for their generous hospitality.

4 My thanks also go to IDRC for the efficient travel and other arrangements made for my consultancy.

BACKGROUND

5 Except in Singapore, agriculture is the biggest industry in the Asean countries of Indonesia, Malaysia, the Philippines and Thailand, with up to 80 per cent of the population engaged in agricultural activities. Throughout the world, the tremendous range of agricultural activities has given rise to an equally large body of agricultural literature and of research in agriculture and its related fields.

6 The five Asean countries participate in the Agricultural Information System (AGRIS), the international bibliographic database set up in 1975 for the bibliographical control of agricultural literature in both developed and developing countries, which is coordinated by the AGRIS Coordinating Centre of FAO. Complementary to AGRIS is the Current Agricultural Research Information System (CARIS) initiated and also coordinated by FAO in 1977 following the success of a number of pilot projects in various countries. The foundation of CARIS-South East Asia (CARIS-SEA) was laid in 1981 and was followed by an IDRC grant for the period August 1983-August 1986 for the setting up and operation of national CARIS Centres in the five Asean countries, with the Regional Centre at the Agricultural Information Bank for Asia.

7 The agricultural subjects covered by CARIS include the following:

- plant science and production
- plant protection
- post-harvest technology
- animal science, production and protection
- fisheries and aquaculture
- processing of agricultural products
- food and human nutrition
- forestry and wood technology
- soil science and management
- agricultural machinery and engineering
- water resources, irrigation and drainage
- energy resources
- pollution related to agriculture
- agricultural economics, development and rural sociology
- education and extension

8 CARIS aims to answer the questions of WHAT, WHO is doing and WHERE agricultural research is being done, while the results of such research would be covered by AGRIS to provide the answers to WHAT has been published, by WHOM, WHEN and WHERE?

9 What follows is a country by country analysis for the following: the organisation and funding of research, the

appropriateness of and support for the national CARIS Centres, the extent and coverage of collection data, dissemination and usage, communication with the Regional Centre, perceived benefits of CARIS and trends in the management of research. A concluding chapter sums up the findings and recommendations.

MALAYSIA

Organisation of Agricultural Research

10 It is estimated that about 70 percent of agricultural research in Malaysia is undertaken by the Malaysian Agricultural Research and Development Institute (MARDI) which had a total of 3,657 staff and expenditure of M\$71.7 mill. in 1986. This covers all areas except oil palm which is covered by the Palm Oil Research Institute of Malaysia (PORIM), an offshoot of MARDI established in 1979; timber which is covered by the Forest Research Institute of Malaysia (FRIM), founded in 1929; rubber which is covered by the Rubber Research Institute (RRI); and freshwater fisheries covered by the Freshwater Fisheries Research Station at Batu Berendam, Malacca which came under the Department of Fisheries from 1984.

11 PORIM moved to its present spacious building in 1984 and now has 500 staff, including 100 researchers. It has three research stations in Malaysia and overseas regional offices in Karachi, Pakistan; Brickendonbury, United Kingdom; and Washington, D.C., U.S.A. Its collection as at October 1988 included 6,500 books, technical reports, standards, patents and theses; 520 journals, 2,950 reprints; 1,500 PORIM publications, over 20,600 microfiches; and 2,850 slides.

12 The Forest Research Institute of Malaysia (FRIM) also acts as the Rattan Information Centre. FRIM has 88 research

officers, each of whom handles 3 to 5 research projects a year. The Rubber Research Institute founded in 1926 has 3 experimental stations and over 200 researchers. The RRI Library is a closed access library open only to staff and Malaysian-based companies. The Library has a book budget of M\$50,000 and a serials budget of M\$116,000.

13 The Universiti Pertanian Malaysia (Malaysian Agricultural University) is the main university specialising in agricultural research and has 8,000 students and 800 lecturers. The UPM Library is the national centre for AGRIS and also serves as the Regional Information Centre on the Management and Utilisation of Wastes (MUWIC). The Library has 30 professional staff and has started to computerise its operations, using VTLS. 50 percent of the card catalogue has been converted and 250,000 volumes barcoded in readiness for the circulation system going 'live' from July this year.

14 Some agricultural research is also undertaken by the other Malaysian universities, including the University of Malaya, Universiti Sains Malaysia (Science University of Malaysia), Universiti Kebangsaan (National University), Universiti Teknologi (Technology University) and Universiti Utara (University of the North).

National CARIS Centre

15 The Main Library of the Malaysian Agricultural Research and Development Institute (MARDI) has served as the national

CARIS Centre since 1975. MARDI began its operations in 1971, following the passing of the MARDI Act in 1969 which paved the way for its establishment.

16 The location of the national CARIS Centre within MARDI is in keeping with MARDI's functions, which are as follows

"to conduct scientific, technical, economic and sociological research in Malaysia with respect to the production, utilization and processing of all crops (except rubber and oil palm) and livestock;

to serve as a centre for the collection and dissemination of information and advice on scientific, technical and economic matters concerning agricultural industry including the publication of reports, periodicals and papers relating thereto;

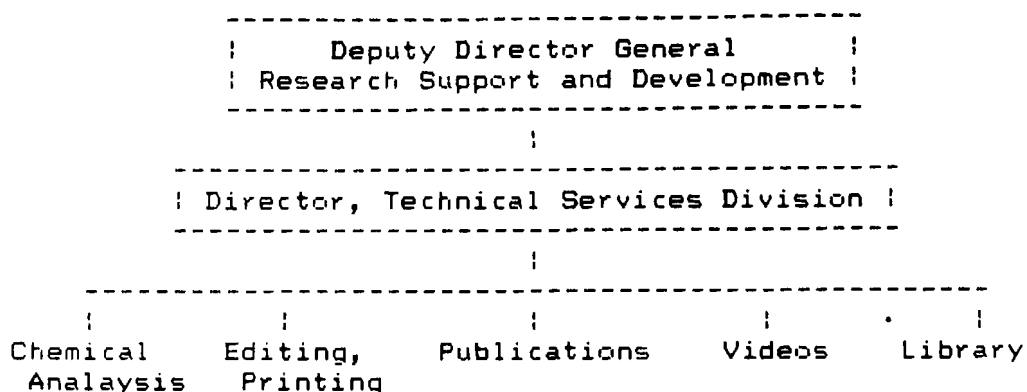
to serve as a centre for specialist extension service in the agricultural industry;

to advise on the training of workers for scientific and technical research and extension;

to provide grants in aid for the purpose of pure and applied scientific, technical and economic research concerning the agricultural industry;

to maintain liaison with other organisations both public and private, indigenous and foreign which are engaged in scientific, technical, economic and sociological research concerning the agricultural industry."*

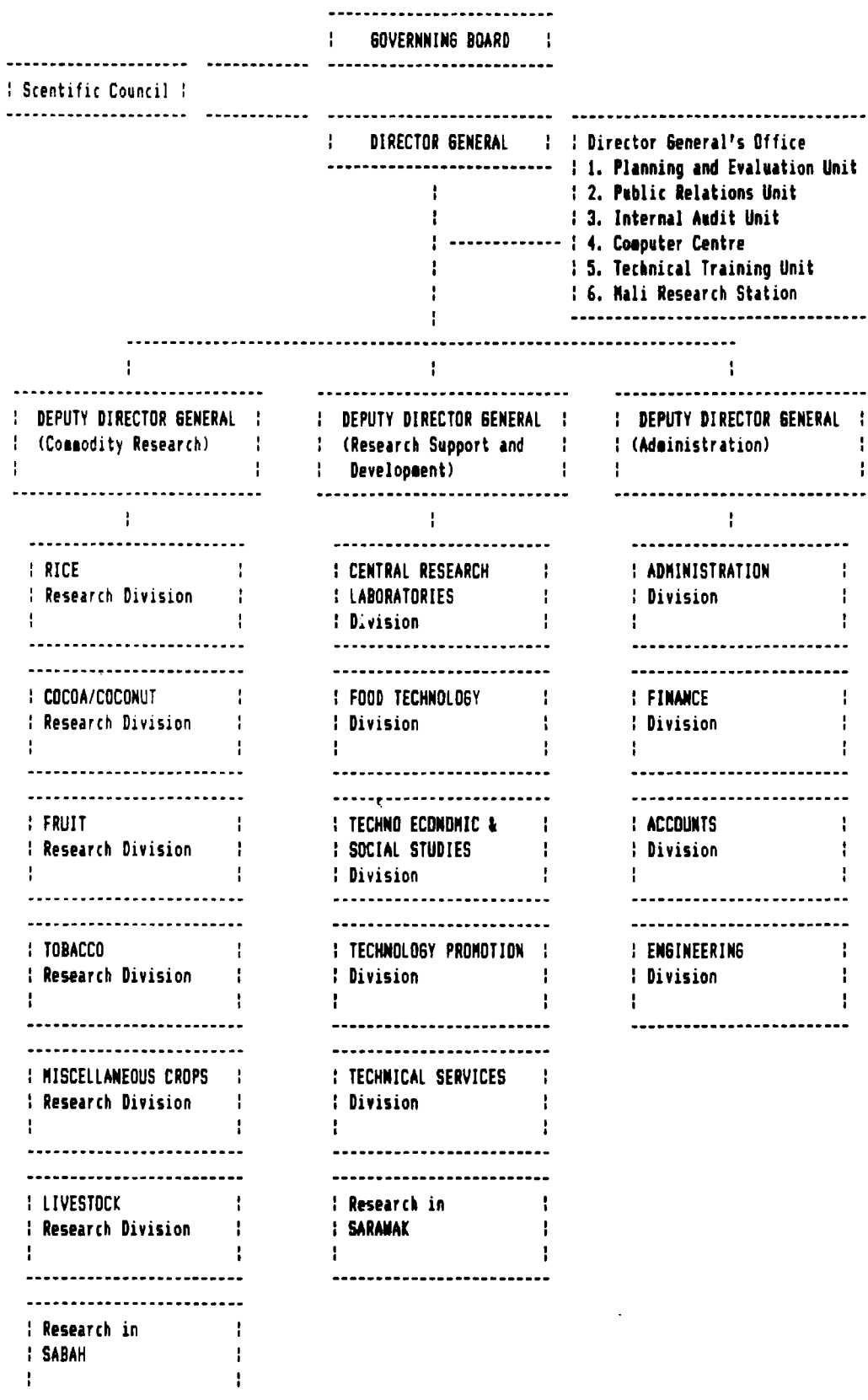
17 MARDI's organisational structure* is given on p.10A. The Main Library comes under the Technical Services Division (which could more appropriately be entitled the Information Services Division), organised as follows:



* Source: MARDI in brief. nd. 8p.

18 The MARDI Main Library has a small staff of 8, including 3 librarians and 3 temporary librarians. Its main task is to provide library and information services to MARDI staff including SDI services, interlibrary loans and current awareness services, particularly from its journal collection of 2,328 journals, including 546 which are subscribed to, 1,517 received as gifts or on exchange, and 265 annual reports. Computerisation of library operations is in progress, starting with serials. The library is also building up a computerised database of Abstracts of MARDI publications, starting with 1980-1983 items which were input into the database in 1987, while compilations for the earlier

MARDI ORGANISATIONAL STRUCTURE



years 1971-1979 and 1984-86 are/will be in published form and will be computerised later to provide a complete database of MARDI publications since the founding of MARDI in 1971. The AGRIS/CARIS categorisation scheme is used for subject headings while keywords are taken from AGROVOC. The Library has also published Abstracts of these\$of MARDI officers, 1978-85.

19 While there is general support for the Library and its work as the national CARIS Centre, the Library is clearly short-staffed while its parent Division, the Technical Services Division, suffered a 33 per cent cut in its budget in the past financial year and has a budget of M\$300,000, excluding salaries.

Collection of Data

20 Laporan Tahunan 1986 (Annual Report 1986) of MARDI records that a total of 590 projects have now been entered into CARIS: 40 in 1984, 176 in 1985 and 374 in 1986. Thus coverage of CARIS data has shown steady improvement, though total coverage is estimated to be around 33 per cent.

21 One of the main difficulties faced by the national CARIS Centre is that the CARIS data forms are sent to individual researchers to complete and return. While it is easier for the MARDI Library to send the forms to MARDI researchers, it is estimated that even the coverage of MARDI research is still incomplete, owing to difficulties of contacting researchers working at MARDI's 28 research stations scattered throughout the country. The response may be slow, partial or totally lacking.

22 Another problem is that since MARDI has the same status as that of other departments and statutory boards under the Ministry of Agriculture, it can only seek their cooperation but has no approving, coordinating or monitoring role in respect of research undertaken by other government agencies.

23 The other research institutes do not contribute to CARIS as they collect and record information on their research projects separately in their own publications.

24 University researchers are generally more liberal in providing information on their research, since advancement

of their academic careers depends on research and publications. However, theses for higher degrees are restricted to prevent infringement of copyright and because of the high cost to students of producing more than a limited number of copies required. Research by university staff is recorded in the University/departmental annual reports, while theses are deposited in the university or departmental libraries.

25 Data on privately funded research is not collected at all unless it is in published form, when it would be listed in AGRIS.

26 Hence the coverage for Malaysia in the CARIS Inventory for 1984 and 1985 was confined to MARDI and its various divisions as well as the Veterinary Research Institute, totalling 13 and 16 institutions respectively in 1984 and 1985.

Dissemination and usage of CARIS data

27 The CARIS-SEA Inventory provides the following information on agricultural research projects: subject category, title of the research project, its objectives, descriptors, starting date and duration of the project, names of the researchers and project leader, their specialisations, the institution involved, its address and code.

28 Such information is primarily of importance to "researchers, research planners, managers and administra-

tors, policy and decision-makers, production and development specialists, agencies funding agricultural research and international organizations".* The importance of this target group of users has not changed.

29 These potential or actual users are provided indirectly with information derived from the CARIS-SEA Inventory, two copies of which are received by and kept in the MARDI Library and used for providing information and retrieval services on request. The main users of the CARIS-SEA Inventory therefore are the librarians who provide such services. Although a request form is used to record enquiries, a variety of sources, including CARIS, may be used to satisfy the enquiry and may not be recorded in the request form. Thus it is difficult to gauge the actual usage of CARIS by the primary user group it is meant to serve. ✓

30 Researchers who come to the Library may refer directly to the CARIS-SEA Inventory and are pleased when they find their research listed in it. As noted earlier, not all researchers may receive the data entry form for CARIS. MARDI suggested that a marketing seminar be held for potential contributors to all users of CARIS to promote greater awareness and usage of CARIS. It also proposed that each MARDI Division and the larger research stations should ✓

* CARIS introduction: Current Agricultural Research Information System. Rome: Food and Agriculture Organization of the United Nations, 1985, p.4.

ideally be provided with a computer and a modem for linking up with the MARDI Headquarters and for conducting online searches, so that information would be 'live'. This would also make it possible to devise a system for monitoring usage of CARIS.

31 It was also noted that many researchers obtain information on research projects in their own field through personal networking. This works not only within the parent institution but operates between staff of different institutions within the country as well as amongst institutions in Asean and non-Asean countries through personal contacts made at conferences, professional meetings, study tours, training courses, and maintained through correspondence or other means of communication.

32 Extension services and the promotion and transfer of technology are key elements in the research programmes of MARDI. Information on agricultural research findings is repackaged and disseminated at courses for extension workers as well as through an extensive publications programme for different audiences, ranging from researchers to extension workers to farmers. Researchers are served by such publications as MARDI Research Bulletin, MARDI Reports, Buletin Teknologi Comoditi (Commodity Technology Bulletin), Teknologi Pertanian (Agricultural Technology) and Jurnal Penyelidikan (Journal of Research), while policy-makers and administrators are informed of MARDI researches through its detailed annual reports.

33 More popular level publications include 35 titles in a series Siri Panduan Usahawan (Industrial Guide series) on the manufacture of food products such as biscuits, ice-cream, jam, etc., Berita Penyelidikan (Research News), Komunikasi MARDI (MARDI Communications), Maklumat Teknologi Makanan (Information on Food Technology) and Siri Maklumat Penyelidikan (Series on Research Information), a series of guides to cultivation of particular fruits and crops.

34 The extension services of the Ministry of Agriculture also disseminate information to farmers through their personal contacts with extension workers and village headmen as well as through film, radio and TV programmes.

35 The Universiti Pertanian Malaysia (UPM) as the foremost university involved in agricultural research also has an extensive publications programme, which includes journals such as Pertanika, and Buletin Maklumat Pertanian, bibliographies, abstracts, including abstracts of UPM staff publications from 1971, and monographs using desktop publishing. Buletin Maklumat Pertanian Malaysia includes a Focus feature, bibliography of latest works on Malaysian agriculture with abstracts, using AGRIS subject headings; agricultural terms in Malay and English; and a calendar of agricultural congresses. The Buletin, issued quarterly, goes to 3,500 persons, including researchers and extension workers who can obtain photocopies of items listed on request. A contents page service from UPM Library's

periodicals holdings has 70 to 100 subscribers. DIALOG searches average 20 a month, while searches on AGRICOLA on CD-ROM are also available at a fee.

36 PORIM provides online bibliographic searches of its database containing the complete holdings of the PORIM Library, SDI service, and DIALOG searches. It is also an information provider for TELITA, a videotext service of Telecoms Malaysia which provides information on PORIM's activities as well as on the futures market.

37 The Forest Research Institute maintains its own database of current research by its staff to which access is restricted, as there have been instances of outsiders publishing material without permission. The FRIM journal, Malaysian Forester, and annual reports give information on who does what in terms of ongoing research as well as research that is to be terminated. The RRI Library maintains a computerised record of research projects and publications of research staff, including publications published outside the RRI and the contributions of individual researchers to a project. Its research database is linked online to the three RRI research stations.

38 Research undertaken jointly with or on behalf of a client in the private sector is also confidential and unlisted by the institution(s) participating in the project.

Communication with Regional Centre (RC)

39 Communication between the RC and the National CARIS Centre has been minimal since the ending of the IDRC grant for the project in August 1986. However, contacts have been maintained through the AIBA Consultative Committee Meetings. ✓
Although the National and the Regional Centre are equipped with telex facilities, communication was generally slow and subject to delays owing to changes of staff, absence of staff on leave and other such factors.

40 CARIS data is now forwarded to and processed and returned by the RC in magnetic tape form. Online search enquiries are offered by the RC but are made by the National Centre only in batch mode at present. It was requested that more copies of the CARIS-SEA Inventory be provided for distribution at the national level, but it was recognised that provision of these would increase costs considerably if the Inventory continued to be supplied in printed form. It was suggested that, as an interim measure, relevant sections of the Inventory could be photocopied and sent to the appropriate institutions or researchers. (It was later found that this was being done by some of the National CARIS Centres.) More imaginative ways of using the Inventory data, including more analysis of the data, were needed. The ultimate solution envisaged by MARDI was for each Division of MARDI as well as the larger research stations to be equipped with a microcomputer linked to the IBM mainframe computer at MARDI so that online searches of the national

CARIS database could be made. However, this would involve conversion of the MINISIS software used for CARIS and constitute a strain on the computer staff resources of MARDI.

41 There was a felt need for more frequent training on an annual basis to be provided for staff of the National CARIS Centre, with staff from the RC conducting such training, in each country rather than at the RC. Training in data entry, use of AGROVOC etc. was needed to update skills.

42 Document delivery was also seen as a major service which could be provided by the RC on lines similar to those of the British Document Supply Centre. (One institution even suggested that IDRC set up a regional equivalent to the BDSO).

43 Promotional materials, including pamphlets and videos, could be produced and supplied by the RC to encourage and support the usage of CARIS at national level.

44 Work on expansion and standardisation of thesaurus terms was a continuing need. At present, institutions forward their proposals on additional or modified terms to the RC but it was felt that small regional specialised meetings could be held to provide for more detailed study and agreement on such terms. The additional problem and costs of translation from Malay into English and vice versa were also noted.

Perceived benefits of CARIS

45 In terms of usage, CARIS was seen to have more potential rather than actual benefits at present, mainly because of its limitations in terms of (1) coverage (2) timeliness and (3) access to and dissemination of CARIS data. ✓✓

46 However, when CARIS had been used by end users such as researchers and policy-makers, it had been much appreciated for

- (1) identifying and locating the researcher, the research institution and the research project
- (2) enhancing the reputation of the researcher
- (3) providing the basis for personal networking with other researchers in the same field (in the same country or other countries) for the purposes of communication, information, avoidance of duplication, validation, etc.
- (4) enabling planners and policy-makers to be informed of research in their own and other countries for the purpose of better planning and allocation of scarce research resources.

47 More generally, CARIS has also enhanced the status of the MARDI Library and other libraries, which have benefited from telex and other facilities available through participation in CARIS. It has also enabled librarians to acquire additional skills, and improved relations between librarians and their clientele, thus leading to closer co-operation and

better understanding of the role of librarians in providing information.

Trends in management of research

48 Recent developments include the appointment of a Science Adviser in the Prime Minister's Department and preliminary work on a computerised database for more effective monitoring of research projects known as the Intensification of Research in Priority Areas or IRPA. IRPA comes under the National Science Council which is under the Ministry of Science. The Council includes representatives of 31 organisations, including Ministries and universities. It receives and considers requests for funding for new R & D proposals as well as for continued funding for ongoing projects and makes recommendations on them to the Budget Division. IRPA will serve as the basis for the Malaysian Scientific and Technical Information System (MASTIC) and will cover four major areas of research: agriculture, medicine, industry and strategic (all other). The IRPA data includes detailed information on the researcher, including educational and teaching qualifications, consultancies, publications, and so on; and on the research project, its objectives, source of funding, budget, current status, equipment used, termination, etc.

49 The information required by CARIS is covered by and is minimal compared with that for IRPA. The question of extracting CARIS data from the IRPA database was discussed.

It was agreed that this would be possible once the technical problems had been overcome and provided that CARIS paid for the service. When raised later with the Regional Centre, it was agreed that such a charge could possibly be met by the Regional Centre.

50. Through IRPA, the CARIS database would be more comprehensive and current and would centralise the present efforts made to collect and disseminate CARIS data. The CARIS Centre would undertake to repackage the data for its own clientele. However, IRPA would still not be fully comprehensive, as it would only cover government-funded research.

51. There is already a link with the National Research Council and IRPA through the Director-General of MARDI who serves as the Chairman of the Agriculture Committee of the Council, while the Head of the Coordinating and Implementation Unit of MARDI serves on the planning committee for IRPA. It will be important for CARIS to be strongly represented on the Council in a review of the MIS of the National Research Council when the MIS reaches maturity.

THAILAND

Organisation of Agricultural Research

52 The extent of agricultural research in Thailand can be gauged to some extent from CARIS-Thai: an inventory of ongoing agricultural research in Thailand, 1987 which records projects from about 125 participants in all. Of these, the Ministry of Agriculture and Cooperatives, with 20 departments and divisions, contributed about 60 percent of the records. Other major contributors included the Ministry of Education under which are 44 agricultural colleges and an Institute of Technical and Vocational Education (including agricultural subjects) spread over nine campuses; and four universities, Kasetsart, Khonkaen, Songkhla and Chiangmai with contributions from their Faculties of Agriculture and Social Sciences.

53 From 1990, the CARIS-Thai Inventory is planned to cover even more participants, including various Ministries such as Science and Technology (including the National Research Council), Public Health, Defence, and the Ministry of the Interior, the Office of Nuclear Energy for Peace and the Bank of Thailand (agricultural economics).

54 Research is also undertaken by the private sector which however does not participate in CARIS with the exception of TDRI (Thailand Development Research Institute), a non-profit agency which is supported by CIDA and the Japanese Government.

55 The Ministry of Agriculture and Cooperatives has 23 research stations. Research comes under one of three Deputy Directors-General and there is a Central Research Committee as well as departmental research committees.

56 The large volume of research activity undertaken by the Ministry has led to a number of initiatives to improve the quality of research. An Australian Cooperation in National Agricultural Research Project (ACNARP) provides training in agricultural research and technical assistance in the setting up of research stations. Workshops are also held on the writing of reports, theses, abstracts, summaries and literature reviews. The Association of Thai Scientists holds similar workshops too.

57 Kasetsart University began as a College of Agriculture offering non-degree courses and became a University in 1943, being the first university to offer degree programs in agriculture. It operates on two campuses, and had 1,378 academic staff and over 11,000 undergraduate and graduate students in 1987, the second largest enrolment being for agriculture. As the foremost university engaged in agricultural research, its budget for agricultural research programs (130 projects) totalled 4,574,640 baht (US\$315,492) in 1987, with a further 278,000 baht (US\$19,172) for 13 projects in food technology. Its research institutes include the National Corn and Sorghum Research Center, National Swine Research and Training Center, operated

jointly with the Ministry of Agriculture and Cooperatives, the Institute of Food Research and Product Development, the National Agricultural Extension and Training Center and the National Agricultural Machinery Center.

58 The Kasetsart University Research and Development Institute (KURDI) was established in 1978 and promotes, coordinates and provides funds for the research programs and activities of the University.

59 Kasetsart University and the other universities engaged in agricultural research come under the Ministry of University Affairs but also work closely with the Ministry of Agriculture and the Ministry of Education.

60 The National Research Council is the national coordinating point for ASTINFO. Proposals for research are submitted to the Council for advice and approval, then to Budget authority before being submitted to Parliament for final approval and allocation of funds. Research is of three kinds: government-supported research, private funding research and contract research. The last of these is treated as confidential.

61 The Thailand Institute of Scientific and Technological Research (TISTR) was set up in 1979 under the Ministry of Science, Technology and Energy (MOSTE) set up in the same year.

62 TISTR's objectives include the following :

to initiate and conduct research and to provide scientific and technological services to state agencies and private companies for economic and social development in the country

to conduct scientific and technological research in order to promote the utilization of natural resources appropriate to the economic conditions, environment, health and welfare of the people

to improve productivity in accordance with the Government policies by propagating the results of scientific and technological research to benefit the country in agriculture, industry and commerce
to train scientific and technological researchers.

63 Thus TISTR not only initiates and conducts research but also collects and disseminates the results of such research.

64 The Thai National Documentation Centre (TNDC), a component of TISTR, serves as the national node for the Asia-Pacific Information Network for Medicinal and Aromatic Plants (APINMAP) and sends national data via diskette to AIBA.

65 The Deputy Prime Minister is in charge of development of the National Information Systems, the six main ones being
medicine - with Mahidol University as the centre
science and technology - with the Department of Scientific & Technological Services as the centre

social sciences & humanities - with the National
Institute of Development Administration
(NIDA) as the centre
economics - with the Bank of Thailand as the centre
agriculture - with Kasetsart University as the centre.

National CARIS Centre

66 The Kasetsart University Main Library has served as the national CARIS Centre since late 1984, when it took over this task from the Thai National Documentation Centre, which served as the first national CARIS Centre.

67 In view of Kasetsart University's leading position in agricultural research and as the centre for the national agricultural information system, Kasetsart University Main Library appropriately serves as the national centre for both AGRIS and CARIS. It also serves as the International Buffalo Information Centre (IBIC), as research on the buffalo is carried out by the Department of Animal Husbandry of the University. The National Agricultural Document Supply Centre is also to be at Kasetsart University Library, which already sends photocopies to countries all over the world.

68 The University Library has 31 professional and 119 non-professional staff. The total collection of both campuses includes over 109,000 books in English, over 100,000 books in Thai, and over 30,000 volumes of theses. It subscribes to 900 periodical titles in English and 613 in Thai.

Although the Library's budget has been cut during the past three years, its reference services are generously available to all outside users, including farmers and high school students.

69 The Library has a strong commitment to CARIS. A Working Group of 11 staff, including librarians and typists, has been set up to organize the work of CARIS, which is carried out by them in addition to other duties. AGRIS, on the other hand, has four staff, two of whom are permanent. The Chairperson of the Working Group is the Associate Director of the Library and Head of Reference Services. Her position brings her into close contact with researchers and therefore facilitates the task of identifying and obtaining information on research in progress.

Collection of Data

70 As Kasetsart University Library became the national CARIS Centre only in late 1984, it did not contribute any entries to the 1984 CARIS-SEA Inventory. It estimated that a total of 590 entries has been contributed to the CARIS database between October 1985 - October 1987, with 103 entries listed in the 1985 Inventory, 162 in 1986 and 325 in 1987. The total coverage for the 3-year period is estimated to be about 34 per cent.

71 The CARIS data forms were redesigned and translated into Thai by the Working Group. As with the other CARIS centres, the forms are sent to individual researchers. Because of

the large number of agencies involved in agricultural research scattered throughout the country, coverage is admittedly, incomplete. However, the response rate is considered satisfactory as most participants have been quite cooperative, with the exception of the Ministry of Education which requires its permission before researchers in colleges of agriculture may supply information. There are also some restrictions on information, for example, on the tobacco industry which comes under the Ministry of Finance.

72 Library staff have provided training in the procedure for completing the forms to library officers in the Department of Agriculture (DA) which is under the Ministry of Agriculture and Cooperatives. The Library also plans to train Land Development Department officers and researchers to be familiar with the input required for the forms. Library staff on field trips to the Kamphaengsaen campus also use this opportunity to contact researchers personally. Information and training on CARIS is also provided through the Association of Agricultural Libraries, which has a membership of about 150 librarians and issues a quarterly Newsletter.

73 CARIS overlaps with a number of other projects providing information on agricultural research and the Kasetsart University Library staff therefore try to liaise with the agencies carrying out these projects to ensure more comprehensive coverage. These include the Department of Agriculture, the National Research Council, the Thai

National Documentation Centre (TNDC) and the Kasetsart University, Research and Development Institute (KURDI).

70. The Department of Agriculture has a small departmental library as its staff can use the larger library of Kasetsart University which is adjacent to it. It also has a number of small libraries at its research stations. The DA Library provides a current awareness service in the form of contents pages of journals to its research stations but funds are sometimes insufficient for the provision of photocopies. Computerisation of the Department is in progress, starting with financial and personnel systems. It hopes to merge its eventually computerised library system with that of CARIS.

71. The DA Library issues a Directory of annual research projects of the Department of Agriculture, the latest for 1987 being published in 1988. It provides the following information: Title (or Project); Subproject; Duration; Budget (optional in the CARIS form); Project Leader & staff; Location; Index of Divisions under which the research falls (instead of individual researchers' names, as in the CARIS form). Fewer projects are listed in the Directory than in CARIS, as those in published form are listed in AGRIS. The DA Library also issues Annual abstracts of projects for each crop and the number of projects completed, for example, 3,255 projects were listed for 1985 of which 1,753 were completed.

76 The National Research Council of Thailand issues a Directory of researchers in all fields and began a pilot project for the computerised listing of research projects a few years ago. The first issue was produced in Thai in 1986 in 300 copies. This listed 400 government-funded research projects, not only agriculture, under government departments and universities. Information provided included Project Title, Faculty, Budget, Results of application approval and Priority of project. The Final Report on the Thailand Computerised Information System on Research in Progress (THRIP) was issued by the Council in August 1987. The approved project is now in progress and the first issue of THRIP will be issued in 1989. Sponsored by Unesco, using an IBM PC/AT and CSI/ISIS software, details of research projects provided will include File number, Title, Institution, Discipline, Researcher, Funding, Approval and Keywords. A demonstration of the system was provided. The Council's plan is eventually to set up an information bank on research.

77 TNDC issues Abstracts of TISTR technical reports annual in Thai and English, with confidential items listed without details, and estimates that it has a 70 per cent coverage of research under TISTR. Reports relating to the Food Industry and Agro-Technology Departments of TISTR are relevant to CARIS.

78 KURDI not only coordinates and monitors research undertaken by Faculties of the Kasetsart University but also

seeks funds for such research. It is therefore concerned to have more accurate and detailed records of research projects but has only one PC for its Research and Evaluation Division, the other being for financial records. It maintains a computerised database listing of researchers and their specialities, but presently this is not very detailed. Abstracts in English are provided by the researchers, with tables and figures also in English.

Dissemination and usage of CARIS data

79 Kasetsart University Library has made commendable efforts to promote and disseminate the use of CARIS. Apart from lectures, workshops and training programmes for agricultural information users, librarians and information scientists, one of its most important initiatives has been the issue of CARIS-Thai: an inventory of ongoing agricultural research in Thailand published in 1986 and 1987. This illustrates the double burden borne by the national CARIS Centre in that completed entries for CARIS received in Thai are then translated into English and sent in diskette form to the Regional Centre, while the same data is sent to national users in Thai in the form of CARIS-Thai. The cost of the publication is met by the Centre, which distributed 300 copies of the 1987 issue to CARIS participants, policy-makers and planners.

80 Promotion of the usage of CARIS is not considered a problem, since the CARIS-Thai Inventory is used to a larger extent than the regional CARIS database owing to the limited

X number of copies of the CARIS-SEA Inventory available for distribution.

81 The Library has also developed online CARIS search services through the storage and retrieval of CARIS data on an IBM PC, using dbase III software. This is available only within the Library at present, but it hopes to extend online access to the CARIS database as online facilities, still limited in most parts of the country, are gradually expanded. For a start, the Library plans to compile a list of research institutions with microcomputer facilities with which it can exchange CARIS data in diskette form. The Ministry of Agriculture, for example, has equipped less than 10 of its 20 departments with microcomputers so far, but all its departments will have them by 1990.

82 Researchers make requests for information to the national CARIS Centre in person, by telephone, telex or mail, often as a follow-up of the CARIS-Thai Inventory. Requests for documents and referral services are more easily satisfied when made at the national level. Requests for information from other countries are more difficult to satisfy and are usually met only in the form of English abstracts of the projects listed. The language barrier applies particularly to Indonesian and Malaysian material. However, while the CARIS national databases would be in the national languages of the participating countries, the regional database would continue to be in English.

86 The Office of Extension and Training of Kasetsart University also disseminates new knowledge to the public through vocational training courses (attended by about 1,800 persons in 1987), regular news articles, and radio programmes broadcast through the network of KU stations from four strategic locations in Bangkok, Khonkaen, Chiangmai and Songkhla.

87 Dissemination of research completed or in progress is also achieved through the publication of a number of journals, including the Buffalo Bulletin, Kasetsart Journal: Natural Sciences (with abstracts), Kasetsart Veterinarians, Kasetsart Research Reports, and Science Journal, published in English/Thai, Pig Magazine, Animal Production, Buffalo and Cattle Bulletin, Central Laboratory and Greenhouse Complex News, Research and Technology Newsletter, Veterinary News, Thai Agriculture, Thai Journal of Forestry, Corn and Sorghum Newsletter and Food Journal, all in Thai.

88 The Department of Agriculture Library is freely used by farmers, students and private firms as well as DA staff and other researchers. The extension workers of the Department of Extension Service of the Ministry of Agriculture and Cooperatives have an excellent record for conveying the results of research to farmers through demonstrations and personal communication achieved while living with the farmers in the rural areas. A Training and Transfer of Technology Office also commissions and make available videos, films, documentaries, slides, TV programmes and

leaflets in simple language, while other materials are obtained from FAO, UNDP, IRRI and CIMMYT.

Communication with Regional Centre and CCC

89 Communication with the Regional Centre is slow and more regular communication was suggested in the form of a CARIS Newsletter to be issued by the RC to all the national CARIS Centres. It was also suggested that other regional centres for regional networks relevant to agriculture should be linked to the Regional Centre at the AIBA for better communication and exchange of information, for example, the Asian Institute of Technology which is the regional centre for four information systems on ferrocement, geothermal engineering, environmental sanitation and renewable sources of energy and a fifth starting soon on post-harvest technology; the Asean Food Handling Bureau in Kuala Lumpur, the Regional Network for Agricultural Machinery in the Philippines, etc. A Regional guide to information systems and sources on agriculture was also urgently needed and could perhaps be undertaken by the RC.

90 There was also little communication between the CCC and the Thai National CARIS Centre, which had not received the bulletin and notes issued by the CCC.

91 Promotional materials on CARIS issued by the CCC or the RC would be very welcome and were needed in quantity.

92 Kasetsart University Library is spearheading efforts to build up the Thai-CARIS database by developing standard

agricultural subject headings and keywords in Thai. More than 3,000 terms have already been collected and a list of subject headings will be completed by the end of this year. It will then be possible to work on translating AGROVOC into Thai. It is recommended that all the CARIS-SEA countries use AGROVOC as the base for terms in English, including new and expanded terms developed cooperatively, which can then be translated into other languages of the region. The use of a computer would help in the task of permutation and building up a hierarchy of terms.

93 The AGRIS thesaurus is not considered extensive enough for very specialised areas such as post-harvest technology. It is encouraging to note that an international meeting on a thesaurus on post-harvest technology for grains is to be held at Kansas State University in April this year and will be attended by the Project Officer from the Regional Centre.

94 An additional microcomputer for the CARIS database in Thai and English was seen to be an urgent need so that Thai entries could be processed separately for the CARIS-Thai Inventory.

95 The development of online search services in keeping with the development of telecommunications in the country is also seen as the most promising solution to communication at national and regional levels.

Perceived benefits of CARIS

96 The present and potential value of CARIS had been

recognised and appreciated by researchers and policy-makers, particularly those who were recipients of the CARIS-Thai Inventory. More use was made of national rather than regional information owing to the language barrier and the limited funds available for obtaining documents from overseas.

97 It was strongly felt that researchers should be able to freely share and exchange scientific knowledge and that CARIS was an important means of achieving this end.

Trends in management of research

98 The National Research Council of Thailand (NRCT) computerised database on research projects, though not conceived on as extensive a scale as IRPA in Malaysia, is likely to develop into a major source on research in progress. The development of the NRCT database and the existence of other databases such as those of the Department of Agriculture, TISTR and KURDI merit close examination in order to define their scope more clearly, improve cooperative efforts and reduce the volume of work required in creating and maintaining these databases. The number of databases also raises the question of whether smaller databases devoted to a specialised or specific field would be more effective and economical in terms of creation, storage and quicker retrieval than larger, more centralised and more comprehensive databases.

PHILIPPINES

Organisation of Agricultural Research

99 The Philippines has developed the most integrated and coordinated approach to national agricultural research through the establishment in 1972 of the Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD). Originally the Philippine Council for Agricultural Research (PCAR), its mandate was gradually broadened to cover natural resources (PCARR) and eventually to include the development function (PCARRD).

100 PCARRD is a national planning, coordinating and monitoring council for agriculture, forestry and natural resources research and development of the Department of Science and Technology (DOST). Its main functions are to

formulate national agriculture, forestry, and natural resources research and development program on a multi-disciplinary, interagency and systems approach for the various component commodities

establish a system of priorities for crops, live-stocks, forestry, farming systems, and socio-economics research and development and provide meaningful mechanisms for updating these priorities

program the allocation of all government revenues earmarked for agriculture, forestry and natural

resources and development to implement a dynamic national research and development program

establish support and manage the operation of a national network of centers of excellence for the various research and development programs in crops, livestock, forestry, farm resources and systems, and socioeconomics research

provide for and implement the upgrading of research capability of research center/stations through the development of manpower, infrastructure, and facilities

provide for appropriate incentives to encourage topnotch researchers to remain working in their respective areas in agriculture, forestry, and natural resources research

establish a repository of research information in crops, livestock, forestry, farming systems, and socioeconomics

develop a mechanism for full communication among workers in research, extension, and national development

enter into agreement or relationships with other similar institutions or organizations, both national and international, for the furtherance of the above purposes

program foreign funding to supplement or complement government allocation for national research.

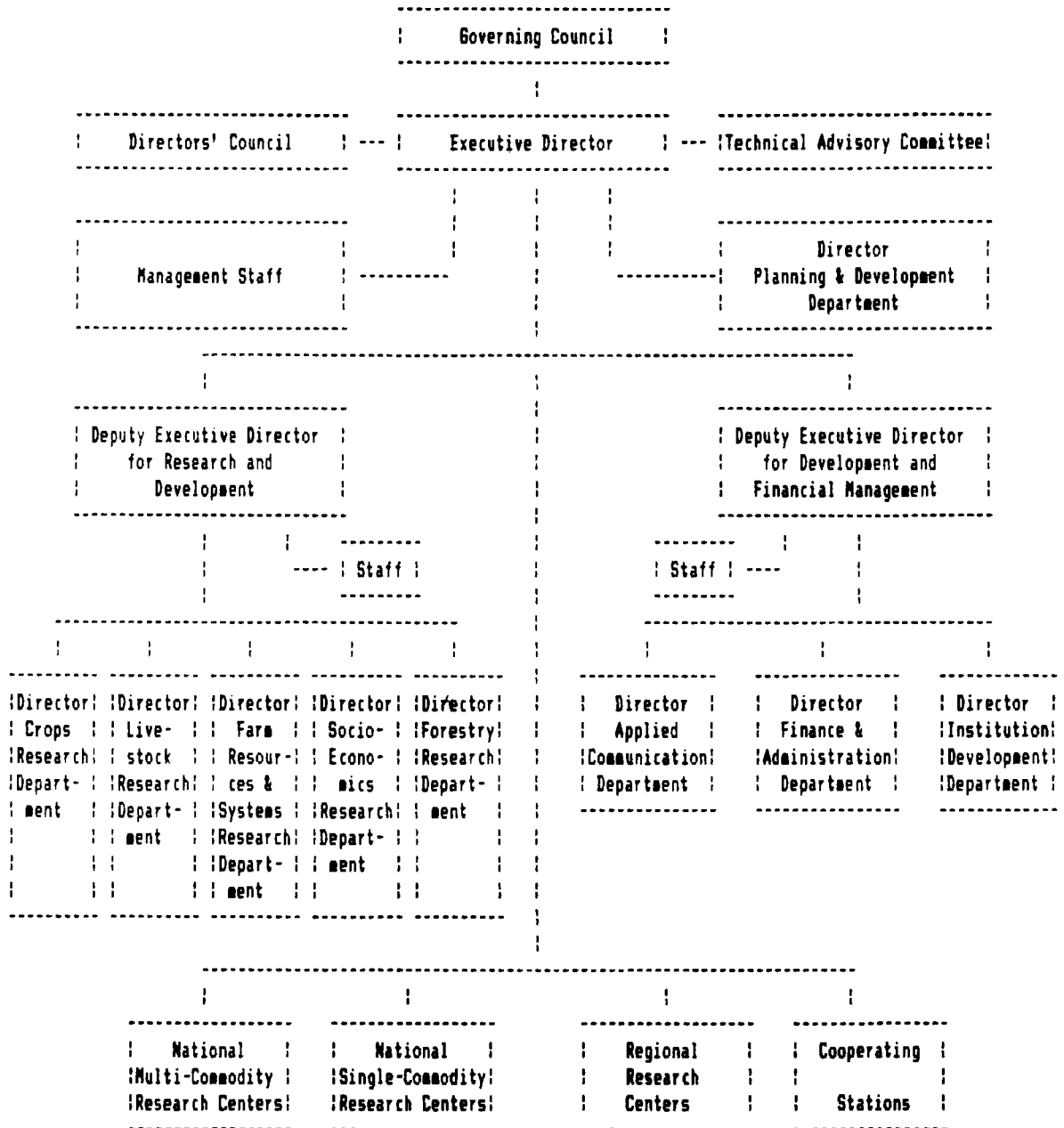
Source: PCARRD: what it is,
what it has done. Los Banos,
Laguna: PCARRD, 1987

101 PCARRD functions through three main bodies: the Governing Council, Technical Advisory Committee and Secretariat. The Governing Council is PCARRD's policy-making body, and one of its functions is to designate the members of the National Research and Development Network (NRDN).

102 The Technical Advisory Committee defines and recommends national priorities in the field of agricultural research, and reviews the national research programme for each commodity/discipline/resource before recommending these to the Governing Council for approval. It also reviews and recommends policies for the development and use of research manpower and facilities, and the funding of research through PCARRD's nationwide network of research centers and stations.

103 The Secretariat implements policies and guidelines laid down by the Governing Council, while the PCARRD Directorate is composed of Directors who head the following departments: Crops, Livestock, Farm Resources and Systems, Forestry, Socio-economics, Applied Communication, Planning and Development, Finance and Administration, and Institutional Development. The PCARRD Organisational Chart is at p.42.

PCARRD Organization Chart



104 The centers of the National Research and Development Network (NRDN) conduct basic and applied research on one or more commodities across a broad range of disciplines, and also package mature and verified technologies. The NRDN consists of:

- 4 national multicommodity research centers
- 8 national single-commodity research centers
- 8 regional research centers
- 83 cooperating stations
- 15 specialised agencies
- 118 total agencies and stations

105 "The national multicommodity R and D centers are based in academic institutions with strong applied communication departments, and are responsible for research in two or more commodities. These centers are the Central Luzon State University, University of the Phillipines at Los Banos, Visayas State College of Agriculture and University of Southern Mindanao.

106 The national single-commodity R and D centers serve the NRDN in the following commodities: tobacco, sugarcane, cotton, coconut, forest production, forest products utilization, fisheries, and mines.

107 The regional R and D centers conduct applied research for commodities of major importance in their regions and verify research results obtained from the national R and D

centers for adaptation. The cooperating stations provide facilities or site for adaptive trials or field experiments."

108 Total funds generated by PCARRD in the form of investments, loans and grants as well as government fund allocations between 1977-1986 amounted to P751.4 M. while under its manpower development programme 2,765 scholarships were awarded between 1973-1986.

National CARIS Centre

109 Responsibility for CARIS comes under PCARRD and more specially under its Applied Communication Division whose objectives are to:

"bring about effective exchange and interaction about research-related information and indigenous knowledge among farmer-producers, researchers, political leaders, policy makers, administrators, and extensionists so that they may actively participate in the formulation of the national research framework, priority setting, and in the process of socialisation or popularisation of research findings and technology

reach farmer-producers, extensionists, administrators, policy makers, and industry leaders with research information and technology using a variety of appropriate communication channels, modern communication technology, and inter-institutional arrangements and strategies so that they may actively participate in research diffusion and utilization."

Source: ACD. nd. 16p.

110 The Applied Communication Department is grouped into seven functional groups as follows: Administrative Services; Sub-Network Secretariat Services; Print Media Outreach; Printing and Duplication Services; Audio-Visual Services; Communication Prototype Development & Testing; and Scientific Literature Service (SLS) and Circulation. This last group undertakes the retrieval and dissemination of scientific literature within the PCARRD network; scientific information services (abstracting, indexing, cataloguing etc.); selective dissemination of scientific information; repository of scientific literature; circulation of PCARRD publications.

111 Strong support is given by the ACD for the work of CARIS. The proximity of the University of the Philippines at Los Banos, which is the AGRIS national centre, of AIBA which houses the Regional Centre for both CARIS and AGRIS, and of the International Rice Research Institute which is also located in the same area also enhances ACD/PCARRD's ideal position which ensures that coverage of CARIS is as comprehensive as possible.

Collection of Data

112 PCARRD's strong position has enabled the Philippines to be the largest contributor to CARIS, with about 75 percent of total entries in the CARIS-SEA Inventory of 3,092 items in 1985. These entries reflect the close cooperation between the SLS, the Management Information Services Division, and the Regional Centre at AIBA.

113 PCARRD issues an annual Directory of research and development projects in agriculture, forestry and natural resources in the Philippines: ongoing, completed and approved (awaiting funding). (A separate Council for Fisheries will be set up in 1989 and will provide entries on fisheries research separately for CARIS.) The computerised Directory, developed inhouse, includes such details as commodity, research code, title, researchers, duration, implementing agency, sources of funds, budget, and whether the research and development projects are new, ongoing, extended or reactivated. Hence all the information required for CARIS is covered by the Directory. As the PCARRD system is compatible with CARIS, a subset of CARIS entries is produced and three professionals in the SLS Library add the descriptors, categorisations and specialisations for each project. The Management Information Services Division processes the entries on magnetic tape and forwards them to the Regional Centre at AIBA for merging with the data from the other CARIS-SEA participating countries.

114 The Management Information Services Division uses two systems for CARIS: RMIS (Research Management Information System) and RETRES (Research Information Storage & Retrieval System) and has developed a number of other support systems, including ARTIS (Agricultural Resources & Regional Technology Information System), EIMS (Equipment Infrastructure & Manpower Development System), FMS (Financial Management System) and ADSS (Administrative Support System).

115 The International Rice Research Institute in Los Banos, founded in 1960, is a major research institute specialising in a single crop, rice, the staple food of Southeast and East Asia and many other Asian and other countries. It is supported by the Consultative Group on International Agricultural Research (CGIAR) and has almost 3,000 research staff, including 80 senior researchers and 400 junior researchers.

116 The IRRI Library and Documentation Centre, founded in 1962, has 17 staff, including six professionals. Its collection includes 85,000 books and 3,000 journals received on subscription, gift or exchange. Some 40-45 percent of its collection comes from Japan, and two staff are stationed in Japan to collect it.

117 The Library compiles the International Bibliography of Rice Research, the first volume of which, covering 1951-1960, was published in 1963, followed by annual supplements, the latest for 1987 being published in 1988. The Library also published 25 years of IRRI theses and dissertations: an abstract bibliography in 1985 and has many other specialised bibliographies to its credit. It is one of 13 centres of CGIAR working on a union list of agricultural serials. It also works closely with the Department of Agriculture which has produced 36 language editions of A farmer's primer on planting rice, a basic IRRI title.

118 A separate Department of Communications and Publications issues other publications, and cooperates in the issue of CAB Rice abstracts, while another department, the Training & Technology Transfer Department (TTTD) is responsible for sending CARIS entries to the Regional Centre for IRRI research in progress.

119 The University of the Philippines at Los Banos (UPLB) is one of the national multi-commodity research centers in the National Research and Development Network of PCARRD and therefore cooperates closely with PCARRD and AIBA. It has 6,000 students, over 700 academic staff and over 600 research staff. It serves as the national AGRIS Centre, but does not always get completed research publications, as theses and academic exercises of other universities and colleges are collected by and indexed at the National Library. Besides being the national AGRIS Centre, it is also the Philippines Centre for the Asean Food Post-Production Information Exchange Project (APEX).

120 The Library has six microcomputers at present, and has plans to automate its acquisitions and cataloguing operations for a start, using CDS/ISIS software recommended by a consultant. From January 1990 it plans to use its own microcomputer to send AGRIS data directly to Vienna and to Malaysia also and will give AIBA the data on diskette too.

Dissemination and usage of CARIS data

121 The Scientific Literature Service (SLS) of PCARRD provides information on CARIS to researchers, academics, extension workers and other agencies in addition to its other services such as current awareness, SDI, document supply, inter-library loan, referral services and assistance to libraries in the regional through provision of subscriptions to journals.

122 PCARRD conducted a user survey in 1988 to find out the extent of usage of CARIS and AGRIS amongst its researchers, but as with the surveys conducted in other countries, the questionnaire was considered unsatisfactory as users do not usually know and are not concerned with the sources of their information.

123 An individual researcher in the Crops Research Division which has R & D programmes for each of 12 major crops said that CARIS was found to be very useful to the work of the Division. A researcher would usually follow up on CARIS data by writing directly for more information from a researcher identified in CARIS or by making contact through the SLS Library. Such enquiries averaged one in three months, and usually received a satisfactory response. When language was a barrier, the help of student translators was sought, as there were many students from countries such as Thailand and Indonesia who attended courses at UPLB or at SEARCA.

124 Of concern to all users, including UPLB, was the charge for online searches and use of data from the regional database despite participation in CARIS through contributing to the database. A revised price mechanism was suggested whereby agencies which contributed to the database would be given the incentive to contribute more if they could be charged a lower rate for the searches they made. Countries outside the Southeast Asian region could possibly be charged a higher rate too.

125 Since the CARIS-SEA Inventory appeared only on an annual basis and in limited copies for distribution, it was suggested that it should cease to be distributed in printed format and be distributed more widely only in diskette form. National centres could then repackage the data and distribute publications, pamphlets, and other materials to extension workers, farmers and other end-users with the cooperation of other agencies.

126 This is in fact what is being done by PCARRD, whose outreach activities take a variety of forms. Print media is published by the Applied Communication Department and includes various series such as The Philippine Recommends Series, State of the Art Abstract Series, Commodity Industry Analysis Series, Information Bulletins, PCARRD Monitor, Data Series, Research Highlights, PCARRD Farmnews (in Filipino) and Network. The ACD also prepares and distributes mass-media materials such as posters, leaflets, calendars etc.

127 PCARRD believes that "the utilization of research-based technology by target-users is the financial payoff for the high amount of resources invested in research. It uses two strategies to assure that technology reaches the end-users fast and efficiently. These strategies are: pilot projects, and outreach activities.

"In the pilot project strategy, a package of technology is tried in the farmer's field and provided with relevant support such as credit, market, extension, and farmer's training.

The main purpose is to determine whether the technology will work with the essential inputs. Since the farmers or producers actually observe how the technology works, dissemination and utilization are facilitated."

Source: PCARRD, what it is,
what it has done

128 A nationwide applied communication network is used to implement these strategies. Members of the National Research and Development Network are grouped into 15 Regional Research and Development Centers/Consortia, each consisting of about 10 member agencies. A subnetwork of 13 Regional Applied Communication Offices (RACOs) has been set up under the ACD to implement more localised communication activities based on the communication needs of particular regions. Each RACO is a working component of a regional R & D consortium or center and is mandated to carry out the following tasks:

provide communication support to the research activities of the consortium

pool together the scant communication resources of consortium members and cooperating agencies

foster interagency cooperation by providing the venue for cooperative applied communication work

develop and upgrade regional communication resources and eventually make the region self-reliant in meeting its applied communication needs

facilitate the transfer of improved technologies to end users.

129 A visit to the RACD of the Central Luzon Agricultural Resources Research and Development Consortium (CLARRDEC) provided an impressive picture of how these functions are carried out in practice. CLARRDEC is one of the largest consortia, with 14 members, including representatives of the Department of Agriculture (DA), the Department of Environment and Natural Resources, the National Economic Development Authority, the DA Bureau of Agricultural Research, the DA Agricultural Training Institute (formerly the DA Bureau of Agricultural Extension) and PCARRD.

130 The RACD of CLARRDEC was set up by means of a formal agreement between the Central Luzon State University (CLSU), in Muñoz, Nueva Ecija and the Ministry of Agriculture and Food through the then DA Bureau of Agricultural Extension.

It is one of the most mature RACOs, has its own building provided by the CLSU and is headed by a Coordinator who is also on the academic staff of CLSU and a specialist in development communication. (The geographical area and the coordinator for each RACO are assigned by PCARRD.)

131 The RACO of CLARRDEC is one of six RACOs funded by USAID and the Government of the Philippines (GOP) under a Project entitled "Strengthening Regional Applied Communication as a Tool for Agriculture and Natural Resources Technology Transfer in Region III". The Project was launched in July 1988 and will run up to July 1991. It covers seven provinces: Nueva Ecija, Laguna, Quezon City, Tarlac, Pampanga, Zambales, and Bulacan.

132 Funds for the Project amount to one million pesos, and cover the production and distribution of all types of materials, communication training, adoption of mature technologies, communication-related researches and evaluation of communication materials. The RACO of CLARRDEC has a staff of 19, out of whom 12 are full-time, including three technicians from the Department of Agriculture. Part-time students are provided with a per diem by the RACO but revenue derived from the sale of publications goes to the CLSU and not to the RACO. PCARRD is considering setting up a Foundation which could provide funds for publications and thus retain the revenue earned, as is done by the University of the Philippines at Los Banos.

133 The RACD is linked to CLARRDEC member agencies, which include a Regional Research and Development Coordinating Committee (RRDCC) consisting of representatives of the consortium members and a Regional Task Force for the application of the Regional Integrated Applied Communication Program (RIACP) which has about 35 members, including the Applied Communication Unit (ACU) Coordinator, advisers, study group leaders and subject specialists. The ACU Coordinator meets with the RACD every month and provides a list, based on the recommendations of the Task Force, of mature technologies to be used for dissemination. The RACD repackages the materials on a selected technology in popular form and returns it to the ACU for review, then pre-tests the material, incorporates the suggestions of farmers, returns it to the subject researchers for revision, and then finalises the material. 3,000 copies of the material are then produced and distributed in the region with the help of the Department of Agriculture.

134 The activities of the RACD include the following:

Publications preparation and production

Instructional materials development

Audio-visual/mass media services

Radio broadcasting

Scientific literature services (in which it is
assisted by the SLS Library at PCARRD)

Indigenous media production

Conduct of communication and related researches and
of communication and related training.

135 These activities are directed to farmers, who form the RACD's primary clientele, farmers' families, extension workers, researchers, research managers, and graduate students who provide assistance in various projects.

136 Publications and instructional materials prepared and produced by the RACD include a great variety of materials such as newsletters, leaflets, pamphlets, reports, press releases, farmers' primers, occasional papers, research series, technical abstracts and technical updates, some of which are produced in 3,000 copies for four or five language editions. Audio-visual material includes comics (using photographs of local persons), tape-slides, videos, posters (calendar type), and flip charts for farmers and extension workers. Five copies of each publication are given to member agencies of CLARRDEC and are also sent to the ACD and kept in the SLS Library while press releases are sent to PCARRD Monitor.

137 Indigenous media include puppet shows, folk songs, rural theatre and poems, with the farmers themselves writing scripts for dramas and videos, composing songs and skits. Such indigenous media is introduced during local festivals and model family competitions. A special award was made to the barangay (village unit) that pioneered the use of traditional media and is now training other barangays in this field.

138 A variety of materials/media is used for the same product/crop as it has been found that all media are useful, with no one media more important than others. Feedback and evaluation of media is carried out through monthly or quarterly monitoring by contact leaders and students doing field work. Two assessments in the form of graduate studies have also been made so far, one on the use of indigenous media and one on the use of video.

139 In addition to producing its own materials, the RACO distributes PCARRD publications, exchanges publications with other RACOs, provides xerox copies of articles and solicits publications from member agencies and from PCARRD and reproduces these for other members. The RACO has no typewriter and hires a typist and a typewriter for its publications work. It plans to request for furniture, a typewriter and mimeographing equipment under the USAID grant.

140 The RACO's work does not end with the dissemination of technology-based information. It also engages in monitoring and evaluation to determine the extent of technology adoption, benefits derived and problems encountered by the beneficiaries of the technology promoted. A panel of RACO researchers also recommends which researchers should continue and which should be terminated.

141 All the 13 RACOs meet twice a year: for a Planning Workshop in June and a yearly review in December, during which an evaluation and integrated review of ongoing

research done in all the consortia is made by PCARRD. A listing of ongoing research is made by RACO members. RACOs then collect these lists and send them to the SLS at PCARRD for input into CARIS. Training in CARIS is planned to be provided at the RACO Coordinators' meeting in June.

Communication with Regional Centre (RC)

142 Communication with the Regional Centre was not a problem, given the close proximity of the national CARIS Centre to the RC.

143 However, it was felt that links with other national CARIS Centres and between them and the RC needed to be strengthened, as there had been less communication amongst them since 1986. One suggestion offered was for the AGINFO Link issued by AIBA to libraries in the Agricultural Information Network-Southeast Asia (AGINFONET-SEA) to be used to include CARIS and AGRIS news in addition to technical notes instead of starting a separate newsletter. It was also suggested that the annual meeting of CARIS participants could be dropped and an electronic mail system using ordinary telephone lines be used instead. Unesco had donated such a system to PCARRD. The use of electronic mail by the national CARIS Centres would undoubtedly improve communication with the RC.

144 The present CARIS output in hard copy had a limited distribution and was suitable only for listing and not for quick searching. Some interviewees suggested that it be dropped and that the CARIS-SEA data be distributed only in

diskette form and then repackaged in a variety of forms by the national CARIS Centres to serve national needs better. Joint funding or co-publication of certain outputs could also be considered.

145 As with other national CARIS Centres, the conversion of CARIS data to CDS/ISIS format was seen as a means of providing the regional output on magnetic tape to enable on-line searches to be made by researchers at the national CARIS Centres. With readier access and more complete coverage of CARIS, the national CARIS Centres would be able to enhance the use of CARIS. However, the question of online search fees would have to be resolved. If national CARIS Centres and participating institutions such as UPLB eventually had their own online search facilities, they would not need to go through AIBA to access the regional database.

146 It was considered that AGROVOC was weak in the areas of forestry, fisheries and environmental conditions. The ACD added its own descriptors and used its own thesaurus based on AGROVOC to meet local needs. So far, it had listed 6,000 terms which had been sent to the RC on magnetic tape.

147 Abstracts for CARIS entries were provided by researchers, with PCARRD only exercising quality control through editing. RETRES had prepared technical abstracting standards and a preliminary edition of a technical abstracting manual had been issued by PCARRD in 1988.

148 Training and standardisation in these key areas of thesaurus development and abstracting could be provided by the RC.

149 In general, it was felt that the RC should be further developed and strengthened as a regional information resource, providing training of trainers and stronger links with CARIS at regional and international levels. At CARIS regional meetings, librarians, computer and communication professionals should be represented in order to encourage a more integrated approach to research information services and management. The RC could also assist in the production of material for intensified marketing and promotion of CARIS. The possibility of sharing of technologies at regional level should also be studied.

Perceived benefits of CARIS

150 CARIS was perceived to be of direct benefit to the target groups of users, ie researchers, policy-makers, extension workers and farmers. It was well established by now and enjoyed the support and cooperation of all user groups.

151 However, the limitations of CARIS in terms of the extent of its coverage were recognised but a reliable assessment of what was being missed was not considered feasible.

152 As with Thailand, it was reiterated that there should be liberal access to information and that there should not be country barriers to such access.

Trends in management of research

153 A proposal had now been prepared by the Management Information Services Division of PCARRD and submitted to the IDRC for a sophisticated National Agricultural Information Monitoring, Retrieval, Documentation and Exchange Program (NIRDEP) for the agricultural regional research and development centres. This would be expanded from and strengthen the present systems in use, ie RETRES, RMIS and ARRTIS and would provide a technology support system and information for regional research managers to facilitate decision-making. A pilot project in two regions had been proposed and ACD would also be able to use the system to repackage information for farmers.

154 As other countries are also working towards a more integrated approach to the management of research, the outcome of the proposal and its implementation will be of keen interest and great value to them in their planning of their own national systems to meet similar objectives.

INDONESIA

Organisation of Agricultural Research

155 Responsibility for the national agricultural research system in Indonesia rests with the Agency for Agricultural Research and Development (AARD) of the Ministry of Agriculture, one of 14 agencies for research and development established by Presidential Decree in 1974.

156 The AARD Secretariat, the Centre for Agricultural Statistics and Data Processing and the National Library for Agricultural Sciences (NLAS) provide the centralised support services for AARD. In addition, there are two major Research Centers for Soil Research and Agro-Economics Research respectively, and 5 Research Coordinating Committees (RCCs) for Food Crops, Industrial Crops, Horticulture, Animal Sciences and Fisheries. Under the RCCs are 16 Research Institutes as well as a separate Management Board for Estate Crops with 6 Research Institutes and 4 Centres and a Management Board for Sugar Research with a Sugar Research Institute. The research institutes and centers have 51 research stations and 197 experimental farms under them through the Indonesian archipelago. AARD's organisational structure is given on p.62.

157 For the period 1981/82 - 1986/87, AARD received 211 billion rupiah (equivalent to US\$229.2 million) from the Government of Indonesia and US\$170.1 million from external sources, half of which came from the World Bank and USAID. The final approval for all research projects comes from BAPENAS (the Planning Authority) and the Ministry of Finance. In 1986, AARD had a total staff of 11,512, including 150 Ph.Ds, 350 MScs., and 1,409 undergraduate degree holders. The large investment in the infrastructure of agricultural research and development, including manpower development, is due to the dominant role which agriculture plays in the economy of Indonesia, providing 52% of employment and 20% of the GDP in 1986.

158 A number of universities also undertake agricultural research, as most universities have a Faculty of Agriculture. The foremost agricultural university is the Institut Pertanian Bogor (IPB) founded in 1963, which started with Faculties of Agriculture and Medicine. It now has nine Faculties and a total of 10,000 students and 1,000 academic staff, including about 300 Ph.D. holders. The IPB has close cooperative links with an American Mid-West Consortium which includes the Universities of Kentucky, Michigan State, Missouri, Minnesota, Illinois and Wisconsin as well as relations with universities in Japan, Australia and the Asean countries. IPB has helped to develop graduate schools of younger Indonesian universities and provided training for staff from other Asian universities. It coordinates its

research programmes with those of other Indonesian universities through the Directorate of Higher Education of the Department of Education and Culture.

159 In 1988 the IPB had 65 multi-disciplinary research projects, 49 funded by the Department of Education and Culture and 16 by its clients, including the Department of Agriculture, the Department of Forestry and private firms. Faculties and Departments also carry out mono-disciplinary research. From 1989 all research must be registered with the Lembaga Penelitian (Research Board) of IPB but approval must come from the Lembaga only for multi-disciplinary research.

160 There are two categories of research proposals, the first being from Faculties, and the second from clients. For the first category, Faculties are asked in June to prepare their proposals which are then submitted in September and then evaluated by the Lembaga Penelitian. 201 proposals were received in 1988, of which 31 were not approved and were returned to the Faculties. Proposals supported by the Lembaga are sent to the Department of Education and Culture which approves or disapproves of them by January or February, and the projects then start in April.

161 The second category of research proposals is of those undertaken with clients. The Faculties discuss them with their clients, then submit the proposals to the Lembaga for approval. After approval is received, a contract is signed

between the Faculty and the client concerned, usually a private firm.

162 Also located in Bogor near the National Library for Agricultural Sciences and the IPB is the Southeast Asian Regional Center for Tropical Biology set up by the Southeast Asian Ministers of Education Organisation (SEAMEO BIOTROP) in 1968. In its Third Five-Year Development Plan for 1983-1988, BIOTROP included 12 in-house research projects and two contracted-out research projects under its Tropical Forest Biology Program, 14 research projects under its Tropical Agricultural Pest Biology Program and six research projects under its Tropical Aquatic Biology Program. It has also served as the Southeast Asian Weed Information Center (SEAWIC) since 1986 and continues to do so with IDRC support.

163 BIOTROP activities include research, training (at postgraduate level), scientific meetings, extension and consultation services, and Clearing House activities, covering library, documentation, scientific information, publications and public relations services. It has 800 journal titles, including 300 on exchange and 30 or 40 subscriptions. There is a total staff of 17 for the Clearing House, including 2 qualified librarians and 3 Library Technicians. Funding is provided from a number of sources. Funds for research are provided by the Indonesian Government and were cut to 20 per cent in 1986 but are now gradually being restored. Funds for the Clearing House come from the

Indonesian and Netherlands Governments and IDRC, while funds for training come from the SEAMEO Headquarters in Bangkok and are provided by member governments. SEAWIC was funded by the IDRC from 1986-1988.

National CARIS Centre

164 The National Library for Agricultural Sciences (NLAS) which comes under AARD serves all the departments and research institutes of AARD and is thus well placed to serve as the national CARIS Centre. It is also the national AGRIS Centre as well as the centre for two other networks, APEX and the National Fertiliser Information System (NFIS) which operates under ESCAP. Indonesia does not as yet have a national centre for APINMAP.

165 The NLAS has an old and proud history as the Bogor Bogoriensis Library (founded in 1842). It now has 100,000 volumes, 2,000 journals (700 obtained on subscription and the rest as gifts or on exchange), and 3,000 rare books and occupies five floors of a modern building of 7,652 sq.m.

166 The NLAS has a total staff of 160, who provide library, information and publication services, including current awareness service, SDI, photocopying and microfiching of nonconventional material, including theses and conference papers. Theses obtained from universities include those submitted for the 4-year graduate and 2-year Master's programs as well as Ph.D. theses. Current awareness service

is provided for 1,200 researchers and also for 27 agricultural libraries on a subject basis. The libraries in turn circulate the contents pages to their researchers and refer requests for photocopies to NLAS. Although there is no association of agricultural librarians, the NLAS organises meetings of agricultural librarians working in government-funded libraries.

167 Computerisation of the Library's catalogue has started, with 11,000 records completed so far. The Library has also computerised its Indeks biologi dan pertanian since 1986 and the National Agricultural Bibliography, an output of AGRIS, since 1984. It also provides the abstracts for Abstrak hasil penelitian pertanian Indonesia (Abstracts of research output on Indonesian agriculture).

168 There is enthusiastic commitment to CARIS by the NLAS, which considers that participation in the regional network has been and will continue to be of great mutual benefit to researchers and policy-makers as well as to librarians and information providers. On the other hand, it is clear that such participation has also strained the manpower and other resources of the national CARIS Centre.

Collection of Data

169 The CARIS data forms are sent by NLAS staff to the research institutes and centers under AARD, which then pass them on to the researchers. Visits to the institutes are sometimes also made by NLAS staff but funds previously

provided for travel are not available now. 483 entries were contributed to the CARIS-SEA Inventory in 1985. It was estimated that about 500 entries would be contributed for 1988, with about 100 in process. Coverage was estimated to be about 50 per cent, and was affected by whether the research topic was too general (in which case it would be omitted) or experimental/ specific. The best coverage was considered to be of food crops, with improvements needed in the other areas.

170 Apart from problems of communication, there was also a psychological barrier in that researchers did not want to reveal details of the funding they received. (Such details are optional in the CARIS form.) A more important factor was that there had been limited research during the past four years, as the budget for research had been reduced.

171 The Lembaga Penelitian of IPB-Bogor was computerising a Directory of research workers using DBase. This was planned as a simple MIS system, providing details of name, rank, department, faculty, address, telephone number, education, training, language ability, public service experience and list of publications. So far 900 names out of 1,000 staff had been processed. Access to this Directory by the NLAS would be of great assistance in reaching more researchers.

172 Research results were divided by the Lembaga Penelitian into two types: (1) classified, ie. results of research commissioned by clients would not be given, though the topic

of research would be listed (2) unclassified, ie. results would be sent to the University Library and to the Public Service Institute, which would disseminate them in keeping with IPB's tradition of service.

173 BIOTROP had its own computerised database and presently had three microcomputers, two donated for SEAWIC and one donated by Unesco. For BIOTROP, there are three separate forms for tropical aquatic biology, tropical forest biology and tropical agricultural pests respectively. The forms provide details of the program title and number, aims and objectives, description of project and methods used, name of supervisor, and details of the staff involved, including names, position held and qualifications. For SEAWIC, it distributes forms to more than 500 researchers and passes on the research records to CARIS.

Dissemination and usage of CARIS data

174 The NLAS received 5 diskettes in November 1988 from the Regional Centre covering the cumulative regional CARIS database since the start of CARIS. However, it was considered that diskettes were not always suitable for storage. If their quality was not good and storage conditions not ideal, the information could be lost. It was considered better to provide the regional database in COMfiche output and to use microfiche which could easily be mailed in aluminium foil for individual items. This was successfully being used for providing copies of items listed in the Indeks biologi dan pertanian.

175 Researchers are sent relevant sections of the CARIS-SEA Inventory in the form of photocopies at present. They also send their enquiries by mail or by telephone or in some cases by telex if they are unable to come to the NLAS. As in the other countries, personal networking is also an important means of communication.

176 The NLAS is involved in the planning of the Master Research Plan and is responsible under the Plan for scientific communication, publication and communication activities to strengthen research and extension linkages. The two-way linkage is considered a key element so that problems in the field can be conveyed to researchers and research results conveyed to extension workers and farmers. Thus the NLAS is very conscious of its role in disseminating CARIS data and providing feedback on its benefits.

177 The NLAS will be holding a meeting in Feb 1989 with extension workers and subject specialists to promote communication. In each of the 27 Indonesian provinces, a Provincial Agricultural Information Centre has been set up by the Extension Department of the Ministry of Agriculture and will be linked with the NLAS. Each Centre is to have one or two computers which can provide input on research in progress and will also send Centre publications to the NLAS.

178 More than 40 staff from the Information Centres have been trained so far in information work by the NLAS. The benefits of such training are that it provides for inter-

action with other working in the same field and has a multiplier effect in that those trained return to their Centres and train others also. Other agencies also send their staff to the NLAS for in-service training for one to three months. The training is provided freely by the NLAS but transport and accommodation are provided by the agencies concerned.

179 Training is also to be provided for a group of 20 fisheries librarians in connection with the Fisheries Information System supported by IDRC and the Indonesian Directorate of Fisheries.

180 The NLAS now has 10 microcomputers, the first one having been given by the IDRC. Of the 10, six are used for information work, two for publications, one for a mailing list of 20,000 addresses and one for administrative purposes.

181 The Department of Agriculture also issues a Buletin informasi pertanian (Bulletin on agricultural information) for extension workers and leaflets and pamphlets for farmers which include repackaged information derived from CARIS data.

182 The Institut Pertanian Bogor publishes three publications concerned with research: (1) Gema Penelitian which began in September 1988 provides the answers to the question of who is doing what at the IPB. It includes a list of research proposals on a yearly basis. It has a small circulation of 200 copies and is distributed to other

universities (2) Buletin Penelitian (Bulletin of Research) provides abstracts of research results and (3) A new periodical is planned to start in September 1989 and will be published twice a year. It will contain selected articles on research projects. Dissertations by students are listed separately by the different Faculties.

183 SEAMEO BIOTROP disseminates information on research through its training courses for research workers, its publications, library and scientific documentation services. Its outreach services include radio and TV coverage of important events, exhibitions, films, slides and photographs, press releases, articles in newspapers and newsletters, leaflets and brochures.

Communication with Regional Centre (RC)

184 Communication between the RC and the National CARIS Centre was difficult because of poor telecommunications, hence the telex link between AIBA and the NLAS was unreliable. (For example, the copy of my programme in Indonesia sent in advance by the NLAS to the RC never reached the Project Officer at AIBA.)

185 The National Centre had to pay for online searches and SDI services provided by the RC. However, it could not retain revenue for services it provided within the country, including photocopies, microfiche copies and translations of material into English. It was also difficult to obtain translations for material in other languages, eg. Thai,

Russian and Japanese in the case of CARIS and/or AGRIS data.

185 The National Centre also suggested that there was a need for the RC to decentralise training as well as to provide training particularly at advanced level. For example, an advanced course on CDS/ISIS was needed. Version I was still in use. Version II of CDS/ISIS was to have been officially released in September 1988. Its release had been delayed to March 1989 but it was used at a training course held at the Asian Institute of Technology (AIT) in 1988. The AIT course had been held for three months, but it was felt that the course could have been shorter.

187 As with the other national CARIS centres, training by the RC in abstracting and in the use of AGROVOC was a felt need.

188 Training could also be provided on a regional basis, according to each country's strengths. For example, Indonesia could share its experience on research and extension linkages.

189 As databases became larger, they would also give rise to problems of storage and retrieval. It was proposed that databases could also be decentralised, eg. rice and that new forms of storage and retrieval such as CD-ROM should be looked into.

Perceived benefits of CARIS

190 The NLAS considered that a quantifiable assessment of

CARIS benefits was too limited. More important were the unquantifiable and long-term benefits of CARIS and its impact on librarianship and information services at the national level. The image of the library as a storehouse for publications and providers of only loan services had changed. It was now seen as a provider of information service and was therefore better appreciated by policy-makers and researchers. The increasing use of computers had also improved the image of libraries and librarians, who were seen to be able to produce more and better products. On the negative side, the improvements in service led to ever greater demands on libraries, which found it hard to cope with them. Continuous training of staff was needed to increase their confidence and ability to cope with these increased demands.

191 After the first computer had been donated to the NLAS for CARIS work, its demonstrated usefulness had led to five more computers being provided, so that computer capacity had been increased from 20mb to 180mb. This was an example of how the NLAS, in trying to improve and strengthen its services to the research institutes, had initial difficulties in convincing the policy-makers. It had to prove that its methodology was working and demonstrate the products, so that the policy-makers would eventually want the equipment etc. to be provided in their own institutes. The NLAS would get a laser jet printer, scanner, mouse and improved monitor, for example, next year, for improving the

quality of its products. One of the problems of expanded computer capacity, however, was the difficulty of retaining systems analysts after training them, a problem common to all the participating countries.

Trends in management of research

192 The Ministry of Science and Technology plans to coordinate all agricultural research in Indonesia by the public and private sectors, including joint research, ie. research funded by the private sector but undertaken by research institutes and universities. Coordination and cooperation with universities will also be improved, as they may obtain funds for research from USAID, the World Bank, international aid agencies and overseas universities.

193 Preparatory work has started on an Agricultural Research Management Project which will be discussed by universities at a meeting in February 1989 and by research institutes at their annual meeting in March 1989. The aim is to develop a computerised Management Information System which will provide more detailed information on researchers, funding and projects, enabling research agencies to learn more from one another's strengths. There will be four sub-systems initially, covering manpower, programmes, finance and research facilities. Later the MIS will be expanded to include the output of the research and provide a summary of the results. All aspects of agriculture will be covered except forestry which will be dealt with separately.

194 The Extension Department of the Ministry of Agriculture will also be elevated to the same level as the AARD, and will have four Directors-General for food crops, estate crops, livestock and fisheries respectively. The four subdivisions for these areas will undertake multi-location testing of research in addition to their extension activities.

195 It is anticipated that these developments will lead to an improvement in the coverage, dissemination and usage of CARIS and maximise its potential benefits.

SINGAPORE

Organisation of Agricultural Research

196 Singapore is a small, highly urbanised newly industrialising country (NIC) in which farming is limited by the availability of land. Individual farms are giving way to companies. In marked contrast to the other participants in the CARIS-SEA network, its agricultural research is therefore a low priority compared with industrial and technological research. Agricultural research in Singapore is also highly localised and narrowly focused on a few key areas of intensive, commercial and high technology farming.

197 The bulk of agricultural research is undertaken by the Primary Production Department, particularly its Agriculture and Fisheries Divisions, the Parks and Recreation Department, the Marine Fisheries Research Department, and the Botanic Gardens, all of which come under the Ministry of National Development. Research is also undertaken by the Department of Botany, the Department of Zoology and the Institute of Molecular and Cell Biology of the National University of Singapore. Research by the private sector is usually undertaken jointly with the government or the University.

198 Government funds for research are limited while business firms also find it difficult to obtain funds for research as banks are generally reluctant to invest in agricultural ventures. More generous grants are made available to

government departments, the University and the private sector by the Science Council of Singapore for research under its Research and Development Scheme (REDAS) which aims to encourage medium to long-term research activities.

199 It is estimated that private firm presently spend 3 to 5 per cent of their budget on research. In the public sector, the aim is to provide one per cent of GNP for research.

200 Where projects that can be commercialised are undertaken by the government with the private sector, the private firm pays fifty per cent of the funding and has proprietary rights over the research findings. In such instances, the findings cannot be published till three to five years after completion of the project, with prior agreement of the firm concerned.

201 The Primary Production Department has 100 graduate officers, 40 per cent of whom are doing research. It is responsible for the development and management of ten agrotechnology parks as well as agrotechnology services in selected areas such as aquaculture, for example, shrimp/prawn and fish vaccines, automated feeding systems; horticulture; and livestock and other services, for example, feedmilling and pig and cattle embryo transfer. A Departmental Research Steering Committee is chaired by the Commissioner of Parks and Recreation, with three or four officers from each Division, to consider research proposals and

recommend them for approval and financing by the Ministry of Finance.

202 The Marine Fisheries Research Department has about ten researchers and covers such areas as fisheries, fish technology and aquatic science. The Botanic Gardens has specific emphasis on horticulture, parks and trees to serve recreational needs, and landscape gardening. It has six researchers at present. An Advisory Council consisting of the Commissioner and the Asst. Commissioner of Parks and Recreation, and the Director and the Asst. Director of the Botanic Gardens advises and oversees research projects and keeps close tabs on the costs of each project. Joint projects on horticultural research where costs of research and staff are shared are also undertaken with the National University of Singapore under a PPD/NUS Committee on Research and Development Cooperation Programme initiated in 1987.

203 The Botany and Zoology Departments of the National University of Singapore have adequate, perhaps generous resources for research. A Central Committee of the University headed by the Vice-Chancellor and including Deans of Faculties and the Bursar evaluates applications for research projects. The Botany Department estimates that an average of S\$60,000 per staff is provided for each project. Its emphasis is on very specific areas such as orchids, ornamental plants, vegetables and horticulture, while the Department of Zoology has three major research thrust areas:

reproductive biology of animals; entomology and pest management; and aquaculture and animal production.

204 There is no coordination of agricultural research on a national level and many expressed the hope that the Science Council would undertake this role.

National CARIS Centre

205 The National University of Singapore (NUS) Central Library accepted the invitation to serve as the national CARIS Centre mainly because it was already serving as the national AGRIS Centre and saw CARIS as an extension of its work on AGRIS. The NUS Central Library is one of six libraries in the NUS Library System, other libraries being the Chinese, Law, Medical, Science and the Hon Sui Sen Library which specialises in economics, finance and related subjects. The collection of the total NUS Library System includes 1.4 million books and 14,000 periodical titles. The acquisitions, cataloguing and circulation systems have been automated in all the libraries except for the Chinese Library where only cataloguing has been automated. Periodicals indexing by the Central Library has also been automated. The NUS Library System subscribes to a number of on-line database services, is a member of the Singapore Integrated Library Automated System (SILAS), a national bibliographic network under the National Library, and provides interlibrary loans and other library and information services. It is estimated to have about 60 professional staff, including 51 qualified librarians.

206 As with the other national CARIS Centres, work on CARIS is undertaken by one of the librarians in addition to other duties. Staffing problems were particularly acute in 1984-88 and are likely to continue, as zero manpower growth is expected in the next five years.

207 Furthermore, as agriculture as such is not a teaching subject at the NUS and is perceived as a low-level priority at national level, the NUS Central Library admittedly regards CARIS work as of lower priority than other areas, such as AGRIS, where entries total over 100 a year.

208 However, there appears to be no suitable alternative to the NUS Central Library continuing to serve as the national CARIS Centre as long as it also serves as the national AGRIS Centre. One alternative that could be considered would be to have the Science Library rather than the NUS Central Library serve as the national CARIS Centre. As the NUS Science Library rather than the NUS Central Library is well used by staff of the Botany and Zoology Departments, librarians in the NUS Science Library would come into closer and more frequent contact with staff of these Departments. This would facilitate a better response to and greater usage of CARIS by such staff.

209 The Primary Production Department, as the contributor of the greatest number of items to CARIS, would also appear to be a possible candidate for the national CARIS Centre. However, it has a small library staffed by a Library Technician

and it is unlikely to be able to obtain a suitable librarian and support staff who could undertake the work.

Collection of data

210 Between August 1984 and September 1986, the NUS Central Library sent out 80 data forms to researchers in ten organisations, including the teaching departments of the National University of Singapore, the Singapore National Academy of Science, the Primary Production Department, and the Botanic Gardens. Only seven forms were returned, and no Singapore entries were listed in the CARIS-SEA Inventories for 1984 and 1985. In 1988, 71 forms were sent to researchers, of which 39 were returned and 31 ultimately selected for submission to the Regional Centre at AIBA in November 1988.

Dissemination and usage of CARIS data

211 As with the other national CARIS Centres, the National University of Singapore Central Library deals with enquiries related to CARIS. In-depth research enquiries which may use CARIS are recorded but no analysis of these has been made. Researchers usually make direct contacts with one another at national and regional levels or through the Library when seeking more information on particular projects.

212 The National University of Singapore Directory of current research is an annual listing of research interests of academic staff, but does not list specific projects. The National University of Singapore Publications and theses is

another annual publication which lists publications, including monographs, articles and conference papers, as well as Masters' and Ph.D. theses, while Honours degree theses and academic exercises are listed by the NUS Central Library.

213 The research findings of the NUS Departments of Botany and Zoology are usually presented at staff seminars as well as in the Faculty of Science Bulletin which includes research reports and news of recent staff publications. Other forms of dissemination include presentation of papers at seminars or conferences of the Singapore Institute of Biology, the Microbiological Society, the Asian Fisheries Society and other professional societies. Personal networking with researchers in the other CARIS participating countries is also a regular means of communication.

214 The Primary Production Department disseminates information to farmers and those involved in the various food trades through publications, booklets, posters, slide shows, shortseminars, talks and visits by the PPD officers in the various sections and units of the Department. For example, the Marine Aquaculture Section provides technical assistance to fish farmers on farm establishment and management, fish health, breeding and feeding, while the Freshwater Fisheries Section advises farmers and exporters of ornamental fish on farm management and disease control. The Fruit Tree Centre of the PPD provides an advisory service on fruit tree growing and maintenance. The PPD also provides short training

courses for supermarket supervisors on the storage and handling of fruits and vegetables.

215 The Marine Fisheries Research Department compiles quarterly progress reports on its research which are issued to staff and also sent to the Southeast Asian Fisheries Development Centre (SEAFDEC) in Bangkok, which operates the Southeast Asia Fisheries Information System (SEAFIS). SEAFDEC has published a Directory of fisheries research and a List of SEAFDEC publications, 1968-1985.

216 The Botanic Gardens has its own Gardens Bulletin for the dissemination of its research, which is available on exchange.

217 Agencies which lack online facilities themselves usually make use of the NUS Central or Science Libraries for online searches, interlibrary loans, photocopies or fax services. The Singapore Institute of Scientific and Industrial Research (SISIR) is also used for such services.

Communication with Regional Centre (RC)

218 Communication with the Regional Centre was considered rather unsatisfactory, whereas bilateral communication between two national centres was easier and responses promptly made.

219 As with the other Centres, online access to the regional CARIS database was considered essential in promoting greater usage of CARIS data. The rates of payment for access to the

database would have to be worked out by common agreement of the participating countries and AIBA.

220 A training programme was also needed, particularly for online searching, data inputting, use of AGROVOC and thesaurus construction. One person could be sent to all the countries to conduct courses in each country for a group of librarians and end-users.

221 Promotional materials could also be provided by the RC for use by the national CARIS Centres.

Perceived benefits of CARIS

222 All researchers interviewed agreed that it was important and useful to know what research is being undertaken in the other participating countries. This would enable them to avoid verifying results or duplicating efforts already made as well as to identify problem areas on which more research was needed.

223 Many researchers relied on their personal contacts with their counterparts whom they met or communicated with at Asean and other seminars, conferences or official meetings of Asean committees such as the Asean Committee on Food, Agriculture and Forestry and the Asean Agricultural Research Coordinating Board. Most of their institutions also had exchanges of publications with their counterparts in the other Asean countries. The language barrier for Thai and Indonesian publications prevented them from being fully used.

224 Some research such as that undertaken by the Botanic Gardens was considered to be too localised to be relevant to other countries and vice versa.

225 On the other hand, it was recognised that certain problems, eg. pesticides, food handling and storage were common to all the countries and that it was of mutual benefit to know what was going on in such areas so that common solutions could be found. Certain forms of research such as biotechnology were very expensive and private investment in such fields could be encouraged in order to provide services which could apply to all the Asean countries.

226 It was also noted that Singapore is not a member of the Food and Agriculture Organization (FAO) but would participate in FAO projects in the region if they were funded by UNDP.

227 The Asean Food Handling Bureau was better known and appeared to be most used. It was cited frequently as a model for cooperative information services.

228 One interviewee also brought up the question of information overload, and felt that this could be minimised if more state of the art reports could be provided by the RC.

Trends in management of research

229 The greatest need was for coordination of research at national level, possibly by the Science Council. The Science Council had conducted a survey of research activi-

ties in the public sector in 1988 and was also working on a report on technology policies and planning.

230 More attention was also being given to the costing of research in order to ensure value for money spent. The private sector would in future play a larger role in the funding of research undertaken by the NUS or government agencies, particularly where it had commercial possibilities. This trend could however lead to more restricted dissemination of information.

Conclusion and Recommendations

231 In all the CARIS-SEA member countries, agricultural research is carried out by three main sectors: governments, including departments, statutory boards and research institutes usually under a Ministry or Department of Agriculture at national and/or provincial/state level; universities specialising in the teaching of agriculture; private firms either independently or, increasingly, in conjunction with government agencies or universities on a contract basis. Most member countries also host a number of regional or international research centres in specialised fields of agriculture which may contribute to CARIS and AGRIS as well as to specialised regional or international information systems in their respective fields.

232 The variety of sources, volume, range and multidisciplinary nature of agricultural research to be covered in CARIS presents a daunting challenge to the national CARIS Centres. Added to this is the additional responsibility accepted by most of the Centres to serve as the national nodes for other regional and international agricultural information systems or networks which have proliferated within the past two decades. Some of these overlap with or duplicate one another, as invitations to participate in such information systems are made by international or regional agencies as well as by individual overseas universities and research institutions specialising in particular fields. Such invitations may be accepted by governments or sometimes directly

by institutions with little or no regard to the overall coordination and integration of such systems on a national level in the general absence of a national information policy or plan.

233 Participation in these networks often proves to be a mixed blessing. The immediate benefits usually include the provision of computer hardware and software; the training of staff in new information technology, sometimes at a regional or other overseas centre; and access to a larger, usually international, database. On the other hand, such participation may be achieved at the expense of the provision of basic services and resources; put a strain on the limited telecommunication and computer capabilities of the participating institution; be expensive in terms of connect time, document delivery etc.; and provide limited relevant information because coverage of the database is oriented towards developed countries.

234 With CARIS-SEA, however, it is clear that participation has proved rewarding and that there is a positive commitment to the continuance and development of the network. It is therefore concluded that the key to the strengthening of CARIS-SEA to enable it to realise its full potential lies in the strengthening of the national CARIS Centres. This will enable them to fulfil their obligations more effectively at national level, particularly in the collection and dissemination of CARIS data. Once this is achieved, it will be possible for them to contribute next at the regional level,

will be possible for them to contribute next at the regional level, and lastly, at the international level. A national rather than a strictly regional approach would take into account the different stages of development of library and information services attained in each participating country. It would be based on the actual resources and capabilities of each national Centre and aim to reduce or level differences as far as is feasible, thus providing assistance on the basis of identified needs rather than of parity.

235 The recommendations that follow are based on this principle and are expressed only in broad terms, with follow-up by the national CARIS Centres and the Regional Centre to be made in terms of more specific and detailed plans for implementation.

236 Recommendations

It is recommended that:-

National CARIS Centres

1.0 The present national CARIS Centres in Malaysia, Thailand, the Philippines, Indonesia and Singapore continue to serve as such and that they be strengthened to enable them to carry out their functions more effectively

Collection of data

2.1 coverage of CARIS be confined to government-funded and government-sponsored research

2.2 data entry forms be sent to Heads of Departments at universities and research institutes as well

as to individual researchers in order to make them aware of and seek their support for CARIS. Larger agencies, especially those located far away from the national CARIS Centres, should be encouraged to appoint Liaison Officers to distribute the CARIS forms within their agencies, ensure that they are completed within the stipulated time, and return them to the national CARIS Centres

2.2 where a research management information system has been or is being developed by the National Research Council or other appropriate government agency, the national CARIS Centre be urged to participate in the system and to negotiate for extraction of CARIS data as a subset of the system and undertake repackaging of the data for its own clientele. The national CARIS Centre should furthermore be strongly represented in a review of the NRC-MIS when the MIS reaches maturity

2.4 assistance be provided to the national CARIS Centres in Malaysia, Thailand and Indonesia for the translation of CARIS entries from Malay, Thai and Indonesian into English, as this entails additional work for these Centres

Dissemination and usage of CARIS data

3.1 assistance be provided for the production of the CARIS-SEA national databases in Malay, Thai and

- Indonesian by the national CARIS Centres in Malaysia, Thailand and Indonesia
- 3.2 assistance be provided for the production and distribution of promotional materials on CARIS in Malay, Thai and Indonesian by the national CARIS Centres in Malaysia, Thailand and Indonesia
- 3.3 online facilities between the national CARIS Centres and research stations/institutes be provided or expanded in keeping with the expansion of telecommunication capability in each country to enable researchers to make direct online searches of the CARIS-SEA national and regional databases
- 3.4 the CARIS-SEA database be provided by the RC in a variety of formats, including print copy, microfiche, diskette, magnetic tape or CD-ROM, according to the preferences and capabilities of each national CARIS Centre, to facilitate repackaging and greater usage of CARIS data
- 3.5 travel assistance be provided to enable staff of the national CARIS Centres to hold seminars or meetings throughout the country with researchers and agricultural librarians in order to encourage and train them to participate in CARIS, promote the usage of CARIS and obtain feedback on such usage
- 3.6 Heads of national CARIS Centres regularly disseminate news and information on CARIS in national

or local newsletters or journals of agricultural librarians as well as to the RC

Communication with RC

- 3.7 national CARIS Centres be encouraged or assisted to instal electronic mail systems to facilitate speedier and more direct communication amongst the participants and the RC

Regional Centre (RC)

- 4.1 the RC assist the national CARIS Centres in the conversion of CARIS-SEA data in CDS/ISIS format
- 4.2 the RC assist the national CARIS Centres by paying for extraction of CARIS data from the national research management information systems
- 4.3 the RC maintain and expand AGROVOC, with the help of a regional committee, to provide for specialised terms in English in the fields of agriculture and forestry, which could then be translated into the main languages of the region, such as Malay, Thai and Indonesian
- 4.4 the RC provide regular updates on new terms accepted by AIBA
- 4.5 the RC review and if feasible revise the charges for online searches at the RC to allow for lower rates for participants in the CARIS-SEA network
- 4.6 the RC provide a variety of promotional materials on CARIS in English, including pamphlets, posters, tape-slide shows, videos, which can be

- distributed to the national CARIS Centres and where necessary translated into other languages
- 4.7 the RC assist the national CARIS Centres by drawing up a standard questionnaire on the usage of CARIS which can be used by all the Centres for conducting of periodical user surveys
- 4.8 the RC provide training preferably on a country basis for staff of the national CARIS Centres in data-inputting, online searches, use of AGROVOC and thesaurus construction
- 4.9 the RC represent the interests and synthesise the views of the national CARIS Centres at international meetings on CARIS
- 4.10 the RC provide state of the art reports and other specialised reports at the request of the national CARIS Centres
- 4.11 the RC provide a guide to agricultural information systems in use in the CARIS-SEA countries
- 4.12 the RC provide news and information on CARIS developments in the AqinfoLink and other regional and international journals and newsletters
- 4.13 the RC continue to confine the scope of the CARIS-SEA Inventory to the countries of Indonesia, Malaysia, the Philippines, Singapore and Thailand.

Itinerary and Schedule of Meetings

I. MALAYSIA

Sun	8 Jan 1989	2015 hrs	Depart for Kuala Lumpur on SQ114
		2100 hrs	Arrive at Subang Airport
Mon	9 Jan 1989	0730 hrs	Depart for visit to MARDI, Serdang
		0830 hrs	Meeting with Datuk Dr. Haji Mohd Yusof bin Hashim, Director-General MARDI
		0900 hrs	Discussion with Mrs Jariah Jais, National CARIS Centre, Malaysia and visit to MARDI Library
		1130 hrs	Return to hotel for Lunch
			Afternoon free
		2000 hrs	Dinner with Dr. Tay Tian Hock, Director, Technical Services Division, MARDI and Mrs Jariah Jais
Tues	10 Jan 1989	0730 hrs	Leave for MARDI
		0830 hrs	Discussion with Dr Sharif Ahmad, Deputy Director-General, MARDI
		0900 hrs	Discussion with : Tuan Haji Samion Abdullah, Head, Coordinating and Implementation Unit, MARDI Dr Tay Tian Hock, Director, Technical Services Division, MARDI Tuan Haji Kamaruddin Saadan, Head, Computer Centre, MARDI Mrs Jariah Jais, Head, National CARIS Centre
		1200 hrs	Lunch with Mrs Jariah Jais

Tues	10 Jan 1989	1400 hrs to 1615 hrs	Visit to Universiti Per- tanian Malaysia Library and discussion with Tuan Syed Salim Agha, Librarian, UPM Library
Wed	11 Jan 1989	0745 hrs	Leave for Forest Research Institute of Malaysia, Kepong
		0900 hrs	Visit to Forest Research Institute Library and dis- cussion with Mrs Susan Kong, FRIM Librarian and Mr Kaw Hun Woon, Librarian, Rubber Research Institute
		1200 hrs	Lunch with Mrs Jariah Jais, Mrs Kong and Mr Kaw
		1400 hrs to 1500 hrs	Visit Palm Oil Research Institute of Malaysia (PORIM) and discussion with Dr Haji Abdul Halim bin Haji Mohd Hassan, Deputy Director-General, PORIM and Mrs Mardhiah Mohd Zin, Librarian, PORIM
		1530 hrs to 1930 hrs	Free
		2000 hrs	Dinner with Syed Salim Agha and wife
Thurs	12 Jan 1989	0800 hrs	Leave for Sungei Buloh RRI Research Station
		0900 hrs to 1030 hrs	Visit station and discussion with Mr Kaw Hun Woon, Librarian, RRI and Mrs Jariah Jais
		1030 hrs	Depart for Subang Airport
		1100 hrs	Arrive at Subang Airport
		1850 hrs	Depart for Bangkok on TG416 (originally scheduled to depart at 1245 hrs)

II. THAILAND

Thurs	12 Jan 1989	1950 hrs	Arrive at Bangkok Airport
Fri	13 Jan 1989	0900 hrs	Leave for Kasetsart University
		1000 hrs	Visit Kasetsart University Library and discussion with Mrs Piboonsin Watanapongse, Director, National CARIS Centre, Thailand and Director, Kasetsart University Library, and Miss Praditta Siripan, Associate Director, Kasetsart University Library
		1200 hrs	Lunch with Kasetsart University Library staff
		1500 hrs	Visit Kasetsart University Research & Development Institute (KURDI) and meeting with Dr Pramarn Promsuthiraks, Deputy Director, KURDI and Miss Praditta Siripan
		1630 hrs	Return to hotel
Sat	14 Jan 1989		Free
Sun	15 Jan 1989		Free
Mon	16 Jan 1989	0900 hrs	Leave for Department of Agriculture with Miss Praditta Siripan
		1030 hrs	Meetings with Deputy Director-General, Research Planning Division and Mrs Roongtawan Busapaves, Head, Documents and Research Registry Department
		1200 hrs	Lunch with Mrs Piboonsin Watanapongse and Miss Praditta Siripan
		1400 hrs	Visit Thai National Documentation Centre with Mrs Pranee, Serials Dept,

Kasetsart University Library
and meeting with Mrs
Nongphanga Chitrakorn,
Director, TNDC, and Ms
Salaisophon Komarakul na
Nakorn, Chief, Foreign
Relations Division, Thailand
Institute of Scientific and
Technological Research

1530 hrs Visit National Research
Council of Thailand with Mrs
Pranee, Kasetsart University
Library and meeting with Ms
Panee, Dy. Director

1630 hrs Return to hotel

Tues 17 Jan 1989 1100 hrs Visit FAO Regional Office
with Mrs Piboonsin and
meeting with Mr R.L. Semple,
Regional Coordinator, Re-
gional Network Intercountry
Cooperation on Post-Harvest
Technology and Quality
Control for Food Grains

1200 hrs Lunch with Mrs Piboonsin
Afternoon free

Wed 18 Jan 1989 0730 hrs Depart for Bangkok Airport

1040 hrs Depart for Manila on TG640

III PHILIPPINES

Wed 18 Jan 1989 1445 hrs Arrive at Manila Airport
1930 hrs Arrive at Los Banos

Thurs 19 Jan 1989 0900 hrs Visit PCARRD with Mrs
Josephine C.Sison, Project
Manager, AIBA and meeting
with Dr. Teresea H. Stuart,
Director, Applied Communica-
tion Department, PCARRD and
Head, National CARIS Centre,
Philippines, and Mrs Lilia
Bayabos, Librarian in charge
of Scientific Literature
Service (SLS), PCARRD

Thurs	19 Jan 1989	1200 hrs	Lunch with Dr. Stuart, Mrs Sison and Mrs Bayabos
	(cont'd)		
		1400 hrs	Visit PCARRD Library and discussion Mrs Bayabos
		1500 hrs	Visit MIS Division with Mrs Bayabos and meeting with Mrs Cynthia Mamon, Director, MIS Division
		1630 hrs	Meeting with Ms Flordeliz Tiamson, Crops Research Division
		1700 hrs	Return to Guesthouse
Fri	20 Jan 1989	0500 hrs	Depart for Central Luzon State University, Munoz, Nueva Ecija Province with Dr. Stuart and Mrs Bayabos
		0900 hrs	Arrive at Central Luzon State University. Visit Regional Applied Communication Office (RACO) at CLSU and meeting with Dr. Rosita Roce, RACO Co-ordinator Visit Central Luzon State University Library
		1230 hrs	Lunch and rest
		1515 hrs	Depart for Manila
		2000 hrs	Arrive at Manila, dinner with Dr Stuart and Mrs Bayabos
		2200 hrs	Arrive at Los Banos
Sat	21 Jan 1989		Free
Sun	22 Jan 1989		Free
Mon	23 Jan 1989	0900 hrs	Discussion with Mrs Josephine Sison at AIBA
		1115 hrs	Courtesy call on Dr Gomes, Director, AIBA with Mrs Sison

Mon	23 Jan 1989 (cont'd)	1200 hrs	Return to Guesthouse for lunch
		1400 hrs	Visit International Rice Research Institute Library and meeting with Mrs Milagros Zamora, Asst. Librarian
		1500 hrs	Visit University of the Philippines Los Banos Library and meeting with Miss Lenore Gregorio, University Librarian
		1900 hrs	Dinner at Mrs Sison's, with Dr Stuart and Miss Gregorio
Tues	24 Jan 1989	1030 hrs	Farewell call on Mrs Sison, AIBA
		1100 hrs	Depart from Los Banos for Manila Airport
		1530 hrs	Depart for Singapore on SQ81
		1835 hrs	Arrive at Singapore Airport
		2030 hrs	Depart for Jakarta on SQ210

IV INDONESIA

Tues	24 Jan 1989	2300 hrs	Arrive at Jakarta Airport
Wed	25 Jan 1989	0830 hrs	Leave for National Library for Agricultural Science, Bogor
		1000 hrs	Meeting with Dr Prabowo Director, NLAS, Mrs Liannie K. Daywin, Reference Librarian, and other staff, NLAS
		1200 hrs	Lunch with Mrs Liannie
		1330 hrs	Visit NLAS with Mrs Liannie
		1500 hrs	Return to Jakarta
Thurs	26 Jan 1989	0815 hrs	Leave for Bogor

Thurs	26 Jan 1989	0930 hrs	Meeting with Dr Lufti Nasution, Head, Agricultural Research & Development Centre, Bogor Agricultural University and Mrs Liannie
	(cont'd)		
		1100 hrs	Visit BIOTROP Clearing House, Bogor and meeting with Mrs Soetitah S. Soedoyo, Head
		1300 hrs	Lunch with Mrs Liannie
		1400 hrs	Return to Jakarta
			Afternoon free
		1830 hrs	Dinner at Miss Luwarsih's
Fri	27 Jan 1989	0800 hrs	Meeting with Mrs Paransih Isbagyo, Secretary, Agency of Agricultural Research and Development Dept of Agriculture, Jakarta and Mrs Liannie
		1000 hrs	Visit National Archives
		1100 hrs	Visit National Library
		1230 hrs	Lunch with Director, National Library and Dra Soemartini, Director National Archives
			Afternoon free
Sat	28 Jan 1989	0800 hrs	Depart for Jakarta Airport
		1030 hrs	Depart for Singapore on SQ203
		1300 hrs	Arrive at Singapore Changi Airport

V SINGAPORE

Wed	1 Feb 1989	1100 hrs	Meeting with Mrs Peggy Hochstadt, Chief Librarian, National University of Singapore Library and Head, National CARIS Centre, Singapore, and Mrs Seow Nyuk Yin, Coordinator, LOIS & CARIS
-----	------------	----------	--

Wed	1 Feb 1989 (cont'd)	1230 hrs	Lunch with Mrs Hochstadt
Tues	14 Feb 1989	1430 hrs to 1530 hrs	Meeting with Prof. Lam Toong Jin, Head, Dept of Zoology, Faculty of Science, National University of Singapore
Thurs	16 Feb 1989	1530 hrs to 1645 hrs	Meeting with Dr Robert Lee Yuen Tong, Head, Fisheries Division, Primary Production Department, Ministry of National Development
Sat	18 Feb 1989	1000 hrs to 1100 hrs	Meeting with Dr Tan Wee Kiat, Director, Botanic Gardens Division, Ministry of National Development
Mon	20 Feb 1989	0930 hrs to 1000 hrs	Meeting with Prof. Gloria Lim, Head, Botany Depart- ment, Faculty of Science, National University of Singapore
Thurs	23 Feb 1989	1000 hrs to 1130 hrs	Meeting with Dr Lee Song Kheun, Head, Agriculture Division, Agriculture Re- search Section, Sembawang Field Experimental Station, Primary Production Depart- ment, Ministry of National Development

Publications and Documents Received

MALAYSIA

Institut Penyelidikan dan Kemajuan Pertanian Malaysia (MARDI). Laporan tahunan (Annual report.) 1983, 1984, 1985, 1986. Serdang, Selangor: MARDI, 1983-86.
+ also received in English

MARDI in brief. Serdang, Selangor: MARDI, nd. 8p.

Maklumat dan Pembangunan Seiring Jalan. Serdang, Selangor: MARDI, nd. 12p.

Buletin Maklumat Pertanian Malaysia. Jil 8, bil. 2 & 3, Jun/Sep 1988.

Penerbitan Universiti Pertanian Malaysia 1989. 2p.

Regional Information Centre on the Management and Utilization of Waste: MUWIC. nd. leaflet.

PORIM 10th anniversary 1979-1989. Bangi: PORIM, 1989. Diary.

PALMSEARCH: PORIM Library Online Search Services. Bangi: PORIM, 1988. 6p.

THAILAND

Kasetsart University. Concise information 1988. Bangkok: Kasetsart University, 1988. 33p.

Kasetsart University Research and Development Institute (KURDI) Thailand. Bangkok: Kasetsart University, nd. leaflet.

Kasetsart University Library. nd. 2p. mimeo.

Kasetsart University. Organization chart. nd. mimeo.

Kasetsart University in brief 1988. card.

The Kasetsart Journal: Natural Sciences. vol.22, no.3, Jul/Sep 1988.

The Kasetsart Journal: Social Sciences. vol.9, no.1, Jan/June 1988.

Piboonsin Watanapongse. The Thai National CARIS Center.
1989? 3p. mimeo.

Country Report: Thailand. Presented at 4th Technical
Consultation of CARIS Participating Centers, Rome, 5-8
Oct 1987. 2p. mimeo.

Country Report: Thailand. Presented at 7th AIBA Consulta-
tive Committee Meeting of National AGRIS Centers,
University of Agriculture, Serdang, Malaysia, 6-10 Oct
1986. 3p. mimeo.

Kasetsart University. Map showing 10 yield field stations.
nd.

Thailand Institute of Scientific and Technological Research
(TISTR). Bangkok: Ministry of Science, Technology and
Energy, 1984. leaflet.

Thailand Institute of Scientific and Technological Research.
Bangkok: Ministry of Science, Technology and Energy, nd.
16p.

Thailand Institute of Scientific and Technological Research.
Organization chart. nd.

Research News 1986-1987. Bangkok: Thailand Institute of
Scientific and Technological Research, 1988?

PHILIPPINES (including RC)

PCARRD: what it is, what it has done. Los Banos, Laguna:
PCARRD, Department of Science and Technology, 1987. 28p.
(Information Bulletin Series, no.15)

ACD (the Applied Communication Division of the PCARR
Secretariat) Los Banos: Philippine Council for Agri-
culture and Resources Research), nd. 16p.

SLS (the Scientific Literature Service). Los Banos:
Philippine Council for Agricultural and Resources
Research, nd. 8p.

The RACD of CLARRDEC. nd. 4p. mimeo.

CLARC Highlights. vol.2, nos.1-3. Oct.1988.

Research and Development Program. Munoz, Nuevaz Ecinja,
Phils.: Central Luzon State University, nd. 12p.

"Ngayon" Program BIDANI. Nuno, Nueva Ecija, Phils.: Central Luzon State University, nd. 16p.
(BIDANI = Barangay Integrated Development Approach for Nutrition Improvement. The RACO Coordinator of CLARRDEC is also the Coordinator for BIDANI.)

Applied Communication Program Targets of the RACO, CLARRDEC, Region III, for 1989. 4p. mimeo.

Gregorio, Lerner B. and Josephine C. Sison. Agricultural information transfer in developing countries. Paper presented at the Regional Conference of the International Association of Agricultural Librarians and Documentalists, Universiti Pertanian Malaysia, Selangor, Malaysia, 21-24 Nov 1988. 141. mimeo.

Kennedy-Olsen, J. Strategic issues in agricultural information. Key paper presented at the Regional Conference of the International Association of Agricultural Librarians and Documentalists, Universiti Pertanian Malaysia, Selangor, Malaysia, 21-24 Nov 1988. 13p. mimeo.

Current Agricultural Research Information System. Rome: Food and Agriculture Organization of the United Nations, nd. leaflet.

CARIS introduction: Current Agricultural Research Information System. Rome: Food and Agriculture Organization of the United Nations, 1985. 28p.

Agricultural Information Bank for Asia. College, Laguna: SEAMED Regional Center for Graduate Study and Research in Agriculture, nd. 8p.

CARIS-Asia: Current Agricultural Research Information System-Asia. College, Laguna: Agricultural Information Bank for Asia, Southeast Asian Regional Center for Graduate Study and Research in Agriculture, nd. leaflet.

INDONESIA

This is the Agency for Agricultural Research and Development (AARD). Bogor: Department of Agriculture, Republic of Indonesia, nd. 48p.

5 years of agricultural research (1981-1986): its contribution to agricultural development in Indonesia. Bogor: Agency for Agricultural Research and Development, Ministry of Agriculture, 1987? 115p.

Gema Penelitian: Wadah pertukaran informasi penelitian-IPB. vi, no.1, Sep 1988, vi, no.2, Dec 1988. Bogor: Lembaga Penelitian-IPB, 1988.

SEAMEO BIOTROP: Southeast Asian Regional Center for Tropical Biology. Bogor, Indonesia: SEAMEO BIOTROP, 1986. 16p.

SEAMEO-BIOTROP Publications 1988. leaflet.

Weedwatcher. 8 & 9, 1988. Bogor: Southeast Asian Weed Information Center, 1988. leaflet.

SINGAPORE

Country Report Singapore: Presented at 7th AIBA Consultative Committee Meeting, Serdang, 6-10 Oct, 1986. 2p. mimeo.

Primary Production Department. Annual report 1987. Photocopy from Singapore Yearbook 1987. Chap.8: Maximising primary production. p.39-43.

National University of Singapore. Department of Zoology. leaflet.

National University of Singapore. Department of Zoology. Zoological Reference Collection. Singapore: Department of Zoology, National University of Singapore, 1988. leaflet.

SME Newsletter/Productivity Digest. Jan.1989: Special feature on Agrotech. Singapore: Small & Medium Enterprise Division, Economic Development Board, 1989. 12p.

*National University of Singapore. Directory of current research, 1988-89. Singapore: National University of Singapore, 1988.

*National University of Singapore. Publications & theses 1987. Singapore: National University of Singapore, 1988.

*Science Council of Singapore. Annual report 1987/88. Singapore: Science Council of Singapore, 1988.

*referred to