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

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

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

ISNAR is supported by a number of the members of CGIAR, an informal group of approximately 43 donors, including countries, development banks, international organizations, and foundations.

1989 Annual Report

May 1990

International Service for National Agricultural Research

Contents

Items in separate shaded boxes....

Foreword

The ISNAR Board of Trustees and management take pleasure in presenting ISNAR's Annual Report for 1989.

The year 1989 saw many important changes:

* Alexander von der Osten, Director General since 1985 and Executive Officer at the time of ISNAR's founding, became Executive Secretary of the CGIAR in May;

* The Board of Trustees selected a new Director General, Christian Bonte-Friedheim, to take up responsibilities beginning January 1990;

* Howard Elliott, Deputy Director General in charge of Research and Training, became Acting Director General until the end of the year;

* ISNAR moved to its new home, which offers improved facilities for training and space to accommodate new staff.

These changes did not lead to an interruption of ISNAR's work with NARS nor to a decline in its productivity. ISNAR's clear strategy for strengthening NARS continues to guide the efforts of a dedicated staff, support and professional staff alike.

As outlined to CGIAR donors at International Centers Week in October, ISNAR's three programs of advisory service, research, and training are successfully integrated at the NARS level. Our services aim at immediate impact, our research aims at improving the service we provide, and training extends our work to a wider audience.

In 1989, our advisory service activities broke new ground in planning and assistance with structural adjustment, while we continued to review systems. Our support in human resource management took on new depth in Africa and Latin America. (Senegal, for example, moved several steps closer to developing its integrated approach to managing human resources; Uruguay and Ecuador are on similar tracks.)

We saw publication this year of several major research studies, representing the harvest of many years of investment. We make mention in particular of the ISNAR Agricultural Research Indicator Series, a global data base on national agricultural research systems which was published by the Cambridge University Press for ISNAR. The book is likely to become a benchmark for future data collection efforts. It will serve our partners in developing countries, research policymakers in the donor community, and researchers worldwide in analyzing national agricultural research systems. We also saw a flow of publications from the On-Farm, Client-Oriented Research study and publication of the book, *Making the Link*, coming out of the study of Research - Technology Transfer Linkages.

Training activities in 1989 continued to be an integral part of support to NARS and a vehicle for collaboration with other orga-

nizations. The SACCAR-ISNAR Regional Agricultural Research Management Training program was externally evaluated and found to be meeting the needs of our partners. Joint workshops with ISNAR-IICA-FAO, and a host-country NARS continue to express our complementarity with others. And at ISNAR headquarters, two major international workshops provided an international exchange of knowledge. Our International Agricultural Research Management workshop was a true consultation with our partners on the relevance, rigor, and usefulness of our work to them. Our workshop on Making the Link provided an opportunity to exchange knowledge on a detailed theme across regions and to disseminate the findings of our OFCOF and RTTL projects.

As in previous years, the Board of Trustees was closely involved in all aspects of ISNAR's work. At its meeting in December, in San José, Costa Rica, the Board saw first-hand some of ISNAR's field activities and cooperation with a partner organization.

The Board confirmed for itself that ISNAR had continued to build the staff and equipment needed to carry out the mandate given to it. However, towards the end of 1989, it became clear that both its human resources and the financial means from core resources will be insufficient in the future to meet the increasing number of requests for assistance which come in increasingly specialized areas.

We will be forced to limit our responses to requests for reviews and advisory service; our ability to develop new management tools and to disseminate them through organized training will be below that expressed in our medium-term plan. However, the strategy and medium-term plan continue to give clear guidance to our activities.

ISNAR's 1989 annual report is a true reflection of an institution with a clear strategy and highly professional staff dedicated to working in partnership with national agricultural research systems. We can only share in their successes.

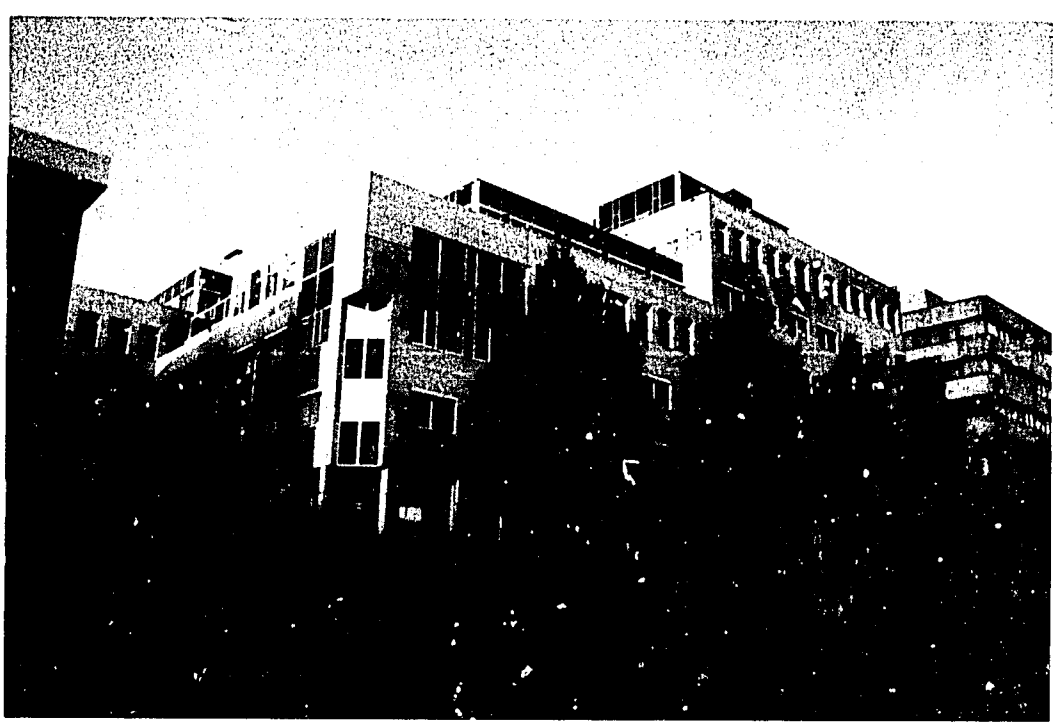
Henri Carsalade
Chairperson, Board of Trustees

Howard Elliott
Acting Director General

Christian Bonte-Friedheim
Director General (from 1 January 1990)

The Board of Trustees in Costa Rica. *(Facing page)*
From the left: D. Merrill-Sands (secretary), Th. Wessels, H. Elliott, H. Carsalade, H. Rakotovao, Sadikin S.W., J. Dillon, C. Lopez-Sanbidet, K. Hemmi, J. Thomas, E. Porceddu. (Not present: G. Camus, H. Mwandemere).

ISNAR occupied its new premises in The Hague in August 1989.



ISNAR Board of Trustees — 1989

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Indonesia

Joab Thomas
University of Alabama
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Th. J. Wessels
Ministry of Foreign Affairs
The Netherlands

** Joined the Board in 1989
* Completed service in 1989

Acknowledging Long and Dedicated Service

Alexander von der Osten

Alexander von der Osten left the post of ISNAR Director General at the end of the Board of Trustees' annual meeting in mid-May 1989. However, he remains within the broader community of international centers, serving as Executive Secretary of the Consultative Group on International Agricultural Research.

When von der Osten left last year, his direct involvement with ISNAR had spanned a time longer than ISNAR's life as an institution. He was part of the planning of ISNAR as an institution, part of its actual creation, and later its chief executive for more than 3½ years.

In 1978, the CGIAR approved in principle an international body to work to strengthen management in national agricultural research systems. It appointed Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) to execute plans to establish what became ISNAR. Von der Osten, then on the staff of GTZ, led the work that followed.

As executive officer of the new ISNAR, von der Osten and two others made up the founding party that arrived in The Hague in September 1980. He left ISNAR in 1983, going to Rome to head the Secretariat of TAC (the CGIAR's Technical Advisory Committee). He came back to ISNAR late in 1985.

Von der Osten summarized his associations in a message in the *ISNAR Newsletter* of July 1989. He said, in part:

Looking back, . . . I ask myself what we have achieved, . . . what remains to be done?

We responded to needs . . . we worked with well over 40 NARS in all four of the world's developing regions. We addressed their problems, and jointly we made impact. NARS are gaining in strength.

Today we see ISNAR as a healthy institution with a strong and focused program, a highly competent staff, and close working relationships with NARS and many other institutions. It has gained itself a firm place in the international research-and-development scene. Its mandate has gained in weight; its support by donors has consistently increased; its delivery capacity has grown; demand for its services has expanded even faster.

Chairman Henri Carsalade, speaking for the Board of Trustees, thanked von der Osten for his strategic vision, hard work, and great friendship. "The clear direction that von der Osten brought," he said, "will continue to influence ISNAR well into the future."

Trustees in Costa Rica

ISNAR's Board of Trustees traveled to Costa Rica in December for its expanded program committee meeting. In addition to a business agenda, the group got a first-hand view of ISNAR's impact on a national agricultural research system. ISNAR's first review, in 1981, was in Costa Rica. In 1986, it was invited back — then to review the NARS in association with IICA (Inter-American Institute for Cooperation on Agriculture).

In meetings with various agencies and in less formal sessions (such as lunch with the Agriculture Minister), the trustees heard about the impact of ISNAR's work in Costa Rica. The minister, NARS staff, university faculty, members of the National Commission on Research and Transfer of Technology, and some farmers told of benefits. They cited improvements from sharpening priorities in research (from 88 commodity programs in 1986 to 20 in 1989), establishing a national policy and coordinating group, regionalizing operations of research stations, and from ISNAR's direct help in training and advisory support to managers on a range of critical management factors.

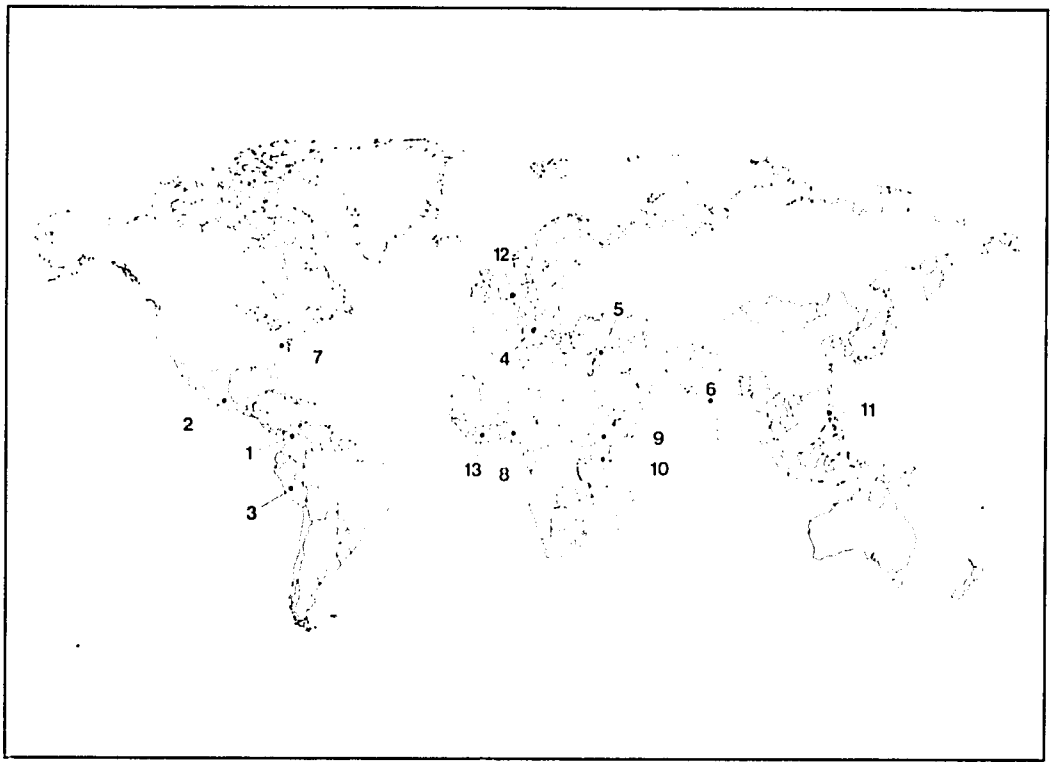
Eight national research programs are represented on the Los Diamantes station, including food crops, cash crops, and livestock. The station director told ISNAR trustees of "very positive changes from restructuring of stations," resulting from collaboration with ISNAR. Simpler administrative procedures and its own budget let the station give better support to researchers and research programs in the region, he said. A director's advisory committee helps orient the station to needs of the region's agriculture sector. (Decentralization was one of the recommendations from the reviews by ISNAR and IICA; at the NARS's request, an ISNAR consultant worked directly with station managers on a mission in 1989.)

Trustees took special interest in a visit to a plantation specializing in *palmito*, the heart-of-palm food delicacy. At this stop, they learned how the formation of *integrated national programs* had fostered private- and public-sector cooperation. In this case, research leadership rested with the University of Costa Rica, strongly linked to the Ministry and the private sector. In another visit, trustees talked with a small-holder farmer who grows macadamia nuts; he told them services he gets from the research system have improved notably in the last few years.

CGIAR-Supported International Agricultural Research Centers

1.	CIAT	Centro Internacional de Agricultura Tropical, Cali, Colombia
2.	CIMMYT	Centro Internacional de Mejoramiento de Maíz y Trigo, El Batan, Mexico
3.	CIP	Centro Internacional de la Papa, Lima, Peru
4.	IBPGR	International Board for Plant Genetic Resources, Rome, Italy
5.	ICARDA	International Center for Agricultural Research in the Dry Areas, Aleppo, Syria
6.	ICRISAT	International Crops Research Institute for the Semi-Arid Tropics, Andhra Pradesh, India
7.	IFPRI	International Food Policy Research Institute, Washington, DC, U.S.A.
8.	IITA	International Institute of Tropical Agriculture, Ibadan, Nigeria
9.	ILCA	International Livestock Centre for Africa, Addis Ababa, Ethiopia
10.	ILRAD	International Laboratory for Research on Animal Diseases, Nairobi, Kenya
11.	IRRI	International Rice Research Institute, Los Baños, Philippines
12.	ISNAR	International Service for National Agricultural Research, The Hague, The Netherlands
13.	WARDA	West Africa Rice Development Association, Bouaké, Côte d'Ivoire
	CGIAR	Consultative Group on International Agricultural Research

Locations of the International Agricultural Research Centers supported by the CGIAR.



ISNAR Staff 1989

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Howard Elliott, Acting Director General (June-December), Deputy Director General, Research and Training

H.K. Jain, Deputy Director General, Collaboration with NARS

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Peter Ballantyne, Librarian

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Pablo Eyzaguirre, Research Officer

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Dely Gapasin,** Senior Research Fellow

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Ghazi Hariri, Senior Research Officer

Huntington Hobbs IV, Senior Research Officer

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Gregory Krapp, Planning and Development Coordinator

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Robert Raab,** Research Associate

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Han Roseboom, Research Associate

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Robert Witters, Senior Research Officer, Research Management (based in Bangladesh)

Dennis Wood, Senior Research Officer, Research Management (based in [illegible])

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Susan van der Wee-Noden,* Senior Secretary

Anna Wuyts, Research Assistant

** Joined during 1989
* Left during 1989

ISNAR staff 1989

Donors

Core Funding

Australia (Australian International Development Assistance Bureau)

Belgium (Belgian Administration for Development Cooperation)

Canada (Canadian International Development Agency)

People's Republic of China

European Economic Community

Federal Republic of Germany (Bundesministerium für Wirtschaftliche Zusammenarbeit)

France (Ministère de la Recherche et de l'Industrie)

International Bank for Reconstruction and Development (The World Bank)

Government of Italy

Japan (Ministry of Foreign Affairs)

Netherlands (Directorate General for International Cooperation)

Philippines (Ministry of Agriculture)

Spain (Instituto Nacional de Investigaciones Agrarias)

Sweden (Swedish Agency for Research Cooperation with Developing Countries)

Switzerland (Department für auswärtige Angelegenheiten)

United Kingdom (Overseas Development Administration)

United States (Agency for International Development)

Funding of Special Projects

Asian Development Bank

Bundesministerium für Wirtschaftliche Zusammenarbeit (Federal Republic of Germany)

Cameroon/IBRD

Canadian International Development Agency

Deutsche Gesellschaft für Technische Zusammenarbeit

Food and Agriculture Organization

International Development Agency

Overseas Development Administration (United Kingdom)

International Bank for Reconstruction and Development (World Bank)

Malagasy Democratic Republic/IDA

Niger/IDA

Rockefeller Foundation

Rwanda/IDA

United Nations Development Programme

United States Agency for International Development

Organizations or programs referred to by acronym

AARD	Agency for Agricultural Research and Development — Indonesia
AARINENA	Association of Agricultural Research Institutions in the Near East and North Africa
ACIAR	Australian Centre for International Agricultural Research
ACSAD	Arab Center for the Studies of Arid Zones and Dry Lands
ADB	Asian Development Bank
AFESD	Arab Fund for Economic and Social Development
AGIR	Projet d'Amélioration de la Gestion dans les Instituts de Recherche — Sahel
AOAD	Arab Organization for Agricultural Development
ARC	Agricultural Research Corporation — Sudan
ARD.	Agricultural Research Division — Lesotho
ARETP	Agricultural Research, Extension, and Training Project — Sudan
BARC	Bangladesh Agricultural Research Council
BMZ	Bundesministerium für Wirtschaftliche Zusammenarbeit — Federal Republic of Germany
CATIE	Centro Agronomico Tropical de Investigación y Ensañanza — Central America
CIAT	Centro de Investigación Agrícola Tropical de Santa Cruz — Bolivia
CIDA	Canadian International Development Agency
CIFAP	Center for International Food and Agricultural Policy — University of Minnesota, U.S.A.
CIRAD	Centre de Coopération Internationale en Recherche Agronomique pour le Développement — France
CSIR	Council for Scientific and Industrial Research — Ghana
DEPA	Departamento de Pesquisa Agricola — Guinea-Bissau
DR&SS	Department of Research and Specialist Services — Zimbabwe
EEC	European Economic Community
FAO	Food and Agriculture Organization of the United Nations
GGDP	Ghana Grains Development Project
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit
IAR	Institute of Agricultural Research — Ethiopia
IBTA	Instituto Boliviano de Tecnologia Agropecuaria — Bolivia
ICA	Instituto Colombiano Agropecuario — Colombia
ICRAF	International Council for Research in Agroforestry
IFAD	International Fund for Agricultural Development
IICA	Inter-American Institute for Cooperation on Agriculture
INERA	Institut d'Etudes et de Recherches Agricoles — Burkina Faso
INERA	Institut National pour l'Etude et la Recherche Agronomiques au Zaïre
INIA	Instituto Nacional de Investigaciones Agropecuarias — Uruguay
INIA	Instituto Nacional de Investigaciones Agropecuarias — Chile
INIAP	Instituto Nacional de Investigación Agropecuaria — Ecuador

INIFAP	Instituto Nacional de Investigaciones Forestales y Agropecuarias — Mexico
INRA	Institut National de la Recherche Agronomique — Morocco
INRAN	Institut National de Recherches Agronomiques du Niger
IRA	Institut de la Recherche Agronomique — Cameroon
IRAG	Institut de Recherche Agronomique de Guinée
IRZ	Institut de Recherches Zootechniques — Cameroon
ISABU	Institut des Sciences Agronomiques du Burundi
ISAR	Institut des Sciences Agronomiques du Rwanda
ISRA	Institut Sénégalais de Recherches Agricoles
KARI	Kenya Agricultural Research Institute
LAC	Lesotho Agricultural College
LAPIS	Lesotho Agricultural Production and Institutional Support project
MIAC	Mid-American International Agricultural Consortium
NAARM	National Academy of Agricultural Research Management — India
NORAD	Norwegian Ministry of Development Cooperation
NUL	National University of Lesotho
OECD	Organisation for Economic Co-operation and Development
ODA	Overseas Development Administration (United Kingdom)
ORSTOM	Institut Français de Recherche Scientifique pour le Développement
PCCARD	Philippine Council for Agriculture, Forestry and Natural Resources Research and Development
SACCAR	Southern African Centre for Cooperation in Agricultural Research
SADCC	Southern African Development Coordination Conference
SARMAC	Strengthening Agricultural Research Management in Arab Countries
SPAAR	Special Program for African Agricultural Research
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
VORADEP	Volta Region Agricultural Development Project — Ghana

General terms sometimes referred to by acronym

AgGDP	Agricultural Gross Domestic Product
ARIS	Agricultural Researcher Information System
ATMS	Agricultural Technology Management System
GDP	Gross Domestic Product
IARM	International Agricultural Research Management Workshop
MIS	Management Information System
NARS	National Agricultural Research System

Building a Base for Working Together

In ISNAR we put nearly half of our resources into working with those who make decisions for and in national agricultural research systems (NARS). We try to build relationships with national decisionmakers so we can work with them as they deal with their own needs.

For our advisory service to be effective, we must know our partners. This means knowing each country's policy environment, its structure and organization, and how it deals with critical factors of research management.

We usually start this relationship with a diagnostic review. The review gives us both basic knowledge of the country's system and personal acquaintance with key persons within it.

Getting to Know Five More Systems

We began an advisory-service working relationship with five NARS in 1989. Approaches varied with the different countries.

Two followed the typical ISNAR review format: one in Bolivia, the other in Ghana. Our typical approach involves a team led by an ISNAR staff member with other staff and consultants chosen for special knowledge of the country and system. Usually working with staff of the NARS, the team prepares a report and presents it to the government for approval before publication.

A third collaboration in 1989 followed the model of a team review, but was applied to a small-country system. Two ISNAR staff spent two weeks in Lesotho. The terms of reference related to the integration of agricultural research and education.

Researchers in another small-country system — Guinea-Bissau — examined their own research units and developed a national plan. We supported them in this work, at their request, with a one-week ISNAR-led workshop on strategic planning.

An exercise using the agricultural technology management system (ATMS) methodology began in Iraq in mid-1989. In Iraq, ISNAR trained a national team to use the approach and continues to support them with specific aid as they carry out the process. The team leader spent time at ISNAR studying the diagnostic tools of ATMS.

These five bring to 39 the number of developing-country NARS we have come to know well in our nine years as collaborators on national agricultural research management.

Bolivia: A National System with Two Institutes

Nature gave Bolivia three main agroecologies. Over half of the agricultural base is in tropical lowlands, one-fourth highlands or altiplano, and the remainder is in mountains and valleys. Separate institutes serve the lowlands and the altiplano.

The Government of Bolivia asked ISNAR to review its NARS and recommend ways to strengthen it. They were interested in both research and the transfer of agricultural technology. Terms of reference embraced structure, functioning, and management of the NARS. Terms focused on adjustments, including decentraliza-

Cochabamba, Bolivia.
Two members of the ISNAR Bolivia review mission discuss research findings with a station manager.

tion, that could strengthen public-sector activities.

ISNAR responded with a review mission. The team included two staff and two consultants well-versed in ISNAR approaches; one had been a regionally based ISNAR staff member, and one was an experienced Latin American agriculturist who had often worked with ISNAR.

The team began its work in Bolivia on 18 May 1989 and left on 8 June. In a concentrated effort that combined the review and report in the field, the team's draft was in the hands of the government by 23 June, approved by the government on 24 July, and published by ISNAR as the final report in September.

Key recommendations were being implemented before the final review document was published. Some, based on interactions with the team, had been launched even before the members left the country.

Two Agricultures, Two Research Systems

Bolivia has formed two research institutes that deal with its different agricultures, the research center for tropical agriculture, CIAT (Centro de Investigacion Agricola Tropical de Santa Cruz) and IBTA (Instituto Boliviano de Tecnologia Agropecuaria). Both have links to the Ministerio de Asuntos Campesinos y Agropecuarios (MACA).

CIAT serves agriculture of the lowlands of the north and east, which include the area with the best production potential. IBTA relates to agriculture in the valleys (500 to 3000 m altitude) and the altiplano, where altitudes go above 3000 m.

The two institutes have fared differently over the years in financing, continuity of leadership, and support from producers. CIAT has been relatively well-supported in these respects; the effectiveness of IBTA has been adversely affected by limitations and deficiencies in these same factors.

Analysis of CIAT

The review team found that CIAT has retained qualified professional staff who have generated new technologies for its region, most notably within the Department of Santa Cruz. However, the sheer diversity and complexity of the wider agroecology it serves now put heavy pressures on CIAT's resources.

A relatively small organization (44 professional staff in 1988), CIAT had concentrated decision-making in the hands of a few persons. Yet it must respond to the needs of different zones and of farmers with different situations, especially small farmers. The team recommended that CIAT take steps to broaden its decision-making structure, delegating program responsibilities to middle-level managers in commodities and zones.

Reviewers suggested ways to strengthen CIAT:

- organize work into five programs: four by commodities (rice and maize, soybeans and wheat, animal production, and tree crops) and one zonal program related to operations for the regional research centers;
- restructure the Technical Council;
- form an Executive Council;

- strengthen management in areas of setting priorities, planning, and monitoring and evaluation;
- strengthen the search for new sources of funding;
- set up a unit for commercial management.

The reviewers saw CIAT as successful, but they did not propose it as a model for other departments. Each department or region needs a model that fits its resources and administrative autonomy, they concluded.

Building Strength for Other Areas: The Case of IBTA

IBTA faced a host of difficult problems, the team found. The nation has, until recently, put low priority on agricultural development in the regions IBTA serves. Clearly, farmers in the regions need support from research: they deal with widely diverse and difficult situations, often in fragile economic and ecological settings.

The review team found severe organizational constraints in IBTA. Its support has varied over time. It has lost qualified staff, and the programming system has deteriorated. For various reasons, extension services have been unable to deal fully with the needs of farmers and the rural population.

The ISNAR review team proposed major changes in both strategy and structure.

The government decree that created IBTA in 1975 gave it autonomy. The reviewers think it should keep its autonomy in the new design. But changes would be needed — all intended to meet criteria for improving the system's performance. These would include creating or providing:

- a central unit to propose policies to decisionmakers, identify priorities, guide national programs, and supervise operations;
- regional service units, with broad decision capacity, to relate to the diverse conditions of Bolivian agriculture, including most technology development (regional councils would play a key role here);
- national programs to link institutions and projects in support of national policies and priorities;
- "technological linkage" units to coordinate the transfer of technology among many institutions, including corporations, universities, and nongovernment organizations.

Both national and regional financial resources would be used. In the proposal, the national budget would cover needs of the central unit, national programs, and basic functions of the regional services. Over time, local contributors would pick up greater shares of support for the regional activities. These contributors might include development corporations, producer organizations, and others.

Suggested Projects for Action

The review team noted ways in which international cooperators could help bring about changes proposed for the system for research and transfer of technology.

They suggested four specific projects for funding and technical assistance:

1. to develop and strengthen the central unit of the national system;

2. to strengthen national programs;

3. to set up the technological linkage units;

4. to support regional services in the national system for research and transfer of agricultural technology.

Immediate Responses

Changes had begun before 1989 had ended, especially within CIAT, where a reasonably strong base for research management existed. Most recommendations to CIAT had been put in place by the end of 1989. One follow-up visit had helped leaders make smooth the process of implementation. A newly formed level of middle management was assuming roles competently and with dedication.

To strengthen research for the highlands and valleys calls for more initiatives. By the end of the year, however, ideas from the ISNAR review were forming the backbone for a major donor project to help transform and upgrade IBTA. Before the end of the year, new leadership in the ministry and in IBTA had asked ISNAR to help revise its legal documents and for assistance in human resource development.

Ghana: Restoring Research Capacity

In the early years of its independence, the Ghanaian development policy gave a leading role to agricultural research. Policy emphasis changed in the mid-1970s and continued well into the eighties, with agricultural research suffering from lack of resources. Most programs declined in research capacity, and many strong staff went off to international jobs.

Plans laid in 1988 called for a review of agricultural research as part of the Agricultural Services Rehabilitation Project (with funding support from the World Bank). A joint national and ISNAR team carried out the review in 1989. The local members were named by the Council for Scientific and Industrial Research (CSIR). Following a joint planning session, the team gathered much of the review data in January-April. It covered more than 300 researchers in 57 units and stations.

Two staff and four consultants made up the ISNAR part of the review team. They joined the local group in mid-April for site visits and to work with the local team on data it had obtained.

Known as the Gold Coast before it became independent in 1960, Ghana leads most of its West African neighbors in education and literacy. However, only a tenth of its 92,000 square miles is suitable for agriculture to feed a population growing at rates over 3% per year.

Long a leading producer of cocoa, Ghana gets up to three-fourths of its export revenue from the crop. Research contributed to peak cocoa yields and output that came nearly two decades ago, in the 1960s to early 1970s. They were then twice the 1948-50 average. By the early 1980s, affected by such factors as marketing problems, world prices, and diseases, production had dropped well below the high years.

Major food crops include cereals (mainly maize, rice, and sorghum), roots (cassava and yam), and bananas and plantains. Mid-1980s yields of most crops, according to FAO reports, were generally at or below those of 30 years earlier. Meat and milk output, on the other hand, had increased notably.

Three Types of Research Bodies

Three main types of institutions carry out agricultural research in Ghana: national research institutes (most under CSIR); the universities; and research units under other ministries and quasi-government organizations.

The reviewers traced three main themes in their analysis. One dealt with how the research program was determined. Another focused on management of the means (personnel, facilities, finances) to carry out research. The third looked at linkages, especially how the research system passes findings on to those who can use them.

Determining the Research Program

The review team focused on the planning and review processes through which researchers build their programs. Planning covers three levels: national (setting policy and priorities by commodities), institute (ranking constraints on production of main crops), and station (choosing studies to reduce constraints).

The team looked at how research proposals were reviewed at the same three levels: station (for quality and relevance of the work); institute (for fit with guidelines and resources); and national (for fit with priorities, budget, and national goals).

The team concluded that the **review process** was satisfactory. Individual proposals were brought together and reviewed at the institute level (then on to CSIR for those institutes under it), then sent to the Ministry of Finance and Economic Planning.

Research planning was not defined as well. No national body guided agricultural policy or advised on commodity program priorities. Agriculture ministry departments that use results had little influence on research planning in CSIR institutes. (Steps had been started recently to meet this need. The team endorsed the idea of an apex body to form national agricultural research policy. Members suggested some revisions in the terms of reference already set out for that body.)

The Means of Doing Research

Personnel and their time make up the key means of doing research. Nearly half the 150 person-years of professional research time was found in CSIR units. The cocoa and forest products institutes (outside CSIR) accounted for about 16% of the total, and university researchers for 15%. The remaining 22% was found in the min-

istries and quasi-government organizations.

Allocations of research time revealed the emphasis among major commodities or programs. Broad areas of work in 1988 had these shares of research time: cocoa, 11%; all other crops, 51%; livestock, 17%; food processing, 10%; forest products, 6%; fisheries, 4%; and general support, 2%.

Only a few individual commodities seemed to have been given enough staff for a critical mass to support applied research in addition to adaptive or testing research. Four commodities had five or more person-years of research input: cocoa, 16; maize, 11; oil palm, 6; and cowpea, 5. All the others shared the remaining 112 person-years; none of these could call on as much as three person-years of professional research time.

Operational funds (excluding researcher salaries) make up another vital factor. Most research institutions were found to be short on this funding. The team compared recurrent funding for 1986-87 with 1974, when agricultural research in Ghana was relatively well-funded.

Operational funding in the CSIR institutes in 1974 averaged US$20,500 per scientist (in 1987 US dollars). The average stood at US$10,000 by 1986-87, with wide variations among institutes. At the main crops research station (CRI), operational funding in 1986-87 was US$19,000 per scientist. In the same year, the low figures were US$2,000 in the food research institute and US$2,900 per scientist in the animal research institute (ARI). In 1974, the CRI and ARI had the same operational funding per scientist — then about US$25,000 each. (Only programs backed by projects from outside were funded reasonably well in 1986-87, the review team found.)

Review data showed the need for higher university research funding. (In addition to being able to do research, universities need better facilities to turn out well-trained recruits for the research system, reviewers noted.)

Many agricultural researchers do their work at **stations and trial sites**. Reviewers considered Ghana well-endowed with stations and sites. They found a few stations in good condition, but most needed rehabilitation.

Library and information services support research. Ghana's research library once ranked among the best in Africa. The last decade has seen serious deterioration.

The Linkages

The review team focused on the linkages between research and groups with extension functions. It found some instances of excellent linkages — as in the Ghana Grains Development Project (GGDP) and the Volta Region Agricultural Development Project (VORADEP). These could serve as guides for stronger collaboration between research and extension, the reviewers suggested. However, the team found cases where linkages with development agencies and other users needed improvement.

Recommendations

The joint Ghana-ISNAR team found the structure and organization of research to be appropriate. They suggested that the system could take steps to improve performance with little change in structure.

Areas for improvement included: procedures for determining the program; means of carrying out the research; and methods of getting results to the potential users.

Determining the research program

The team approved of the procedures now in place to review proposals that come from researchers. However, it proposed new actions to improve the process for planning research.

- Create a body with authority to set national agricultural research policy, based on national policies for science and technology and for agricultural development. The present CSIR Technical Committee for Agriculture, Forestry and Fisheries could be given new terms of reference to become that body, the team suggested. Membership should be revised to fit such new tasks.

- Establish national agricultural research policy that specifies: goals for agricultural research; allocation of resources; and guidelines for planning by units that get resources. The units would identify the main constraints to productivity that research should deal with.

- Involve development staff of ministries and universities in planning at national institute levels. They can help set guidelines for station-level team leaders and researchers. They can also play a role in first-level review of proposals for studies and experiments — preferably within a group that includes several disciplines.

- At the national level, coordinate commodity or factor research that goes beyond the bounds of a single institution. Large programs may need program coordinators (along the lines of the CGDP management committee).

- Produce a medium-term agricultural research plan based on policies and priorities laid down by the national body. It should include plans for recruiting and training staff and developing facilities in line with long-term plans.

Means of carrying out research

The reviewers' recommendations in this area included:

- Rehabilitate selected buildings, laboratories, and farms; repair or replace equipment.

- Bring operational funding back to the 1974 level (US$20,000 to US$25,000 per researcher in 1987 US$). (That level can be achieved with a budget still well below the figure of 1% of AGDP for research, as suggested by the World Bank.)

- Give individual research staff postgraduate training in research for fields needed in the national program.

- Set criteria for staff promotion that reflect national policy and the contribution of individual researchers in the system.

- Improve the scheme of service to offer incentives to hold strong research staff over long periods of service.

Communicating results

Research looks to the extension sector as the main vehicle for getting research results to users. The review team stressed this linkage in its recommendations.

- Links are needed at several levels of management. Linking procedures evident in GCDP and VORADEP could be models for other projects. All links need resources, which should be included in the budget.

- Reduce lags in the time it takes innovations to reach farmers; involve extension staff in final research station stages and with widespread testing before release.

- Study the full range of important linkages. Choose the most useful and assign priorities; funding cannot cover all linkages.

Other recommendations

Reviewers offered other recommendations:

- To help maintain a high level of collaboration, avoid sharp lines drawn between kinds of research and groups of researchers. Keep administrative and territorial claims to the minimum.

- Think through the uses of each of the substations maintained by institutes, universities, and ministry departments. Treat them as national sites for trials by all institutions (at their expense), maintained for the benefit of all by one most-convenient institution.

- Rehabilitate university faculties of agriculture (including their libraries, facilities, and equipment) so the well-qualified staff can provide high-quality postgraduate training for the research services.

Lesotho: A Small-Country Review

Lesotho is a small and mountainous country surrounded by the Republic of South Africa. Agriculture remains a key to its economic and social development.

Agriculture there faces three major problems: soil erosion, rainfall, and only one growing season in the year. Agriculture's share in Lesotho's gross domestic product (GDP) has dropped (from 38% to 20% between 1978 and 1984) due to unusual circumstances. At any one time, half of the male labor force works for wages in the mines of South Africa. This means, despite high rural unemployment, that there are temporary labor shortages on farms. Investment in agriculture brings a low rate of return.

Livestock accounts for one-third to one-half of the agricultural product. Crops account for less than one-fourth. Basotho farmers grow five major crops: maize, wheat, sorghum, beans, and peas. Their maize and wheat production meets less than half of the national demand. The third-ranking cereal, sorghum, nearly meets its demand. Production levels are

low for all five crops. Five-year figures show cereals to average between 500 and 600 kg/ha, while beans and peas fall below 400 kg/ha.

The small and fragile agricultural land base of Lesotho includes four agricultural environments. Most of the 450,000 ha of cultivated area lies in the lowlands (between 1500 and 1800 m elevation). This area has the most potential for intensive production. The 1.8 million ha of grazing land fall in three zones. Some grazing lands (in foothills and lower mountain levels) occur on fragile soils suited mainly to livestock, with some crops farming carried out carefully. Lands above 2500 m provide grazing by goats and sheep but are not suitable for cropping.

Lesotho's farming sector urgently needs to improve productivity while conserving the delicate natural resource base. Leaders at the highest political levels understand this need; government strategy calls for more intensive production in agriculture.

New and improved technologies are needed. The research system must select, screen, and adapt technology for producers. Lesotho's small agricultural research system, however, has not been able to fully play its key role.

The ISNAR Mission

The Ministry of Agriculture, Cooperatives and Marketing of Lesotho asked ISNAR to review its agricultural research system. (Its Agricultural Research Division [ARD] carries out most of the current agricultural research in Lesotho.) The U.S. Agency for International Development (USAID), with major agriculture projects in the country since 1979, joined the ministry's request for the review.

Terms of reference asked the team to determine a viable size and scope for a sustainable research system within the Lesotho context. A second request asked reviewers to consider whether and how to integrate agricultural research and education (involving college and university faculty as well).

Two ISNAR staff led the mission. Four persons from the ministry and a USAID staff member contributed to the review and to proposals for strengthening the national system.

Findings

The review team found favorable conditions for developing and sustaining an effective NARS in Lesotho. National policy recognizes the role of agriculture in development. The ministry has set clear policy goals for the agricultural sector.

Both farmers and public and private development agencies in agriculture want new technologies. Investors are willing to put capital from non-agricultural sources into farming — this includes rural workers with earnings from mine labor.

Reviewers found that most agricultural research has been done in ARD, which had 17 researchers, all assigned to its main research station. Three branch stations were in operation, with a fourth in planning.

Some 50 development projects operate in Lesotho. Some include research activities. The Lesotho Agricultural Production and Institutional Support (LAPIS) project is

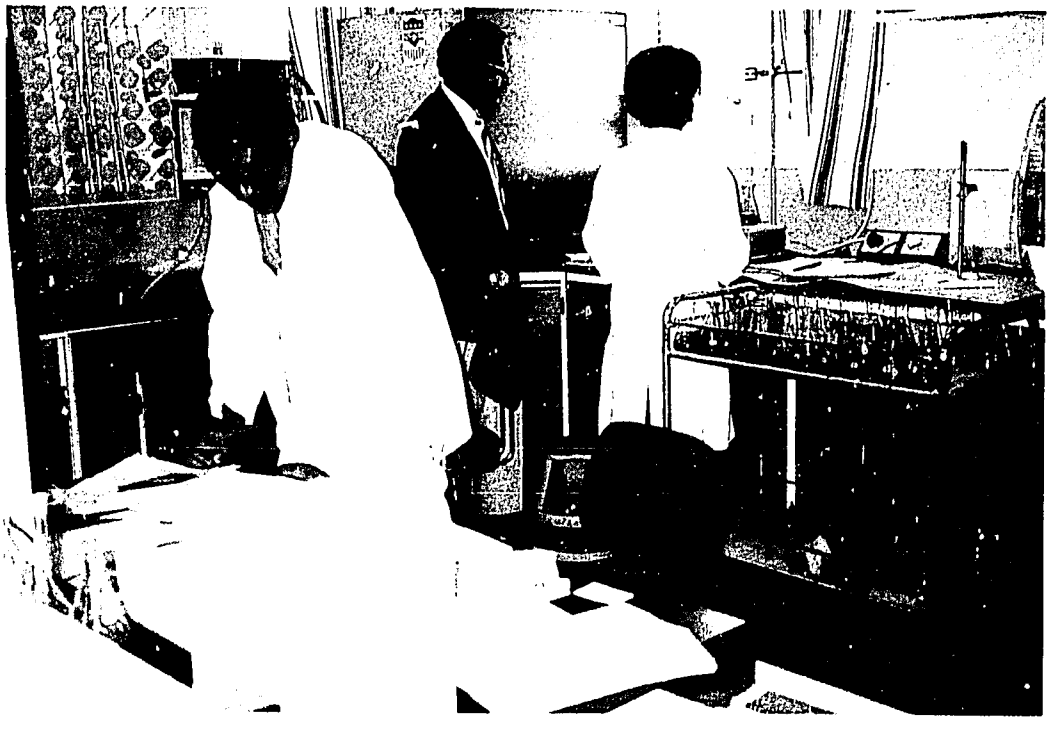
the largest. This USAID project includes help to develop ARD research stations.

The present system has some successes behind it. It has introduced improved technologies for such commodities as pinto beans, leafy vegetables, and cereals.

The review team found parts of the system to be in close touch with farmers. Farming-systems research emphasis, begun in 1979 and supported by a USAID project, helped achieve that. In many cases, however, independent programs have achieved neither critical mass to meet complex problems nor the means to set and pursue priorities.

The team found other parts of the system that did not function well. Researchers had little contact with policymakers, within the Ministry of Agriculture as well as with other government and development departments. The linkages to world sources of technology and knowledge were weak. Little interaction took place across disciplines. Commodity and production-system research lacked input from socioeconomic disciplines. Research programming procedures had only recently begun to bring together results from different sources.

Maseru, Lesotho.
At the main station of the agricultural research department, an ISNAR team member observes the state of the principal facilities.



Strengthening the System

Based on their own brief but intensive review, plus working with the local task force and others, the ISNAR reviewers proposed steps to strengthen the Lesotho NARS

They believe the NARS goal must be to screen and test technologies from other places for use in the Lesotho situation. However, it may not be possible to borrow technologies for natural resource management and conservation farming. Work in the medium term should focus on these needs.

Reorganize research programs

Reviewers expressed the need for ARD to reorganize its programs and its process of planning research. They suggested regrouping elements to form five research programs; leading candidates were (1) cereals, (2) food legumes, (3) fruits and vegetables, (4) livestock, and (5) natural resource management.

These core programs could concentrate ARD and LAPIS resources for the short and medium term on fewer but high-priority goals. Within a program, several disciplines could get behind a clearly defined research effort to seek specific results.

A sixth research program was suggested — if resources become available. It would deal with crop diversification. The program group would look for new high-value crops to boost farmers' incomes. It would consider crops outside the core programs, although core-program researchers might work on selections to test and adapt them. Reviewers suggested a formal process to formulate programs for more impact. The process would assure at least three benefits for each program: clear objectives; the listing of research inputs and critical mass of resources needed; and a time target for the results.

Get closer to clients

ARD researchers serve policymakers on one hand, doing research to help advance development goals. On the other hand, their research serves needs for technologies that benefit the farmers. They need to be closer to groups on both the upstream and downstream sides of their work.

Reviewers proposed a research program advisory committee as one formal way to help meet this need. The committee could include heads of development divisions of the Ministry, district agricultural officers, and farmers. The committee could draw others from the National Development Corporation, the National University of Lesotho, and the Lesotho Agricultural College.

Develop human resources

ARD began in 1979, staffed by holders of the certificate or diploma from the agricultural college. Further training began right away. By 1989 the 17-person research staff included persons with these degrees: 1 Ph.D., 7 M.Sc., and 9 B.Sc. Fourteen others were then in training, 6 for B.Sc., 4 for M.Sc., and 4 for Ph.D.

ARD needs well-qualified researchers. Their work stresses ability to find, select, and adapt technology from other sources. In addition to research ability, the researcher needs to know what is going on in world agriculture and to know well the

conditions in Lesotho. Reviewers said this calls for a higher level of training, exposure, and experience than now present in Lesotho.

The small number of researchers means problems in critical mass (the resources needed to have impact in a specific program). Careful assessment of core-program requirements becomes the basis for decisions about numbers of persons to train in certain research specialties. Reviewers believe that by 1993, with some 31 trained professionals then in post, ARD will be able to serve each suggested program with an average of five to six researchers. This number approaches the critical mass thought to be sustainable in the system over the long run.

Research support staff make up part of critical mass as well. The reviewers found the present ratio too low: now three technical officers for each five researchers (0.6:1). They urged that the ratio be brought to 1:1 within three years. For the longer-run target, they suggested one-and-a-half technical support staff for each researcher.

Incentives and rewards affect motivation and tenure throughout a system. The reviewers considered as urgent the need for ARD to get a scheme of service with a clear career structure. They suggested a framework that related research scientists to university faculty, with similar grades and salary levels.

Research and education

Several proposals in Lesotho have dealt with the idea of linking agricultural research and education. ARD, the Lesotho Agricultural College (LAC), and the National University of Lesotho (NUL) come up in discussions.

The ISNAR team reviewed various proposals and talked with many people in Lesotho. They endorsed the principle of linking agricultural research and education. They cautioned, however, that to link them should not weaken the specialized research and education capabilities ARD and LAC have now.

The team looked at four possible options for bringing agricultural research and education together.

- Create a National Institute of Agricultural Research and Education under the national university. This would bring ARD and LAC into one unit funded jointly by the ministries of agriculture and education.

- Strengthen ARD and, in parallel, develop a Faculty of Agriculture within LAC. Both would function independently but with strong linkages.

- Combine and upgrade both ARD and LAC to set up a university-level school or college of agriculture.

- Form a Faculty of Agriculture entirely within NUL, with two-way links to ARD and LAC.

Reviewers recommended the first option: a university-based institute. They suggested, however, that option number two could also serve Lesotho well, if carefully developed and managed. The choice, they added, should give a cost-effective arrangement in which both research and education serve agricultural development to the benefit of Lesotho.

Guinea-Bissau: A Workshop Approach

Agricultural research began in Guinea-Bissau as early as its independence in 1974. At least five international agricultural research centers of the Consultative Group on International Agricultural Research (CGIAR) have worked there in years that followed: WARDA, IITA, CIMMYT, ICARDA, and ICRISAT. From those collaborations and their own work, local researchers have introduced some improved cultivars.

No national system for agricultural research had emerged by 1988, however. The Departamento de Pesquisa Agricola (DEPA) has been the most active unit in agricultural research in the tiny West African country. However, research was only a part of the activities of DEPA, which is a unit within the Ministry of Rural Development.

Guinea-Bissau is one of the world's small countries, in both population (840,000 in the mid-1980s) and area. Its 2.8 million ha of land area include 280,000 ha of cropping land. Cereals occupy the largest share of land but don't produce enough to meet national needs. About 1.3 million ha of permanent pasture lands support herds of cattle, goats, pigs, and sheep — in that order by numbers.

Agriculture accounts for up to 70% of the gross domestic product. Eighty percent of the labor force works in agriculture.

Prospects for World Bank and United Nations Development Programme (UNDP) assistance to research brought two Guinea-Bissau leaders to ISNAR in 1988. They asked for help to make a national plan for agricultural research.

ISNAR sent one senior staff member for a short visit. In this consultation, he and local staff planned what could be called a review/planning process.

This was not a typical ISNAR review. Instead, it took the form of a one-week workshop (in February 1989) in which two ISNAR staff helped the Guinea-Bissau staff to review and plan for themselves.

Nineteen local staff had been involved with DEPA. They made up the roster of workshop participants. ISNAR staff suggested frameworks and approaches for them to carry out a diagnosis; local staff gathered the information. ISNAR staff asked questions; local staff did the thinking and deciding. They carried out the process of designing the research system and planning for their country's needs.

Later two Guinea-Bissau leaders brought their plan to ISNAR headquarters. They consulted widely with ISNAR staff on defining programs, setting up experiment stations, linking with other research centers, designing projects for donors, and more. They left with a document ready for discussion with their government at home. ISNAR will publish the approved report of the review/plan early in 1990.

Three Firsts for ISNAR

The work in Guinea-Bissau offered three firsts for ISNAR. One was a novel way to respond to the needs of a small-country system. Another was the first ISNAR activity in lusophone Africa. Third was preparation of ISNAR's first training materials produced in the Portuguese language.

Iraq Applies ATMS Methodology

Early in 1989, Iraq became the second ISNAR partner to choose the ATMS methodology to review its agricultural research system. ISNAR and the Arab Organization for Agricultural Development (AOAD) give support, continuing their work together. This advanced their joint work in the regional project Strengthening Agricultural Research Management in Arab Countries (SARMAC) begun two years earlier in Sudan. The sponsors expect two additional country studies to follow.

The ATMS approach calls on people within the country itself to gather specific

Contuboel, Guinea-Bissau.
ISNAR team members and national researchers plant a mango tree to commemorate the successful conclusion of the DEPA/ISNAR workshop.

NARS reviews: total to date - 43.

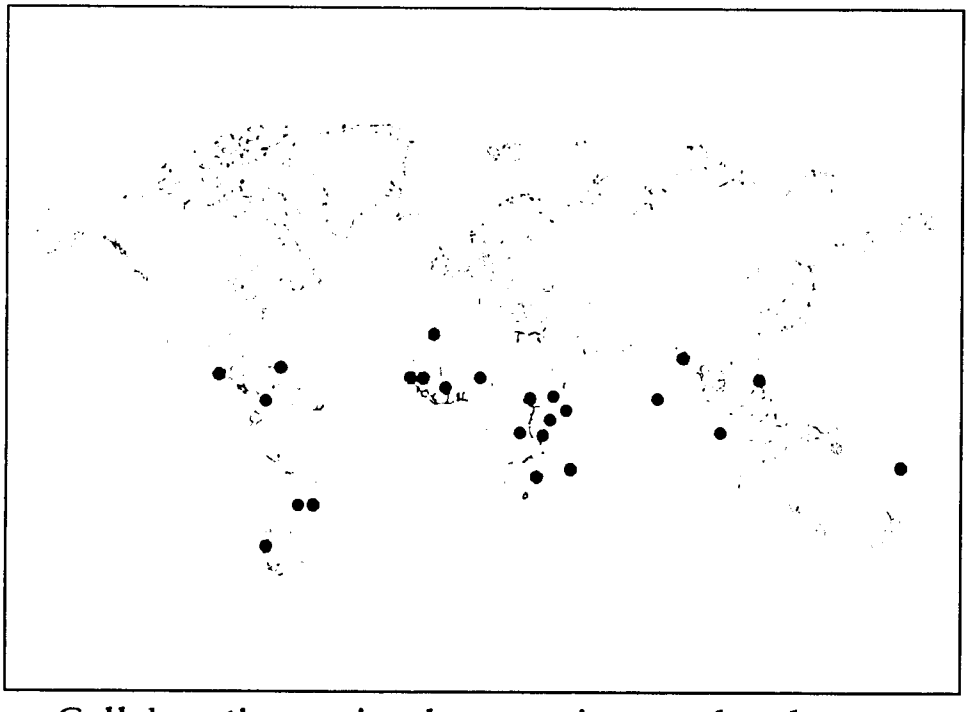
Key to colors

BLUE - reviews completed.

YELLOW - reviews followed by planning, or collaboration began with planning.

RED - ISNAR collaboration continued to implementation, or ISNAR was involved in implementation without previous collaboration.

Collaboration on research planning: total to date - 36



Collaboration on implementation: total to date - 25

information needed to appraise a system. ISNAR provides the backstopping. Local staff use diagnostic instruments developed by ISNAR and Rutgers University (U.S.A.).

An ISNAR staff member in May consulted with Iraqi leaders to identify the local study team. The same staff member also took the lead in the stage of preparing the study. This involved some changes to simplify the evolving methodology.

Training and Support

In early July, this ISNAR staff member was joined by the acting director general (who earlier helped develop the ATMS approach). They spent a week training the Iraqi team for the field study. The study team worked from then through the rest of the year to compile the data.

Analysis and discussion began in November and will carry on into 1990. ISNAR's advisory and problem-solving support continues.

ISNAR supported the work another way. The local study team leader took part in ISNAR's international workshop on ARIS (Agricultural Researcher Information System). Going on from his own learning in that November 1989 workshop, the leader asked ISNAR to train four Iraqi staff in the computer skills that make ARIS work. They will use ARIS (which was developed by an ISNAR staff member) to analyze the human resources facets of their agricultural technology system.

The 1990 agenda calls for the first draft of the study report. ISNAR will also take part in all remaining steps: presentation of the draft to the agriculture ministry, a national workshop for final discussion and conclusions (which leads to the final report), and then publication as proceedings of the workshop. And we expect an advisory-service relationship to continue with the Iraqi NARS.

The United Nations Development Programme (UNDP) joins in funding some phases of the project.

The Focus of ISNAR's Program

Critical Factors in Strengthening NARS

In Agricultural Research Policy

- Creating and maintaining positive interactions between agricultural research and national development policy.
- Formulating effective agricultural research policies: setting priorities, allocating resources, and developing long-range plans.

In Research Structure and Organization

- Building an effective NARS structure and organization.
- Developing linkages between the NARS and policymakers.
- Creating linkages between NARS, the technology transfer system, and users of technology.
- Developing and using linkages between the NARS and outside sources of knowledge.

In Agricultural Research Management

- Formulating programs and program budgeting.
- Monitoring and evaluating research programs.
- Managing information.
- Developing and managing human resources.
- Developing and utilizing physical resources.
- Acquiring and managing financial resources.

Supporting NARS on Plans and Action

In most cases, ISNAR's work with a NARS follows a pattern. The sequence is D-P-I: diagnosis, planning, implementation.

From the review that **diagnoses** *problems and ways to strengthen a system, the model moves on to help NARS managers* **plan** *how to bring about changes to strengthen their system.* **Implementation** *means putting plans into action.*

Responsibilities shift as the sequence proceeds. ISNAR may take lead responsibility for the review, but increasingly does them jointly with NARS teams. Planning must involve the NARS to ensure commitment to the plan.

Managers and staff in the NARS have always played active roles as we work with them in stages of planning and implementation. We are finding to an increasing extent that they should play key parts as well in helping diagnose problems and opportunities in the systems. They not only help us; the review becomes **theirs.** *Often that hastens the process from diagnosis into planning and action.*

We seldom find real life to be as neat and orderly as this sequence implies, however. Typically we work on the problems and at the stages that our partners consider most important. As our working relationships develop with more countries, we find requests increasing for work with them to implement changes in certain parts of their system.

In 1989 we counted 93 separate cases in which we worked with countries on activities relating to the 12 critical factors in building a NARS (set out on p. 19). Six cases dealt with reviews or negotiations for reviews. Thirty-two involved planning, and in 55 cases (almost 60%), we helped our partners to implement activities.

NARS managers ask us for two types of planning support. One deals with plans to build and strengthen the research system itself. The other focuses on plans that will guide the function of their system.

National Agricultural Research Plans

ISNAR continues to build on experiences in helping country leaders prepare national agricultural research plans. We know that **planning** has different meanings in different countries. Some planners cover the breadth and depth of their national system. Some look at narrower horizons — just part of their system. Others may examine broadly but not in depth.

We have worked with NARS on planning in many situations and at many levels. Kenya, Madagascar, Niger, Burkina Faso, Tunisia, and Fiji serve as examples of benefits from research planning. All of these countries use their plans to coordinate efforts and to gain support within their own government and with external donors.

Some persons criticize the project approach donors often follow. They say it distorts national research priorities and does little to build lasting capacity in national institutions. Countries with a strategic plan for their research system seem better able to get positive benefits from the project approach. They use the plan to negotiate with their own government and with donors.

We worked in 1989 with a number of NARS as they prepared national agricultural research plans. Some specific cases from Africa follow.

Tanzania

The research system in Tanzania has been radically reorganized under a project funded by the World Bank and a number of other donors. Parastatal organizations were dissolved, and their research services were returned to the Ministry of Agriculture and Livestock Development. Tanzanian NARS leaders asked ISNAR to help them prepare a national master plan for agricultural research. We are providing planning expertise and identifying and bringing in some key consultants for this exercise.

A group of donors, working together under the Special Program for African Agricultural Research (SPAAR), has put up funds for the planning exercise (US$1.5 million over 15 months). Most of the funds will go to support planning activities by the Tanzanian NARS. We helped prepare a framework to guide the planning process, and we have outposted an ISNAR staff member in Dar es Salaam as external coordinator to work with a local coordinator.

A national workshop there — under the SACCAR-ISNAR regional project — was keyed to training Tanzanian staff on their tasks in doing the national plan. (SACCAR is the Southern African Centre for Cooperation in Agricultural Research.)

Mali

NARS leaders in Mali have approved the main observations in the report of the 1988 review of their research system. We continued in the meantime to work together in 1989 on development of a long-term plan. We helped train the members of five different sectoral groups, interacted with the local team and groups, and made contacts with donors and local authorities.

Progress on planning takes place at the pace at which governments, donors, and NARS leaders reach crucial agreements. This process takes time. By year's end in Mali, it was on track and steps were clear for arriving at a plan.

Zaïre

A national study team in Zaïre invited ISNAR to assist in their research system review in 1984. The team was composed of experts drawn from Government departments and key institutions with a stake in research. Its constitution by the Executive Committee gave it inter-departmental legitimacy. As a result, proposals for a reform of the Institut National pour l'Etude et la Recherche Agronomiques au Zaïre (INERA) gained the commitment of those charged with implementing the reform. Since the review, ISNAR has as-

The acting director general of ISNAR and the Tanzanian commissioner of research and training signed an agreement in December to develop a master agricultural research plan for Tanzania.

sisted the study team in monitoring progress on the reform.

In 1989, emphasis went to a plan for research in the long term. Given our continuing collaboration with INERA, we were asked to help in recruiting a research planning and management advisor, who was seconded to INERA by the French agency CIRAD (Centre de International Coopération pour la Recherche Agronomique pour le Développement) under UNDP funding. As part of the UNDP support, we cooperate with the research planning adviser to counsel the director general of INERA on long-term planning and institutional coordination issues — including the reorganization of INERA. We also advise INERA's programming unit on programming by objective and program budgeting. We will take part early in 1990 in the national seminar concerning the national plan.

Madagascar

Our 1989 collaborative work with Madagascar extends the context of the system review of 1982. By 1989, the work had included both long-term and medium-term research plans. An agricultural research project followed, funded by the World Bank. The NARS took the lead in 1989 to set up a body to coordinate donor support of their research. ISNAR took part, by invitation, with the steering committee for agricultural research funding. Participants included the European Economic Community (EEC), UNDP, International Fund for Agricultural Development (IFAD), SPAAR, France, Germany, and USAID.

Rwanda

The Institut des Sciences Agronomiques du Rwanda (ISAR), working with ISNAR, completed a provisional national master plan for agricultural research. Among other things, the plan set national research priorities based on a weighted-objective scoring method recommended by ISNAR. One strength of the approach is that local persons make the decisions.

Rwandans will next debate and frame the final plan in a national conference with broad participation. Some donors are already using the draft document to plan their future aid.

Support for System-Building Activities

Our collaboration with countries after a review (and sometimes without a review) may take many forms. Not all NARS commit themselves to preparing a formal national research plan. They often ask us to help with parts of the system-building process. Most of the work fits under the 12 critical factors of research management identified in the ISNAR strategy.

In many cases, a NARS needs to be stronger before it goes into a national planning exercise. This means help in areas of policy, organization, or management. We worked in 30 different countries during the year, helping on one or more of these factors in each country.

Anglophone Africa

Botswana

An exploratory mission led to terms of reference for a review-and-planning exercise with the small research service of Botswana. It will be carried out early next year with support from USAID and the Norwegian agricultural development agency, NORAD.

Ethiopia

We participated, by request of the NARS, in a World Bank team that reviewed Ethiopia's agricultural research project at mid-term. The team noted that the board of the Institute of Agricultural Research (IAR) had been given more strength for making policy. The board (which had been proposed in our report) can now provide policy guidance for a strategic plan and a long-term agricultural research plan. IAR's process for multidisciplinary review of research proposals was already operating.

We gave specific help on agricultural research management through a national workshop held last year. We also helped on managing physical resources. Two ISNAR staff reviewed the system's needs for compu[illegible]etting out main options for this [illegible]ament. (The publication, *Computer Acquisition and Deployment* [ISNAR R39], reports criteria and suggested hardware and software configurations to serve computer needs of such a system.)

The Gambia

We worked with The Gambia's National Agricultural Research Board (NARB) and the USAID-funded GARD (The Gambia Agricultural Research and Development) project as they developed national research policy and guidelines for the whole system. NARB was created a year earlier, along lines proposed by our system review mission.

We helped the board this year in the area of priorities for the main commodities and research areas. Two ISNAR staff members helped The Gambians apply a weighted-objective approach. This approach helps in deciding the importance of such factors as value of production, expected yield increases or cost reductions from research, probability of research success, expected adoption by farmers, and future demand for the commodity.

Groundnut rated highest among commodities weighted. This crop accounts for 70% of the country's export earnings, but it has in the past received few research resources. The analysis helped the NARB consider trade-offs among key commodities and research areas as bases for allocating resources.

Kenya

The Kenya Agricultural Research Institute (KARI) and ISNAR agreed this year on a five-year program of training in research management. With backing from donors and funding by the EEC, we will organize training of managers to support and strengthen the implementation of national agricultural research plans.

We worked with Kenyans this year on how to translate the needs of a region's

producers into research programs. They had accepted the principle of shifting from discipline-oriented research to doing problem-oriented research, but faced problems in making the change. ISNAR staff worked with them at both national-program and regional-center levels. We encouraged them to create mechanisms to get inputs to research programs from farmers and extension workers.

Somalia

Leaders in Somalia asked us to help them get ready to update their research plan. They have applied a number of recommendations made in the ISNAR system review in 1983. Among other subjects, we have discussed their interest in a semiautonomous agricultural research corporation. They are also considering ways to involve the university's trained faculty with the rest of the research system. Efforts to strengthen the university and broaden its agricultural options have also been in our talks.

Uganda

We have been working with the Government of Uganda and the World Bank over the last two years. The goal is a strategy for rehabilitating and strengthening the NARS. The government and ISNAR signed a contract this year that defines our relationship. We will work closely with a resident research adviser in Kampala in 1990 to start preparation of a national agricultural research plan. Ugandans want to be sure that the research-extension linkage works, either through joining them in a combined unit or with close links among the four ministries.

Zimbabwe

Problems in funding and staffing of its Department of Research and Specialized Services (DR&SS) in 1989 limited Zimbabwe's ability to undertake initiatives recommended in their plan. DR&SS lost 16 professional staff, including two assistant directors. The recommendation to set up national coordinated programs needed to be reexamined. A workshop planned for 1989 was postponed to early in 1990.

Our staff collaborated this year on how to strengthen research at regional stations. They focused on a station in one of the natural regions. That station serves a communal area where resource-poor farmers face a difficult environment. Our work involved helping Zimbabweans study the area and identify technologies that farmers need.

Francophone Africa

Burkina Faso

A French management expert from ORSTOM (the Institut Francais de Recherche Scientifique pour le Développement), funded by the French Government, took up a post in Burkina Faso to advise leaders in the Institut National pour l'Etude et la Recherche Agronomiques (INERA). This step fitted into the line of our associations with the country. (An outposted ISNAR staff member, from 1984-87, had helped set up the national agricultural research system.)

At the request of INERA and in cooperation with France, we now give technical backstopping to the present adviser. We collaborate in areas identified by the se-

nior research managers. These include help with programming and budgeting and management of programs and resources.

Burundi

Burundi's Institut des Sciences Agronomiques du Burundi (ISABU), began this year to carry out recommendations developed jointly with us and brought out in the 1988 ISNAR review report.

The newly appointed director general of ISABU came to The Hague early in 1989 to work with ISNAR staff. They designed a mechanism for planning and programming in ISABU, guided by Burundi's development objectives. His successor came to ISNAR a few months later to define further actions.

A presidential decree was signed to reorganize the institute in line with review recommendations. Other steps have been taken to implement recommendations: a scientific commission reviews annual programs; program committees have been set up, with membership from the development sector; and new legal arrangements with bilateral agencies increase ISABU's management responsibility.

"Ateliers de recherche" have been implemented with groups of farmers in different provinces. These are designed to make the system more responsive to farmers' needs and to improve the transfer of technologies.

Cameroon

In the wake of Cameroon's financial crisis, the government formed a special commission with the mandate to review parastatal organizations — with an intent to closing, privatizing, or rehabilitating them. The commission asked ISNAR to help the Institut de la Recherche Agronomique (IRA) and the Institut de Recherches Zootechniques (IRZ) in the reorganization exercises.

ISNAR agreed to help the two institutes by providing a methodology the Cameroon staff used for planning their own restructuring. Their plans were approved in December. As asked by the commission, we have also helped the two institutes prepare their action plans and performance contracts with the government. The new plans should help to bring new life to the system at a time of financial hardship.

Also in 1989, we gave training in benefit-cost ratio methodology for assessing major research programs. Both IRA and IRZ are trying this approach, which should help them to relate their commodity research to goals and targets and potential economic and social impact.

We continued our collaboration with an outposted ISNAR research management adviser. He was on scene to interact at all times with the NARS managers according to their immediate needs and interests.

Guinea Conakry

The final report of ISNAR's 1988 review of the research system in Guinea Conakry was accepted and published in 1989. A process of consensus building was involved. Some senior managers in Guinea Conakry did not agree fully with some of our original findings. We had found, for example, that to rehabilitate the system would call for much greater support than

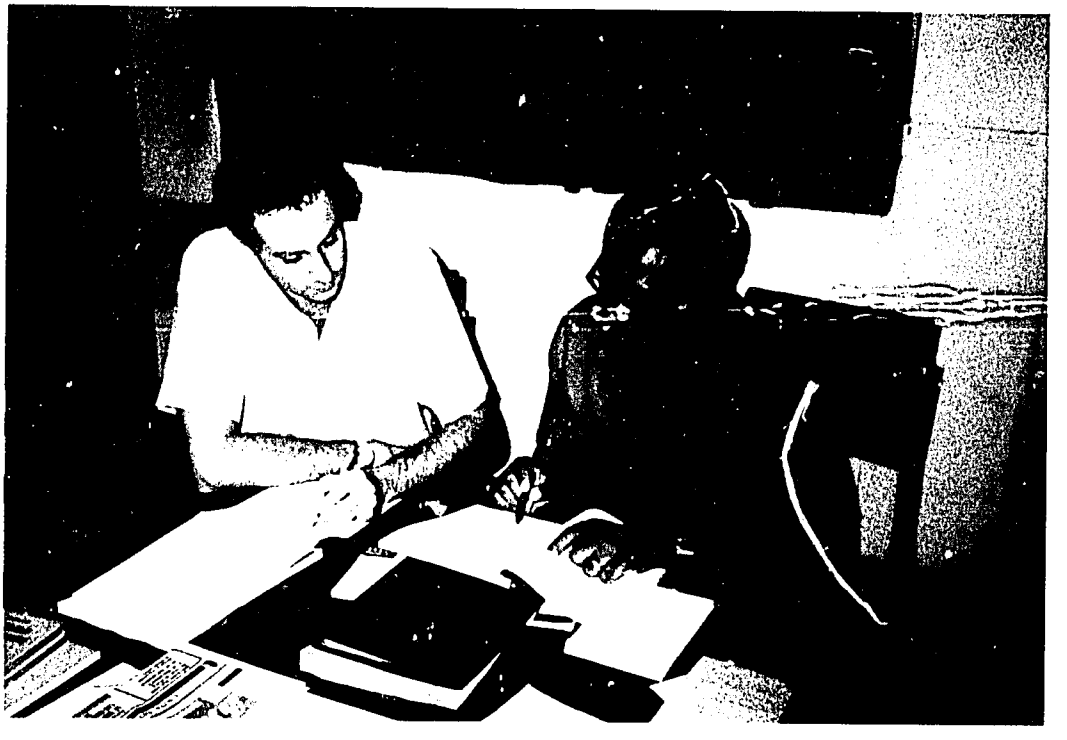
envisaged by the managers. These differences were resolved through discussion, and the final review report was accepted. It offered guidelines for the organization and management of the national research institute.

We presented the main findings in a workshop with 41 leaders of the national research institutes and 9 participants from agricultural development programs. A constituency has now been built up for carrying out many of the recommendations.

Niger

During 1989, ISNAR helped prepare a medium-term (five years) research plan — at the request of the director of Institut National de Recherches en Agronomiques du Niger (INRAN). This took us a step beyond the long-term plan, which had focused on the development of scientific manpower in the next 10 to 15 years. Also we provided technical support to the INRAN director in relation to his negotiations with the World Bank.

An ISNAR staff member (left) reviewing a draft publication with a Burundian collaborator.



Senegal

Our work with Senegal this year continued to focus on human resource management. We have helped a working group there gather and analyze data and then use them in the design of a career development system for Institut Sénégalais de Recherches Agricoles (ISRA). A key input was our joint study and recommendations on salary. The proposals now cover career paths, job descriptions, performance evaluations, and promotion guidelines.

Senegalese leaders came to ISNAR headquarters twice during the year to work with us on human resource questions and on computerizing their data base system.

Fiscal austerity and structural adjustments tend to limit the range of steps available on such matters as level and structure of salaries. Human resources problems cannot be solved in isolation from questions of size, scope, and priorities of the whole system.

West Asia and North Africa

Morocco

Morocco continued to advance its work to apply computers to research management and budgeting. We have aided the work in various ways since the system review in 1984. Largely on Moroccan initiative, and with our support, the system now links activities at the program, project, and experiment levels. It incorporates a budget module based on unit costs at the level of research activities. Also, a human-resource module links scientists and technical support staff time to research activities.

In 1989 we took part in a workshop that trained staff from regional stations to use the system in their current crop cycle. The Mid-American International Agricultural Consortium (MIAC), which works on a USAID project there, was a co-sponsor. The workshop helped gain wider acceptance of the system.

Also last year, two ISNAR staff reviewed computer equipment and software needs. Our publication PRISe, *Acquisition of Microcomputers*, reports their suggestions for several configurations of hardware and software.

Sudan

An ISNAR team introduced computerized program budgeting for research activities in the Agricultural Research Corporation (ARC) of Sudan. This carried forward collaboration under the Agricultural Research, Extension, and Training Program (ARETP). Our team trained task forces for six of the stations to use the method. A future workshop will give ARC managers, national coordinators, and station directors the knowledge they need to use the system.

Syria

We joined a UNDP mission to help Syrians develop an agricultural research strategy as part of follow-up to a review in 1988. We offered a workshop on the planning process, and the Minister of Agriculture and Agrarian Reform appointed working groups to prepare a strategic research plan. This builds a base for expected UNDP support to strengthen the research system in Syria.

Asia and Pacific

Bangladesh

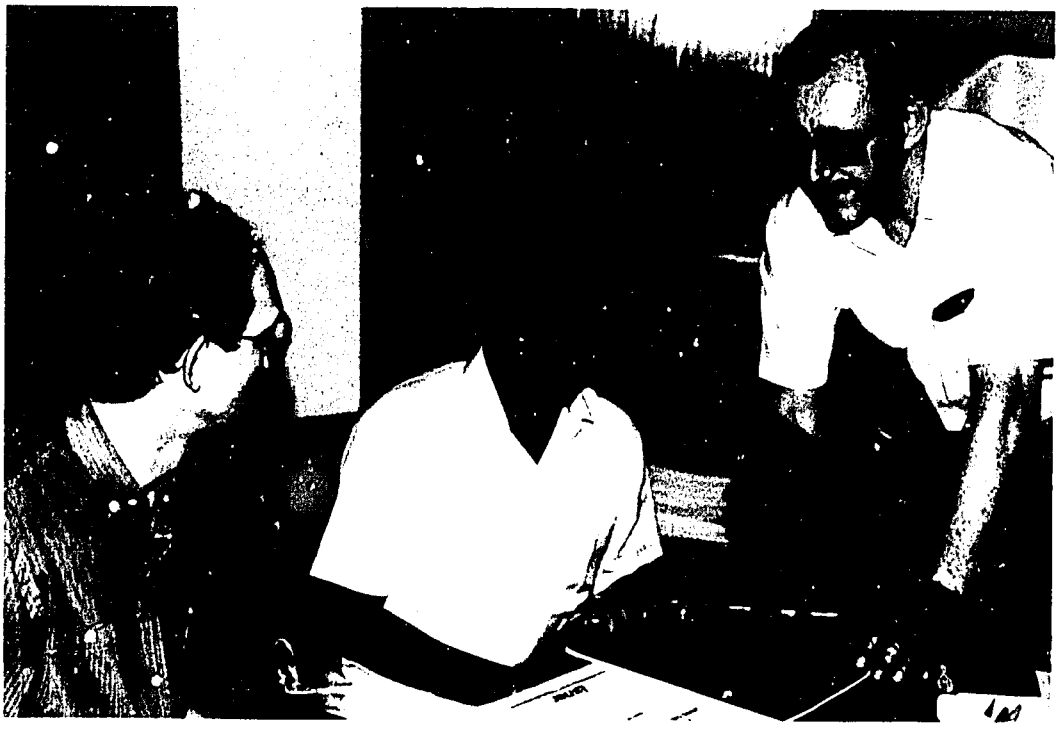
An ISNAR staff member took up his post early in 1989 as a resident senior research adviser in Bangladesh. Supported by USAID, this project aims to help strengthen the Bangladesh Agricultural Research Council (BARC). BARC is unique among the research councils in the larger Asian countries: it has no administrative control over research institutes and stations, but has major responsibility for planning, coordinating, and monitoring research.

The year brought the start of work to determine national research priorities. We are aiding with methodology and with the process itself. BARC units will set priorities for commodities and other research areas at both the national level and the station level.

BARC will also review two of its major institutes: the Bangladesh Agricultural Research Institute and the Bangladesh Rice Research Institute. We have offered a methodology that NARS leaders can use to carry out periodic reviews of their research programs and stations. An ISNAR team will conduct a review in 1990.

We are also helping create a management information system that BARC can use to

ISNAR's senior research officer (right) outposted to Bangladesh discusses useful ISNAR publications with a Bangladeshi official and another ISNAR staff member.



plan for human resources. We will work with BARC to set up a program-budgeting system. A management-information-system workshop in Dhaka last year was a first step in this direction.

Indonesia

The Indonesian Agency for Agricultural Research and Development (AARD), with which we have worked since the review in 1981, has grown into one of the largest research organizations in developing countries. In recent years, including 1989, we have focused on helping to develop a management information system (MIS) for the large and complex agency. USAID provides major support for this work. The MIS will provide information on human resources, research programs and projects, physical facilities, and finances. Indonesians are developing the system, aided by an outposted ISNAR staff member.

Sri Lanka

We had two main activities with Sri Lanka in 1989. One related to developing procedures for the new Council for Agricultural Research Policy (CARP). CARP will coordinate agricultural research carried out in different ministries. A long-term ISNAR consultant, resident in Sri Lanka, this year helped CARP work out modes of operation for institute program reviews, for contract research, and to facilitate the work of CARP's program committee.

In the other major activity, two ISNAR staff introduced MIS methodology to the local staffs and helped them analyze the material. Most research institutes produced MIS reports, with over 440 research staff from 18 institutes included by the end of 1989. The Council will find these data useful to know the current program and to plan and budget for next year. (A sidebar on p. 49 reports on this MIS special project.)

Latin America and Caribbean

Colombia

Our work with Colombia this year involved an adviser for a major monitoring exercise. The Instituto Colombiano Agropecuario (ICA), was called on to organize 10 subsector reviews of research programs. We helped on methodology for the reviews and technical support for the process. The reviewers were brought in from outside ICA; some were Colombian and many came from other countries.

Apart from meeting the requirements set down by the World Bank, the review brought another important outcome. Research managers have now established evaluation as a tool for managing, not as a policing activity to satisfy requirements of funding agencies.

The Colombian experience interested us for another reason. We want to encourage NARS to undertake periodic reviews of their own programs as a healthy practice, a normal part of their management.

Costa Rica

Costa Rica's new National Commission for Research and Transfer of Agricultural Technology became a reality in 1989. With members from 21 public- and private-sector organizations, the body was sworn in at ceremonies in February. It

met monthly to play its legally established role in overseeing and coordinating 20 integrated national research programs. This Commission fulfills a key recommendation of the ISNAR-IICA review of 1987. (IICA is the Inter-American Institute for Cooperation on Agriculture.)

ISNAR took part this year, by invitation, in meetings of the Commission. Our staff made keynote presentations in one follow-up workshop. These presentations triggered discussion groups on such management factors as research planning, programming, and monitoring and evaluation. Leaders continued to use these tools to sharpen the focus of work in the NARS. In 1987, the agriculture ministry worked with research in 88 commodities; the list was pared down to 33 in 1988, then reduced to 20 in 1989. More consolidation will occur another review recommendation.

ISNAR also contributed through a consultant mission on research station management.

Ecuador

Following our joint review with IICA in 1989, we worked with Ecuador this year on an action plan for the future. A change in national administrations caused some of the proposed changes to be put on hold. Two ISNAR staff were asked in near the end of 1989 to help in a planning exercise on administrative and management structure of INIAP, the Instituto Nacional de Investigación Agropecuaria.

NARS staff continued work on human resource management. We had earlier helped with a questionnaire to gather data on human resources. The extensive data and analysis were reported this year in Working Paper No. 25, *An Analysis of Human Resource Capabilities and Constraints in INIAP, Ecuador*. In addition, the Ecuadorian director of human resources spent more than six weeks at ISNAR headquarters to develop a system for human resource management.

Mexico

The year brought ISNAR's first formal contact with Mexico's Instituto Nacional Investigaciones Forestales et Agropecuarias (INIFAP). The product of a major reorganization of the research system in Mexico, INIFAP brings research in agriculture, livestock, fisheries and forestry under one organization. We were asked to help system leaders determine research priorities and help to design a system for program planning and budgeting. We took part in a planning workshop that INIFAP organized for this purpose.

Uruguay

Results of ISNAR's work in Uruguay became more visible in 1989. The Government of Uruguay approved the law creating a new semiautonomous Instituto Nacional de Investigaciones Agropecuarias (INIA). We had focused much work on this area in the years since the 1987 review. We continued work with Uruguayans on the organizational structure of the new institute, setting priorities, research policy, and planning and development of human resources.

ISNAR Research 1989

Strengthening the Knowledge Base on Policy, Organization, and Management of Agricultural Research Systems

The founders of ISNAR foresaw a need for it to do its own research, although by name and mission the new organization emphasized service. Our research function began with gathering and evaluating what was already known about the management of agricultural research. We soon moved to begin our own studies in this area of thinking and action.

We pursue the research function in two main ways. We plan and carry out some formal research projects — supported largely by special grants. We report here on five such current projects. The other research approach comes from our working groups. These are groupings of staff from our three program areas, brought together by shared interest in one of the critical factors in agricultural research management *(see p. 19)*.

With current staff resources, we cannot sustain working groups on all 12 critical factors. We report progress made by seven groups this year in sharpening knowledge and creating tools that managers can use.

Indicator Series Book Published

The Indicator Series ranks as the longest tenured among ISNAR's research efforts. In this project, we collect, validate, analyze, and report on the resources involved in agricultural research in some 150 nations.

The project reached a milestone in 1989 with publication — by the Cambridge University Press, U.K. — of the 25-year data base covering 1960-85 (see p. 44). A companion policy volume is nearing completion. Its international panel of authors focuses on policy issues framed by trends in agricultural research which are documented by the data base. It, too, will be published by Cambridge.

We are proposing a new phase of the indicator project. We hope to improve further on the human and financial resources data. We would correct the data base where new information becomes available. We want also to provide more detail on financial resources: the breakdown of salaries, capital, and operating expenses and data on allocations of human and financial resources by research theme and commodity. A series of focused policy analyses, based on phase I studies, will address certain critical issues facing NARS decision makers.

OFCOR Project in Dissemination Stage

In the fourth year since its start, our on-farm, client-oriented research (OFCOR) project stressed dissemination in 1989. New knowledge and lessons from the nine country cases and syntheses were in use in our advisory service and training programs.

For the record, 1989 brought publication of four more country case-study reports (Bangladesh, Nepal, Senegal, and Zimbabwe). Two comparative study papers came out: resource-poor-farmer participation in research and linkages between on-farm research and extension.

Abedin, Bangladesh (OFCOR)
Thousands of OFCOR reports and papers are in offices and libraries around the world. This reader, who leads farming systems research in Bangladesh, co-authored the case study in that country. He also wrote a paper for the conference, Making the Link.

A synthesis paper on managing linkages was in final editing.

International Workshop

Our largest international workshop of 1989, called "Making the Link," brought findings from the OFCOR project together with those from our study of research-technology transfer linkages (RTTL). More papers will come from that workshop, including some written by NARS managers. A summary will report major conclusions of our talks there with 21 senior NARS managers and 31 others invited to take part.

Members of the ISNAR study group gave papers on project findings in four international conferences in 1989 — in Indonesia, Ghana, Argentina, and the Netherlands.

Publications have gone worldwide. We have sent up to 1,500 copies of each comparative study and 500 copies of each country-case report. More than half have gone in response to specific requests. Our direct distribution is about 650 of comparative studies and 250 of the case studies to NARS leaders, donors, libraries, and regular collaborators.

Major funding for both the research and dissemination phases of this project came from the Government of Italy. The Rockefeller Foundation contributed in the first two years through the Rockefeller Research Fellow who headed the project.

Research-Technology Transfer Linkage Project

As 1989 came to an end, field data had been gathered in our seven-country study of research-technology transfer linkages. The study took a systems approach, dealing with how people, institutions, and technology are related to generate and transfer technology.

Since we launched the pilot study in Colombia late in 1987, field researchers have examined linkages in the transfer of 42 distinct technologies within 20 in-country subsystems.

(Subsystems, as used here, refer to specific farming situations in defined locations. Researchers gain insights into the problems of linking research with clients by studying the way different technologies have been developed and transferred. Examples in the study include beans in south Huila in Colombia, cassava in the southwest of Nigeria, and diffused-light storage of potatoes in the highlands of the Philippines.)

In-Country Researchers

ISNAR recruited a research team within each of the case-study countries. Leaders of six national teams came together in The Netherlands in late February. They worked here with project leaders, case-study supervisors, and others in the ISNAR working group.

From that collaboration came the final design and methodology for the study.

A New Book on Linking Research and Transfer of Technology

A research breakthrough produces nothing until farmers put it to work. Many persons — both upstream and downstream from NARS — take part in debates about how, effectively, to link research and users.

A new book marks the first major product of our research-technology transfer project (funded by the Italian Government with help also from BMZ and the Rockefeller Foundation). *Making the Link, Agricultural Research and Technology Transfer in Developing Countries* contributes new insights to these discussions.

Published by Westview Press, Inc., in both the United States (Boulder, Colorado) and the United Kingdom (London), in cooperation with ISNAR, the 270-page volume was ready for distribution as 1990 came on.

Theory base for linkages study

Eleven writers from five countries produced the seven chapters assembled by Editor David Kaimowitz, ISNAR research officer. Their essays were commissioned to build the base of theory for the ISNAR case studies on research-technology transfer linkages. Kaimowitz led that project, in which field studies were finished in 1989.

Research systems and their links to the process of transfer of technology were viewed from a number of perspectives. All 11 writers have worked in and with developing-country systems.

International perspective

The book opens with a Dutch researcher's description of a knowledge-systems approach. Two United States political scientists take up the political economy view. A Latin American writes on how changes in state policy and organizations affect linkages. A British writer explores human aspects of relations between groups in the process. A researcher from the ISNAR OFCOR (on-farm, client-oriented research) project looked at findings on linkage in those nine country case studies. Two economists, a North American and a South American, consider linkages in private-sector research and transfer. The final chapter sets out the conceptual framework that guided the ISNAR study of research-technology transfer linkages in developing countries.

Distribution plans

ISNAR will distribute the book to its NARS partners in developing countries and to official repository libraries. ISNAR chose to have the work published commercially to ensure a wider distribution.

Country researchers helped refine methodologies for their specific situations. The group reviewed hypotheses of the study, which dealt with factors influencing the linkage between research and transfer of technology. Final choices were made of specific technologies and subsystems for the country case studies.

Country teams collected their data over the next few months — most between March and August 1989. Field visits by the project coordinator and case-study supervisors moved the process along. They reviewed in the field many first drafts of reports on individual subsystems and technologies.

The study's advisory committee played a further role in a September workshop in The Hague. Each country case-study leader reported on the subsystem and technology papers from that country. The workshop gave researchers chances to work individually with the advisory committee and with others of the ISNAR working group.

Literature Emerging

The study has begun to bring out its literature. A commercially published book (see p. 35) has assembled papers on themes that built the theoretical base. The first of a dozen or more papers by country researchers have appeared. These discussion papers report cases that bear strongly — either positively or negatively — on the hypotheses of the study.

Case reports from the individual countries serve two main functions. One serves an ISNAR need, the other benefits the country.

For ISNAR, the reports are the materials from which to draw principles on managing the research-technology transfer linkage. Our synthesis papers, based on case reports, will provide the medium for reporting to managers in NARS and to scholars of technology transfer throughout the world. We plan to produce five main synthesis papers.

For a case-study country, the report by the local team details strengths and weaknesses of its own linkages. In cases where it is desired, ISNAR will help a country publish the report for its own use.

Wide Range of Experiences

The studies were made in widely diverse places to get a range of experiences with research-transfer linkages. Sites were chosen in seven countries: Philippines in Asia; Côte d'Ivoire, Nigeria, and Tanzania in Africa; and Colombia, Costa Rica, and Dominican Republic in Latin America and the Caribbean.

Range of Commodities

The world's leading food group, cereals, came in for the most studies of research-transfer linkages. Country researchers examined four subsystems each for rice and maize. In addition, study teams took up three other food crops — beans, cowpeas, and cassava. One subsystem for fish and two for cattle were included.

Five cases of cash crops came under study: coconut, coffee, cotton, macadamia nuts, and strawberries. Two cases involved farming subsystems, one of small-

farms and one of soil improvement and conservation.

Entering Phase III

The project entered the early stages of Phase III at the end of our report year. In that phase, we will synthesize from the full range of studies to bring out the lessons for agricultural research managers.

We forecast another 18 months or more of activity to bring the project to conclusion. Dissemination of findings will continue beyond that time. We will bring out more literature as theme, discussion, and synthesis papers. We will produce training materials, including audiovisual packages. And our advisory service will draw on this research base in working with NARS managers.

Dissemination has already begun. This project shared billing with OFCOR in one of our three international workshops of 1989. That November event focused on results from these two major research projects. The goal was seeking out knowledge and tools that research managers can use to strengthen the linkages of research with systems that transfer technology.

A total of 51 resource people gave us feedback. A number of NARS leaders gave papers that brought their manage-

RTTL in Tanzania

Case studies in the research-technology transfer project took study teams to the field in widely scattered places in 1989. This group met on a station in Tanzania. Research personnel here weigh forages from a trial with improved Rhodes grass—one of the subsystems analyzed in the study. Present here are the ISNAR study coordinator, Tanzanian case-study researchers, and station personnel.

ment experiences to bear on **Making the Link between Research and Technology Users** — the title of the conference. The workshop report will be published in 1990.

This linkages project has drawn support from two international donors. The Government of Italy funded the country case studies and supports much of the dissemination activity. The project developer and coordinator through the first two years was a Rockefeller Research Fellow, sponsored by the Rockefeller Foundation, New York, U.S.A.

Through its own core research budget, ISNAR insures the synthesis of results and contribution of its advisory group.

Study Small-Country NARS

A year ago we reported plans to study the special problems faced by NARS in small countries — along with how we can better relate to small systems within our resource limits. The year 1989 brought that research to the takeoff point.

We set a conceptual base for the study and framed hypotheses to guide it. We planned a case-study approach and chose seven countries for the studies: Fiji, Honduras, Jamaica, Lesotho, Mauritius, Sierra Leone, and Togo. Later we'll take up regional case studies in the Caribbean, West Africa, and the South Pacific.

Both the study approach and its aims are collaborative. Local teams will carry out the in-country studies, and the findings should improve our ways of working with the NARS of small countries.

During the year, we identified research coordinators within the case-study countries and planned a workshop with them for January 1990. Here they would review and help to sharpen the methodology and get ready for their work in the field.

With the financial support of USAID, we carried out the first case study in Lesotho. (That small-country review by two ISNAR staff is reported in the advisory service section, p. 9.) The Government of Denmark has given support for one country study, while the Italian Government has provided overall funding for the major part of the study.

Fifty Small-Country Systems

We have defined "small country" in terms of population **and** agricultural characteristics. The population must be under 5 million by 1980 censuses. The other definers deal with the importance of agriculture in the country's economy and the livelihood of the population in general.

We formed a matrix with specific parameters and put country data into it. We found about 50 developing countries that fit our definition of a small agricultural country.

Much of this first year's project work went into compiling and studying the literature of agricultural research in small countries. That, plus our own experiences

with NARS in more than a dozen small countries, gave the base for the conceptual framework for this research.

Small size doesn't mean small problems or small numbers of issues. The literature and ISNAR experience confirm this. In fact, smallness may add to complexity. A common situation finds a small and incomplete research system with limited capacity, expected to serve producers' needs for improved, often complex, technology. The small-country producer's needs may be just as great and as complex as those of producers anywhere else.

The research aim, consistent with ISNAR's mandate, focuses on how small countries plan, organize, and manage agricultural research. We seek methods and tools that will help the small-country NARS choose a strategy and then improve its organization and management of agricultural research. We are looking for ways to work effectively — within our resource limits.

Goal: To Help NARS Build Capacity

This study aims first to develop a solid understanding of the problems that face small-country NARS. In gathering this knowledge, we expect to learn how some NARS have worked out ways to solve problems — ideas that others can use or adapt to their needs.

The research approach is collaborative. We are following the country-case method used successfully in the ISNAR on-farm research project and that on research-technology transfer. Case-study coordinators, identified and recruited within the study countries, will gather and help analyze data for their system.

Four Broad Areas of Data

This project focuses on management in the small-country NARS. It aims to give managers a framework for making decisions on structure and organization. The framework covers four main areas of information to be gathered in the case-study countries:

- **country profile**: economy, agroecology, resources, and institutions;
- **the national agricultural research system**: organization and structure, sources and allocations of resources, coverage and type of research;
- **external linkages**: inventory of links of the NARS to outside groups that provide resources, technology, knowledge, or training;
- **internal linkages**: inventory of groups within the country that are linked to the NARS — contributors to research planning and users of products from research.

Looking Ahead

The year 1990 will put the main emphasis on generating new data and information required in the study. Six country case-study teams will do their field work and start writing up their cases. Three regional case studies will be started, and we will review research networks in six regions (Caribbean, Central America, West Africa, Southern Africa, Indian Ocean, and South Pacific).

We expect to be ready early in 1991 for the crucial workshop to discuss our findings with managers of small-country

NARS. These managers, from other than case-study sites, will help us interpret our findings and seek out the lessons for managers.

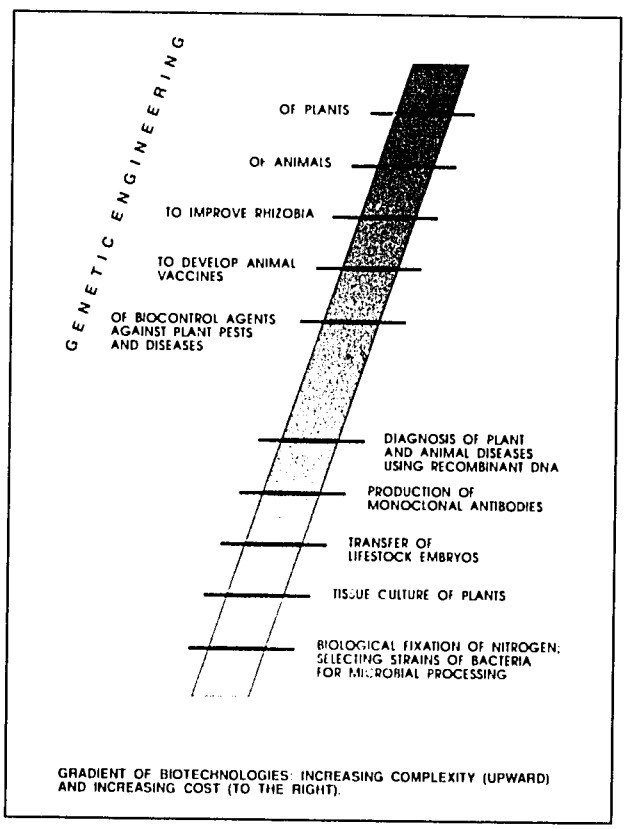
Dissemination will follow, through publications, workshops, and training materials. And the findings will become part of the working knowledge of ISNAR staff who advise NARS managers.

Join for Study of Biotechnology Issues

For a century or more, scientists have been working in biotechnology — mostly without the extravagant claims and fears that the word sometimes calls up today.

Plant breeding and breeding strategies to improve livestock have long used biotechnological methods. But the word has come into wide use more recently and has taken on a special meaning. It seems to be used now mainly to describe what scientists can do with new biological techniques to change genetic factors, and thus change an organism.

The ability to manipulate genes directly raises a host of issues: philosophical, ethical, political, social, and economic. Mod-



GRADIENT OF BIOTECHNOLOGIES: INCREASING COMPLEXITY (UPWARD) AND INCREASING COST (TO THE RIGHT).

Jones, K. A. (1990) Classifying biotechnologies. In "Agricultural Biotechnology: Opportunities for International Development." G. J. Persley, ed. Wallingford, UK: CAB International.

ern biotechnology raises opportunities and concerns also among the international agricultural research and development community.

A Joint Initiative

An initiative on biotechnology was co-sponsored by the World Bank, ISNAR, and two Australian development groups — ACIAR (the Australian Centre for International Agricultural Research) and AIDAB (the Australian International Development Assistance Bureau). An ACIAR staff member was seconded to ISNAR to serve as project manager. The study was co-financed by the Australian Government through AIDAB.

The project first commissioned 31 technical papers on the potential of biotechnology to solve agricultural problems in developing countries. The writers reported on new ways to control pests and diseases of crops and livestock and assessed productivity potentials of biotechnologies. And they identified socioeconomic, policy, and management issues that might affect the use of biotechnologies.

The winter of 1988-89 brought the papers into review and study by three working groups. The groups formulated options that were discussed at a Biotechnology Policy seminar — held in Canberra, Australia in May 1989, with members of the CGIAR and representatives of some national agricultural research systems.

An international advisory group carried on the work. In October, they met at World Bank headquarters, Washington, DC, U.S.A. to review a technical report and to discuss implications for the World Bank.

Technical Report Issued

The technical report, issued by the World Bank in December, lists 60 international contributors to the project; they represent 18 industrial and Third World countries. The report deals with issues of socioeconomics, regulation, environmental protection, and managing intellectual property rights (such as patents).

The writers assess biotechnology as it relates to the industrial world and the Third World, to crops and livestock broadly, and to certain commodities individually. They consider also how biotechnology may affect international agricultural research centers, investments of the World Bank, and options for international development agencies.

Materials from the study will be written to be useful to policymakers who are concerned with biotechnology, but who are not specialists in the field. The World Bank will publish a report summarizing the findings of the study. CAB International will bring out two monographs based on the commissioned papers. ISNAR will make available several country case-study reports.

Working Groups Sharpen Knowledge and Develop Tools for Managers

ISNAR formed working groups to put a research base under the advice and training the staff offers on managing agricultural research systems. Working groups drew their structure from 12 critical factors in building research systems, as identified in the ISNAR strategy. The groups involve all staff and draw lessons from work in all three programs, advisory service, training, and research.

In our medium-term plan, it was clear that we could not do intensive research on all 12 factors at once. All are essential to NARS, but some have to be addressed first. We took advice from NARS leaders in our international workshop and chose six to receive core resources. In each of these, the goal is a full range of service, training, and improved tools for managers.

With a coordinator for each theme, we keep current with developments in all 12, with groundwork laid on which to undertake special projects. Six themes have full working groups.

Feedback from NARS Managers

Three of the six working groups were featured in the 1989 International Agricultural Research Managers Workshop. We see this annual workshop as a consultation with our partners. We invite a number of NARS managers to help us create tools that they and other managers can use.

At the start of the week, each of the working groups spent about one-half day going over its thinking and its materials with the full conference. Three "thematic groups" formed, and each then spent four half-days consulting directly with one of the working groups.

The 5-10 November workshop, held at ISNAR headquarters, focused on Planning and Priority Setting, Structure and Organization of NARS, and Program Budgeting and Management Information Systems.

Agricultural Research Policy

Strategic policy decisions concerning NARS represent the outcome of a complex decision-making process that involves both national and international decisionmakers. These decisionmakers need to be aware of the forces that shape the agricultural research policy environment. The research conducted by the agricultural research policy working group can be used to do just that by providing them with relevant policy analyses and quantitative information.

Both the level and nature of support for public-sector agricultural research are directly affected by the national and international research policy environment. This environment also places policy-induced constraints on the NARS. It limits their ability to generate and extend new agricultural technologies which, in turn,

limits the growth and development of the agricultural sector. Policies that distort the prices of agricultural inputs and outputs, for example, as well as poorly organized or managed marketing agencies can either promote or limit producers' interest in new agricultural technologies. Other macro-economic policies that discriminate for or against agriculture can also impose similar constraints.

The ISNAR Indicator Series project, under the auspices of this working group, has developed the capacity to collect and process a global data base of research personnel and expenditure indicators. It has done this by establishing a quantitative basis for policy research in this area. The Indicator Series volume, published in October 1989, is the first of what is envisaged to be an ongoing series of statistical reference volumes of basic NARS indicators. There are also a number of policy papers, drawing directly on this data base, that have been completed or are under way.

A volume on agricultural research policy is currently in preparation, addressing a series of agricultural research policy issues. The Indicator Series data base provides the quantitative underpinning for much of this work. Cambridge University Press, which published the global data base volume, will also publish this second volume.

Collaborating with Other Institutions

From 1983 to 1986, ISNAR and the policy research group of the University of Minnesota (U.S.A.) jointly sponsored an annual research policy conference. In 1989 we signed an agreement that extends this collaboration for a further six years. With our partner, the university's Center for International Food and Agricultural Policy (CIFAP), we will take part in a series of research and training activities in collaboration with developing countries.

Our policy work in recent years has also created links with several other institutions with agricultural research policy interests, including various universities, the World Bank, FAO, OECD, ACIAR (Australia), AARD in Indonesia, the U.S. Department of Agriculture, and — within the CGIAR system — CIMMYT, TAC, and the Secretariat.

Publications

Much research policy interaction occurs in written format. ISNAR staff have been principal or co-authors of 23 books, special reports, or articles with publication dates within the last two years. Six were published last year in refereed international journals.

The Immediate Future

With the support of the Rockefeller Foundation (U.S.A.), we have initiated a project to study the nature and impact of the agricultural research system in China. CIFAP and the Institute of Agricultural Economics of the Chinese Academy of Agricultural Sciences will collaborate on this project. Looking at this vast structure of research and extension from several policy perspectives, the principal objectives of the project will be to prepare a monograph that describes the development of the Chinese agricultural research system, in both quantitative and qualita-

Two Policy Books Published

Those persons who make or influence agricultural research policy in NARS received two new resources from ISNAR in 1989. Two new books came off the presses and went into distribution. Both grew out of the activities of our working group on agricultural research policy.

One sets a new world standard as a reference on researchers and expenditures for agricultural research. *ISNAR Agricultural Research Indicators Series: A Global Data Base on National Agricultural Research Systems* carries the 1989 imprint of Cambridge University Press of Cambridge, U.K.

The 547-page volume opens with 45 pages of notes on how its authors (Philip G. Pardey and Johannes Roseboom) gathered, validated, and converted the data from 154 national agricultural research systems. Each country table begins with 5-year averages for 1960-64 and 1965-69, then goes on to report the available data annually for the years 1970-86.

ISNAR core resources supported this work, with timely inputs by the Italian Government to complete the process. The data base, to be updated regularly by ISNAR, will find its main users among donors, NARS, and scholars who study national agricultural research systems.

ISNAR has already forwarded copies of the book to selected contacts within the NARS, as well as to donors and our depository libraries in developing countries. The book is available from Cambridge University Press.

World Context for Agricultural Policy

The Changing Dynamics of Global Agriculture uses a book format to give policymakers a world context for thinking about policy in their own NARS. The German Foundation for International Development (DSE) and the Technical Centre for Agricultural and Rural Cooperation (CTA) joined ISNAR in sponsoring the volume, as well as the conference. ISNAR's Emil Javier and Ulf Renborg, Swedish University of Agricultural Sciences, served as technical editors. The content of this book came from an international conference of the same name, held at Feldafing, F.R.G. in September 1988 (reported in our 1988 annual report).

Writers looked at four topics, all with implications for research policymakers in developing countries. These include food surpluses, linking agriculture growth to growth in the rest of the economy, sustainability of agricultural production environments, and mobilizing and sustaining support for agricultural research.

Beyond these key topics, a special paper — also included in the book — was delivered by former ISNAR Trustee Vernon Ruttan. He described an emerging global agricultural research system in which roles of international, regional, and national research systems are changing. A distinguished practitioner in policy

research at both global and developing-country levels, Ruttan is now a Regents Professor of the University of Minnesota, U.S.A.

This book also reports the discussions of participants on each of the main topics. Key participants were 16 invited managers of developing-country NARS and eight others from six European-based organizations.

Published under ISNAR auspices, the book is available directly from ISNAR.

tive terms. It will also assess the impact of investments in research and extension on regional productivity, and finally, it will take a preliminary look at some of the agricultural research priority issues currently facing Chinese policymakers.

We are currently seeking funding for a series of studies on the actual and potential interactions between public- and private-sector research systems in developing countries. These studies will attempt to quantify and assess the scope and nature of the private-sector agricultural R&D that is relevant to developing countries. We will look as well for ways in which these sectors can work together to enhance the growth and development of their agricultural sectors — such as we found in a study of research investment in rice in Uruguay. (See p. 33.) Both NARS managers and agricultural policymakers could benefit from such information.

The Indicator Series Project is now finalizing plans for a Phase II set of activities that will involve a second round of data collection and processing, and will strive to upgrade and extend the existing series through to 1991-92. There will also be a series of collaborative research policy studies. These will involve a series of collaborative research efforts between ISNAR staff and research personnel from developing and developed countries. They will highlight macro- and micro-level policy issues on the financing and impact of rural research in developing countries.

Research Planning and Priority Setting

Working group members continued to focus on both the tools and the processes involved in strategic planning and priority setting for agricultural research.

Strategic Planning

Strategic planning is concerned with planning in a changing environment. As described by members of the working group, the strategic planning process develops a vision of the "preferred situation" to which planners would like the system to move. They form that vision on the basis of (1) a clear identification of the system's mandate and analysis of its environment (in particular, needs of its clients and market potential) and (2) a judgment of the system's strengths and weaknesses. The strategy then lays out the decisions and actions that will gain that desired future situation for the system. A strategic plan must include both institutional and program dimensions. Managers can

apply the principles of strategic planning at the system, institute, or research program levels.

Although principles of strategic planning have been around for some time in other sectors, their application to agricultural research systems is recent. One of the tasks of this group is to clarify the relationship between strategic planning and other forms of "planning" variously described under terms such as long-term planning, medium-term planning, and master planning.

Research into improving the planning process takes place in cooperation with NARS as part of actual system-building activities. In 1989, ISNAR worked with NARS leaders on planning improvements in components of national systems in twenty countries: four in Asia-Pacific, four on Latin America-Caribbean, one in West-Asia-North Africa, and eleven in Africa. In two Latin American countries, Ecuador and Uruguay, staff members helped design planning systems for NARS undergoing structural changes. This involved identifying key actors in the planning process, the functions they must perform, and the ways to improve performance.

The working group will move deeper into planning processes. It has begun a project to analyze ISNAR's own experiences with planning in NARS. Leaders from NARS that have worked with ISNAR will document their experiences, using a common framework of analysis. The group aims to develop guidelines and training manuals on managing the research-planning process — drawing on country case studies.

Priority Setting

ISNAR's research in this area seeks to develop operational priority-setting methodologies that can assist NARS managers in establishing priorities and allocating scarce research resources.

Methodologies are being developed for dealing with both strategic and programmatic issues. This involves developing a range of approaches that can be applied in different decision-making contexts. The choice of approach will depend on the nature of the problem, the availability of data, the local capacity to do the analysis, and the value to the country of investing in improved priority setting as one of its activities.

In 1989 we continued to cooperate in a study of priority setting in four Asian NARS. The main sponsor of this study is the Australian Centre for International Agricultural Research (ACIAR). Funding from GTZ facilitates ISNAR's collaboration with Indonesia's Agency for Agricultural and Rural Development (AARD) as part of this project. The approach is designed to allow research managers to assess the likely consequences for growth and distribution of benefits from proposed research programs. The approach also explicitly accounts for the fact that research impacts may spill over to other regions within the country or between Indonesia and other countries. The results of this study will have great relevance to other regions of the world where priority setting in a regional framework is of particular concern to donors.

ISNAR staff have also undertaken a series of research-based activities working with NARS scientists and decisionmakers to implement various priority-setting meth-

odologies within NARS. We applied a scoring model in the Gambia and initiated a collaborative project combining the scoring approach with an economic surplus analysis in Bangladesh. We built on work done a year earlier in Latin America and the Caribbean.

Our product from our research in this area will be a book on Priority Setting for Agricultural Research. Currently in preparation, this book will describe issues related to establishing research priorities at the strategic level, evaluate alternative methods for setting priorities and give practical guidance for carrying them out in developing-country settings. The book will aim to help two groups: research managers who decide priorities at the strategic level and NARS personnel who do the analysis to support the decision-making process.

This year brought to field-testing a manual to introduce methods for setting research priorities. Accompanying training exercises using readily-available microcomputer software have been well-received in the field. Additional materials for training targeted at priority setting at both the strategic and programmatic levels are also under active preparation.

Structure and Organization in NARS

This working group got well into its priority activity in 1989. It aims to build a cross-national data base on NARS organization and structure, allowing it to analyze the importance of these factors in determining the performance of NARS.

Synthesis of experience

Much of this base comes from ISNAR's own experiences. (We have reviewed more than 40 NARS ourselves.) The challenge is to capture the range of knowledge gathered by many review teams and advisory service contacts. And from the knowledge to find ways to help NARS managers deal with organization and structure issues.

The working group commissioned five senior ISNAR staff, each with long experience in a region, to write review articles on NARS organization and structure. Each focuses on one region of the world: francophone Africa, anglophone Africa, West Asia-North Africa, Asia and Pacific, Latin America and the Caribbean.

Three articles were ready for publication by the end of 1989; two more were due early in 1990. ISNAR Working Paper No. 21, *Organization and Structure in National Agricultural Research Systems*, added to the knowledge base.

Feedback from users

The 1989 International Agricultural Research Management Workshop (IARMW) dealt with organization and structure as one of three themes. Ten NARS managers gave practitioners' feedback to this working group in four half-day sessions. Five main topics occupied them: organizing to legitimize agricultural research at high levels of national policy, deciding research policy, strengthening coordination among institutions, assuring administrative autonomy, and decentralization.

A proceedings from this conference will bring still more knowledge to NARS

managers on matters of organization and structure.

Field activity

Thirteen countries called on us for study or advice on structure and organization. The worldwide range included six Latin America and Caribbean countries, six in Africa, and one in Asia and the Pacific.

Uruguay — as one example — asked us to help design a semiautonomous body to oversee all agricultural research there. That body was created by the government and now functions. In Costa Rica, we helped plan a National Commission for Research and Transfer of Agricultural Technology to represent both public- and private-sector needs. And, at its invitation, we have helped the commission launch its work. It is part of research's agenda to document the factors leading to success or failure of alternative institutional arrangements.

Linking Research and Transfer of Technology

Researchers intend to generate technology that others can use. At ISNAR, we think the research job does not end without action to start the flow of technology to users.

Focus of research projects

ISNAR's two major research efforts of the past three years grew out of managers' need for knowledge and tools in this area. They are the OFCOR project — near the end as a research effort — and the Research-Technology Transfer Linkage study — still in active research stages. Both are updated earlier in this section (OFCOR, p. 33; RTTL, p. 34).

Field activity

The linkage of research and transfer of technology (by extension in most instances) is a continuing concern to NARS managers. We see this in national activities.

The Asia and Pacific region gives an example. Fiji moved to give roles in on-farm research to both research and extension units. The goal of policymakers: to improve the linkage between the two groups.

Asked to give training

ISNAR gets requests to include the topic in training events — at all levels. This linkage was one of five topics in a week-long national workshop in Ethiopia. Costa Rica asked for the subject in training sponsored by its new National Commission for Agricultural Research and Transfer.

At the regional workshop of the Central American institute CATIE, two ISNAR staff presented the subject in a regional workshop. Another regional workshop, in Chile, gave linkages and ISNAR's work a place on its agenda.

At the international level, **Making the Link** was our biggest training event at ISNAR headquarters this year. That workshop brought our OFCOR and linkages researchers together with more than 20 NARS managers. They looked for keys to managing the linkage of research to

Developing a Management Information System for Managers of Agricultural Research in Sri Lanka

By the end of 1989, managers in Sri Lanka could ask and answer detailed questions about the resources going into agricultural research. They had a comprehensive data base on 18 of the country's 19 institutes (and the nineteenth would be added soon). The computer data base in Sri Lanka now covers experiments (1,552), personnel (448 scientists and over 4,000 support staff and laborers), and finances (just a little under 200 million rupees) for the year 1989-90.

It was a different story in 1983, when Sri Lanka invited ISNAR to work with a local group looking into the national agricultural research system. Fifteen agencies under seven ministries, plus a unit in the Office of President, carried out agricultural research. No unit coordinated agricultural research policy. Not much information about agricultural research reached planners of research at national levels.

Sri Lanka later created a Council for Agricultural Research Policy (CARP). The national agricultural research system is still complex. Now, however, planners know a lot more about research programs, thanks to a management information system (MIS) that ISNAR is helping the Sri Lankans develo · and put in place.

Over the last two years, ISNAR has worked with Sri Lankans to help overcome both organizational and information constraints — with support from the development agency GTZ, Federal Republic of Germany. One phase of support has been to the secretariat of CARP, the body formed to act in planning and coordination. The other phase (the focus here) is building a base of information.

In 1987 ISNAR began work with Indonesia on a project to develop a management information system for the national agricultural research institutes. That work yielded ways of gathering data, entering them into a computer data base (using commercially available software), and analyzing by criteria useful to planners and managers.

Lessons from that experience was a starting base for the work in Sri Lanka. Three ISNAR staff have collaborated with Sri Lankans on MIS in their NARS over the last two years.

Work began in 1988 with analysis of one research institute as a pilot demonstration. Next came work with teams from other institutes — using the format developed in the pilot. This covered both the management benefits and the details of gathering data, building the data base, and creating the output.

Sri Lankans have applied the MIS in their institutes. ISNAR staff have kept in close contact. By the end of 1989, 18 of the institutes had developed data bases.

Using the Information Base

ISNAR collaborators took the next steps with Sri Lanka's electronic records. Using a common analytical format, they created a report for each institute. It covered many facets of three factors: experiments, personnel, and finances. This put the information in front of the key personnel in each institute. Each could know more now about total operations than any had known before.

The same format worked with all the institutes. One had as few as six scientists, one had over 50 scientists. A manager could read at a glance such human-resource factors as the age pyramid and highest degrees and experience of his scientists; how many were on study leave; and numbers and training of support staff.

Projects were reported just as fully, according to scientist time, financing, and other factors. Finance data showed many cost centers — for scientist time, supplies, transport, support, labor, and more.

The National System

ISNAR staff drafted a report covering 18 institutes — most of the national system: *Agricultural Research in Sri Lanka*. Its 70 pages offered analyses drawn from the overall data base. The report laid out information in tables, graphs, and charts. The data base had been designed and entered in such a way that each table, graph, or chart could be formed and printed with a few strokes on a computer keyboard.

One example: The 1989 budget for 18 institutes totaled nearly 200 million rupees. The report broke down that amount according to eight budget categories (such as labor, transport, overhead). It even separated the research and nonresearch shares of scientist costs.

Within this data base, it's possible to find all projects dealing with a given topic. Take nitrogen-fixation studies as an example. The data base showed 21 projects on that subject — one or more in 10 different institutes.

All of this can be done with the current generation of personal computers. (This shows the growing potential of microcomputers as aids for research management in developing countries.) Much of the ISNAR staff work was done on portable laptop computers. Portables have let them work in scattered and varied locations.

A Base for Research Policy

When coupled with other information, these data help inform policymakers about the program and opportunities for improvement. During the year, a CARP working group had made a first attempt to rank priorities among some 45 agricultural commodities, using a simple scoring model. Against that list, they compared present allocations of resources to research for each commodity. The four crops they scored highest — tea, coconut, rice, and rubber — also ranked high on two key factors run from the data base: scientist time and project cost.

Not all commodities were that much in line across the three lists. Coffee, for instance, ranked twenty-seventh in priority, eighth on scientist time, and eighteenth on project cost.

The point here is not that the rankings should be the same across factors. That kind of congruence offers a starting point for thinking: a high priority doesn't always mean high expenditures or new allocations. The point is that such an analysis causes the policymakers to think about a situation. And this kind of information lets them consider facts rather than operate on guesses or feelings.

The ISNAR project team was scheduled to take this analysis to the CARP board early in 1990. They will review it in detail with individual institute managers. It will help the board look at important issues.

Two clear benefits can come from this kind of work. Institute managers will have much more detailed information on which to manage. CARP will have much greater knowledge about all the institutes. It will go into its role of making research policy and planning research goals on the base of that greater knowledge.

CARP has named a Sri Lankan researcher to coordinate the work on MIS. ISNAR will host that person at headquarters for further development of the MIS and for training.

those who transfer technology. (See p. 34 for details on that workshop.)

Program Budgeting and Information Management

This working group brings together two critical factors in agricultural research management. A NARS manager needs information to formulate a strong research program and budget. To manage information means to handle much and varied data, including programs and budgets. Program budgeting is one direct application. The two factors relate closely to each other.

Wide sphere of interest

Field activities in these two areas went on around the globe in 1989, in 20 distinct activities in 13 different countries. Eleven involved program budgeting systems (PBS), and nine were on management information systems (MIS) in general.

Our two largest activities on these factors were again the work in Indonesia and Sri Lanka (see p. 49). By year's end in the latter, Sri Lankans had collected, computerized, and analyzed information on more than 1,500 experiments and 445 scientists of 18 institutes. ISNAR's resident adviser continued to support Indonesia's AARD as its staff work to develop an MIS for its extensive and complex system.

Asia project started

August marked the start of a two-year technical-assistance project on management information systems in Asian NARS. The work covers 14 member countries served by the Asian Development Bank (ADB), which funds the project.

The project aims to improve the efficiency and effectiveness of agricultural research in the member countries. This should happen through better management information about what research is going on and about costs, people, and facilities.

Two NARS-oriented products will come from the work. One is practical guidelines for NARS managers, covering principles and procedures on collecting, managing, and using information. (These may take the form of a loose-leaf, updatable manual on MIS.) The second product will be two regional workshops. Trainers will help teams from the countries master skills in setting up and operating an MIS.

In the project, we will work with NARS in Bangladesh, Bhutan, China, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, and Thailand.

Before the end of 1989, ISNAR staff and a consultant had begun the round of visits to all 14 NARS. They were collecting benchmark data on each system. A country paper will describe how the system now manages decision information.

The same visit assessed needs for training on MIS operations. And persons were identified as possible participants in the regional training. (Workshops will take place in the last half of 1990, with one scheduled in Hyderabad, India, and one at Los Baños, Philippines.)

A guidelines product

Work began in 1989 on the guidelines product. MIS was one of three key subjects for the annual IARM workshop. The working group on MIS and PBS presented materials to the entire conference. Ten NARS managers, chosen for their interest in this program area, worked in more depth and detail in two days of thematic group sessions.

On the final day, the group brought its observations back to the plenary session, relating MIS to the other themes: planning and organizational structure of national agricultural research systems. Feedback from NARS leaders is part of the development process for improved management tools.

Monitoring and Evaluating

Monitoring and evaluation, as a critical factor, runs through most of the work of the agricultural research manager. A NARS needs three main types of evaluation. First, before work begins, it needs to set definite aims and make clear to the managers what outcomes will indicate success. Second, it monitors work under way to be able to revise plans or change course if needed. Third, it needs to measure the outcome of research, especially what the research contributes to producers, consumers, or both — in line with objectives that had been set.

Working papers issued

Although few staff resources have gone into this subject in the last two years, the working group outputs help managers. Many NARS managers use our three

Measuring Returns from Investment in Agricultural Research

Rice in Uruguay

An ISNAR staff member and Uruguayan colleagues have reported their analysis of the rates of return to resources invested in agricultural research. In a three-way linkage including the University of Minnesota (U.S.A.), they studied costs and returns for 20 years (1965-85) of research and development (R&D) for rice in Uruguay.

The analysis showed a payoff of $5.50 for each $1 spent.

Uruguay has produced rice since the 1930s, reaching self-sufficiency in 1935. The rice area expanded and Uruguay became an exporter. By the mid-1950s, production was over 40,000 tons per year; by the mid-1980s, it was over 400,000 tons. About four times as much area grows rice now, compared to the 1950s. Yields went up in the same period, from about 3 t/ha to 5 t/ha now.

This study accounted for two variables often omitted from studies of returns to R&D investment:

1. private spending for R&D

2. cost of public programs to transfer new technology to producers.

For the five years 1981-85, Uruguay's private sector bore about 68% of total research and transfer costs for rice. That was more than double the public-sector share in those years. However, R&D efforts of the public sector had played a crucial role earlier. In the 1960s, public researchers introduced varieties from other regions and adapted them to Uruguay.

Most rice research in Uruguay still takes place in the public sector. Private-sector producers fund part of the activities under an agreement with the public sector.

The researchers in this study measured the impact of a package of technology, including improved varieties and agronomic practices. In 1980-85, for example, nearly one-fourth of the average production gain for rice was due to improved varieties, and another 40% was due to better agronomic practices. Still, about 37% of the improvement came from other factors they could not isolate.

This analysis came from joint work of ISNAR and scientists from Uruguay's national agricultural research system. One ISNAR staff member and two Uruguayans published their findings and their analytical approach in ISNAR Working Paper No. 30, *Returns to Investment in The Generation and Transfer of Rice Technology*

in Uruguay. **The paper includes a summary of some 30 other studies of rates of return to agricultural research investment in South America.**

This study touched two areas of current research interest in ISNAR. One is the impact when public- and private-sector R&D efforts complement each other. Another is the importance of domestic research capacity in a small country. This capacity lets a country monitor events outside its borders; it can select, introduce, and adapt external knowledge to its own use.

working papers that deal generally with monitoring and evaluation at the research-program level: the "log frame" (logical framework) in planning and evaluation, project management techniques, and monitoring and evaluation in managing agricultural research. Another working paper offers help on monitoring and evaluation, with a checklist for the institutional level.

We have concentrated on evaluation of system functions. We are working now to develop criteria and tools to evaluate outputs and impacts of research.

Help to NARS

Presentations on monitoring and evaluation have been parts of many training programs, both national and regional. We have responded with specific help in the field for NARS: for example, in Costa Rica. We advised Costa Rica's new commission on research and transfer of technology on evaluating performance of national research programs.

Several advanced systems in Latin America have expressed interest in working with us to evaluate research institutes and their programs. Such a task would exceed ISNAR core resources. We are exploring a special-project response — to develop formal methods and training materials, similar to the Asian MIS project.

Study benefits of research

Policy researchers in ISNAR have carried out studies on research payoff. One study reported in 1989 detailed the returns to investment on rice research and development in Uruguay over the last 25 years. Working Paper No. 30, *Returns to Investment in the Generation and Transfer of Rice Technology in Uruguay.* (Some findings in that study are reported on p. 53.)

Developing and Managing Human Resources

The 1988 International Agricultural Research Management workshop — topic: planning and managing human resources — came in the last quarter of that year. A 270-page proceedings followed early in 1989. It went immediately to ISNAR's NARS partners around the world. Informal feedback returns the message that NARS people with human resource responsibilities are using it.

Contributing to training

A major program for 1989 came out of needs expressed by NARS leaders in that workshop. Two ISNAR staff recast the workshop materials for a five-day regional workshop under the ISNAR-SACCAR training project. (The training section gives details on that event, p. 64.) Proceedings from the workshop, held in Zimbabwe, will give other southern Africans papers and discussions tailored to their regional situation.

The human resources working group had a hand in one of our three international training events of 1989. It held a two-week hands-on workshop on handling human resources information in a NARS. Seven developing-country participants learned ARIS (agricultural researcher information system) and got personal experience at the computer keyboard on how to use it in their NARS. Personnel from seven developing countries took part.

Adding to the literature

Two published proceedings (noted above) and five working papers on human resource management came from this working group in 1989. Two of the working papers (listed in the year's publications, p. 85) covered country-based analyses — Ecuador and Brazil. Three took up management issues: performance appraisal schemes, the changing job pyramid, and recruitment.

Field advisory activities

Twelve countries called on us for specific work with them on human resource management: Asia and Pacific 1, West Asia-North Africa 1, Latin America and the Caribbean 3, and Africa 7. Some requests involved training, others advisory service. In four cases (Senegal, Morocco, Ecuador, and Uruguay), we continued special work under way for several years. Senegal offers a good example of combining research and advisory service to meet special needs of a NARS.

Working with Senegal

In September 1988, ISNAR agreed with ISRA (Institut Sénégalais de Recherches Agricoles) to cooperate on human resources planning and management. The work, supported by USAID, was to focus especially on salary policies, career development, job descriptions, evaluation of performance, recruitment, and training.

This project covered a lot of ground in 1989. Early in the year, we helped the Senegalese working group design and pretest a questionnaire they used to gather data on human resources. ISRA's deputy director general brought the survey findings to ISNAR headquarters, where we jointly created a data base. We could then work through certain computer simulations that show the impact on budget of different salary policies.

With help from the working group, we worked with ISRA representatives to formulate recommendations on salary policy. We took this draft report to Senegal and got agreement from ISRA. (ISNAR published results of the salary study in December.) We also transferred to ISRA the electronic data base on its human resources.

Later in the year, the leader of the Senegalese working group came to The Hague. Staff here helped him make final

recommendations about job descriptions and policies on compensation.

The ISRA working group used the salary study to prepare draft job descriptions for researchers. The drafts were submitted to the ISRA director in December.

ISNAR took the lead responsibility in two other parts of the project. One was to design the system for evaluating performance. The ISRA working group reviewed our design, and near year's end we began drafting evaluation procedures and instruments. We also started to design guidelines for career development, our other lead responsibility.

We will continue to work with ISRA through 1990. Much remains to be done in implementing salary and career policies. And we will support ISRA as staff there deals with certain human resource planning areas, notably for recruitment and training.

Training

The research process, many thoughtful persons agree, doesn't end until users somewhere apply the new technology. We can say the same of ISNAR's growing base of knowledge of agricultural research management — the process doesn't end until knowledge and tools are in use. Training — in addition to our personal contacts through advisory service and our publications — carries much of the burden of informing others and helping them use the knowledge.

ISNAR's training programs take place at three venues: national (one nation at a time), regional (several neighboring countries together), and international (with people from worldwide locations). We offer training under various kinds of sponsorship: we contribute to training sponsored by others; we enter into joint sponsorship; and we take the full responsibility.

Our 1989 training involved all types and at all venues. Gross figures for the year included: 19 events (10 national, 6 regional, and 3 international) involving a total of 706 persons (450 national, 170 regional, and 86 international).

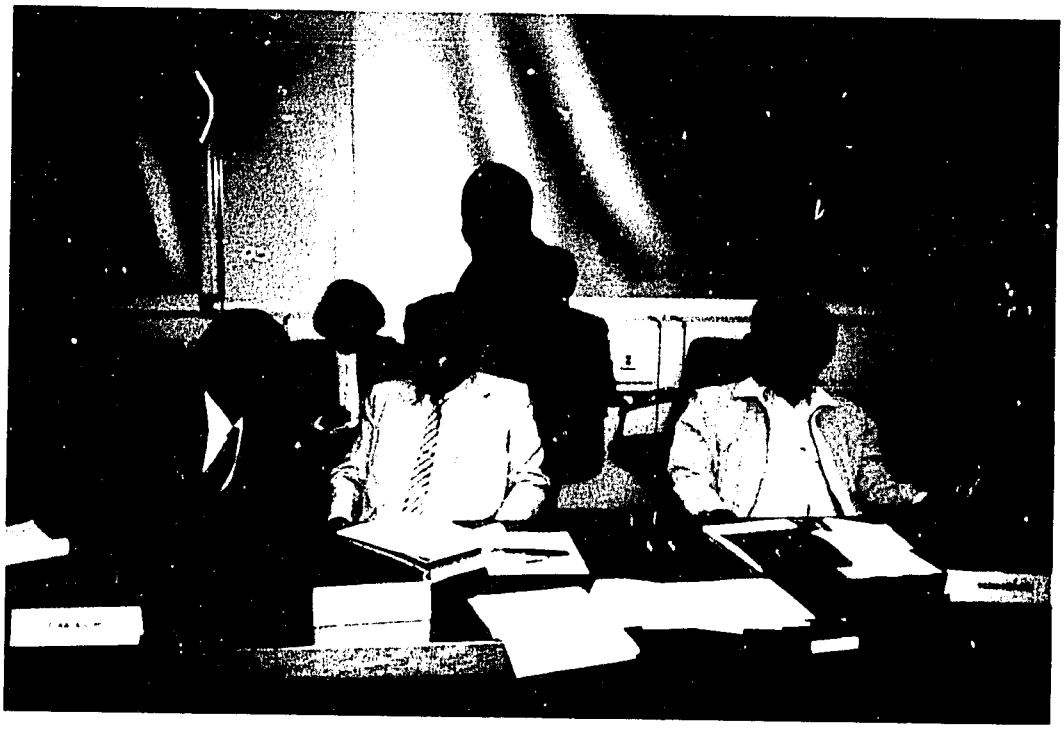
Here is the roster with brief narratives.

National

Ethiopia: 23-28 January

A broad range of subjects made up the agenda for a week's training in Ethiopia's Institute for Agricultural Research (IAR). Staff of the Ethiopian Management Institute joined three ISNAR staff as trainers. In broad headings, content covered general management, agricultural research planning, managing the research program, and linkages — external and internal. Ten local staff papers inserted national issues into the center of the learning process. About 40 IAR senior staff took part.

In addition to the teaching sessions, the group spent nearly nine hours in small-



Some of the participants in the LARM workshop: above during a formal session, below during a break.

group sessions. An ISNAR trainer showed use of microcomputers to help in managing information and setting priorities. It stimulated an end-of-workshop request for specific help to advise IAR strategy on computers. (A two-person mission returned a month later to do that.)

Guinea: 18-20 September

Forty Guineans spent three full and busy days on agricultural research management, working with two ISNAR trainers. This followed our system review of about one year earlier. Co-sponsor of the training was l'Institut de Recherche Agronomique de Guinee (IRAG), the national research unit recommended in that review. It had been created a few months later by the Government of Guinea.

Trainers focused on organization and management topics that would help Guineans develop their new organization and form strategy for it. They dealt with structure and programming methods plus managing human resources, international cooperation, research and development linkages, and annual programming.

Our trainers (one current and one former staff member who has maintained links with ISNAR) brought back data to be computerized at headquarters — and returned to Guinea. One set of data on human resources was analyzed through ARIS (the Agricultural Researcher Information System, a tool for studying the human-resource situation in a NARS). The other became a small data base on the research managers in IRAG.

Guinea-Bissau: 19-24 February

We note this event in two parts of the report. It fits in both **training** (it was a six-day workshop) and in **advisory service** (Guinea-Bissauans carried out their own national review and planning exercise as the focus of the workshop).

Two ISNAR professionals related to 14 staff members of Departmento de Estudos e Pesquisas Agricolas (DEPA) and five from the Ministry of Rural Development. These participants, who accounted for more than 90% of the country's agricultural researchers, created a strategy of development of the NARS. And they came out with short- (five-year) and medium-term (10-year) plans for research.

The group met at one of the field stations, putting in six nine-hour working days. ISNAR staff (given the role title of *animateurs*) offered six Portuguese-language modules to focus the group on its objectives.

Rwanda: 19-28 February

Rwanda's Institut des Sciences Agronomiques du Rwanda (ISAR) planned a workshop on organization of farming systems research. An ISNAR staff member (who served on the team that reviewed ISAR's farming-systems research) was invited as one of the trainers for this workshop.

Tanzania: 10-20 July

Tanzania undertook a deep reorganization of its national agricultural research programs. This called for a master plan

for research, shifting from research done by units within parastatals to a ministry-related research structure. The Ministry of Agriculture and Livestock Development asked ISNAR to advise. ISNAR staff worked with Tanzanians to develop a framework for the master plan.

The 1989 SACCAR-ISNAR national workshop for Tanzania provided a means to support the country's master-planning activity. (Another workshop on the master plan was held during the year, conducted by the German aid agency GTZ that supports the overall planning exercise.)

Twenty-six Tanzanians worked with trainers through 8½ days in the workshop. The format generally presented principles and approaches for key planning elements. Then four working groups each applied those insights to their part of the planning process. Four Tanzanians and three ISNAR staff members served as trainers and resource persons.

The workshop offered five themes related to the master plan: setting priorities and allocating resources; planning and programming research; planning human resources; linkages; and information and documentation. Learning methods covered a wide range: lectures, case studies, simulations, films, group discussions, and working group reports.

Group photograph of the SACCAR-ISNAR workshop in Tanzania, which provided a means to support the country's master-planning activity.

Bangladesh: 20-21 November

A workshop with 100 senior staff was a key step in our joint work on a management information system in BARC (Bangladesh Agricultural Research Council). Two headquarters staff joined the resident ISNAR adviser for this two-day session. One staff member had worked earlier with one BARC institute to apply our MIS methodology in that system and to carry out a pilot analysis.

Indonesia

About 100 Indonesians attended workshops on management information systems in 1989, co-sponsored by USAID. The ISNAR resident adviser conducted the training to equip staff from institutes on data entry for AARD's MIS.

Philippines: 17-21 July

This was our second year as joint sponsor with PCARRD (Philippine Council on Agriculture, Forestry and Natural Resources Research and Development) in research management workshops. ISNAR staff led sessions for nearly 50 senior managers on topics of organizational design, priority setting and resource allocation, and human resource management. We also played a role in a concurrent workshop on management information systems, using as an example our work with Sri Lanka on MIS.

Participants for the two events came from a wide range of national agencies, including departments of agriculture, environment and natural resources, and science and technology; regional R&D consortia; and presidents of agricultural colleges.

Costa Rica: 28 August-1 September

NARS leaders scheduled a one-week workshop as their vehicle for planning the 1990 research program. The ISNAR staff member who works with the program there was asked to deliver a major presentation. It dealt with systems for planning, monitoring and evaluation of integrated research and transfer components of national programs, and centers and data banks of scientific-technical information in the agricultural sector.

Morocco: 16-20 October

We have worked for several years with Morocco's Institut National de la Recherche Agronomique (INRA). A Moroccan staff member, with ISNAR support, has developed a computerized program budgeting system for INRA. Two ISNAR staff were asked this year to visit for five days to help train Moroccan staff to work with the system.

The first day of training introduced concepts of programming-by-objective to seven heads of research programs and 10 research staff. The following four days offered hands-on training for the 10 researchers. They learned to create data bases on computers, working as teams of two to four persons to one computer for each group. Most returned for the optional evening sessions, where they got more hands-on work with computers.

Computers and other support came from two staff of a local USAID project carried

out by the Mid-American International Agricultural Consortium. (Shortly after the training project ended, two ISNAR staff helped develop technical specifications INRA would use in deciding on purchases of computers for research centers and stations.)

Regional

CATIE: 13-21 March

For some three decades, the Centro Agronómico Tropical de Investigación y Enseñaza (CATIE) has served Central America in agricultural research and teaching. It joined with IICA and ISNAR in 1989 to sponsor a regional workshop on agricultural research management.

Twenty high- and middle-level managers from 10 countries came to the workshop at CATIE headquarters in Costa Rica. The countries were Bolivia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Nicaragua, Panama, and Uruguay.

Two ISNAR staff led parts of the training, combining lectures with case studies. One

Small-group discussion in the IARM workshop.

took up the broader subject of agricultural research management. The other dealt more specifically with research-extension linkages, using findings from ISNAR research on the subject.

Latin America: 17-21 April

Four institutions joined to sponsor this cooperative regional initiative in training on research management: FAO, IICA, ISNAR, and Chile's INIA. Held in Chile, the event generally followed a model developed for a 1988 regional workshop hosted by Argentina.

Three ISNAR staff contributed topics on research management: innovation, private-sector linkages, and monitoring and evaluation, plus a paper on basics of biotechnology. Senior- and middle-level managers made up more than half the training group, coming from eight countries plus Chile.

In addition to 20 Chilean participants, managers attended from Argentina, Bolivia, Brazil, Colombia, Ecuador, Paraguay, Peru, and Venezuela.

AARINENA: Cairo: 17-20 December

The Third General Conference of AARINENA in Egypt devoted 1 1/2 days to training on research management. (AARINENA stands for Association of Agricultural Research Institutions in the Near East and North Africa.) FAO, ISNAR, and ICARDA were co-sponsors. Two ISNAR staff presented topics: strategic planning and program budgeting.

Twenty-seven participants came from 14 nations of the West Asia and North Africa region: Cyprus, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Somalia, Sudan, Syria, Tunisia, and the two Yemen republics. Three Arab associations took part — Arab Organization for Agricultural Development (AOAD), Arab Centre for Study of Arid Zones and Drylands (ACSAD), and Arab Fund for Economic and Social Development (AFESD) — along with UNDP and TAC, the Technical Advisory Committee of CGIAR.

SACCAR-ISNAR Regional Workshops

The SACCAR-ISNAR project, in its third year, stressed regional workshops. Training served needs identified in areas that support the main thrust of research management. The regional format offered an efficient way to provide training to a few persons in each cooperating country. The three workshops reached 75 persons from eight of the SADCC countries.

Written Communication Workshop 20-31 March, Zambia

Training focused on writing and editing technical and scientific articles. The main thrust of training was carried by two science-editor consultants — one from the United Kingdom and one from the United States.

There was a train-the-trainer aspect in the workshop: each country chose participants with good writing skills **and** with ability to plan and offer training to others.

In 10 full days of training, within an 11-day period, trainers set out principles, and trainees applied them in exercises and on their own projects. The 16 participants started with learning to understand scientific writing and moved through outlining, writing, doing tables and graphics, editing, and submitting papers for publication. They spent time on word-processing methods, oral reports, grant applications, and thesis writing.

Six SADCC countries sent staff to the workshop: Botswana, Lesotho, Malawi, Swaziland, Tanzania, and Zimbabwe. Two were information officers, but most were agricultural researchers.

Human Resource Management Workshop
Zimbabwe, 2-6 May

A SACCAR conference last year pointed to needs for improved management of human resources in agricultural research. Also in 1988, ISNAR reviewed the state of human resource management knowledge and tools with NARS managers in an international workshop. The regional needs and the ISNAR resources were brought together in a SACCAR-ISNAR workshop.

Thirty participants came from seven of the nine SADCC countries: Botswana 3, Lesotho 3, Malawi 2, Swaziland 2, Tanzania 6, Zambia 5, and Zimbabwe 9.

The workshop content was a "regionalized" version of the international event. Three ISNAR trainers adapted concept pieces and tools from the 1988 workshop. Four leaders from the region offered papers that helped further to focus on local situations. (An approach applauded by many in statements volunteered on individual evaluation forms.)

Staff from the region play significant roles when the SACCAR-ISNAR program delivers training events. In addition to enriching the learning experience through local wisdom, this practice helps increase capacity within the region for training in research management.

Consultancy Skills Development Workshop
Zimbabwe, 2-6 October

NARS managers deal with consultants over a wide range of subjects and purposes. And in 1989, SACCAR-ISNAR conducted a workshop designed to help managers gain the most — for their systems — from consultants.

This workshop pursued two broad goals: (1) to help managers understand the role of consultants and their own role in managing consultants; and (2) to build a manager's skill in handling consultants and consultancy assignments.

Two ISNAR staff and two consultants taught the five-day workshop. The consultants came from the Netherlands International Institute for Management. The workshop earned strongly favorable evaluations, with participants noting that the subject could have justified even more time devoted to the training.

Eight of the nine SADCC countries were represented among the 29 participants: Botswana 3, Lesotho 4, Malawi 3, Mozambique 4 (its first attendance at a SACCAR-ISNAR event), Swaziland 4, Tanzania 4, Zambia 4, and Zimbabwe 5.

Review Team Finds Strength in SACCAR-ISNAR Training Project

The middle months of 1989 brought to mid-term the five-year SACCAR-ISNAR Training Project for nine SADCC countries.[1] Original terms of this project — funded by aid agencies of Canada, United Kingdom, and the United States — called for a mid-term review. An international team of five reviewers began that task in mid-1989.

The group had not filed its final report at year's end. However, a draft report was made available for comment by the principals in the project.

That draft reported favorably on the project overall, noting some issues that call for attention as the project goes into the final two years of its first phase. Already, these reviewers recommended that planning start for Phase 2, which would begin in 1992. The draft stated the recommendation in these words:

"The Evaluation team is of the view that the SADCC/ISNAR project is a good one and that a Phase 2 should be undertaken. This should be for a three-year period, during which the transfer of responsibility from ISNAR to the NARS (coordinated by SACCAR) should take place. ISNAR has done a good job of initiating the project and henceforth will have the challenge of gradually turning over the project to the member states of SADCC."

In the long-run strategy, ISNAR would prefer working with NARS of a region where institutions of the region can train as needed on agricultural research management. In that situation, ISNAR can provide a bridge to other regions of the world, as well as to its own growing knowledge. The project review team agreed with that strategy, confirming the ISNAR intent to foster research management capacity in the region through this project.

The review team members included two agricultural researchers from the region (both plant breeders in their respective NARS, Zambia and Malawi), a Canadian team leader, one member from the United Kingdom, and one from the United States.

The team reviewed documents, interviewed SACCAR and ISNAR leaders, sat in on one workshop (Tanzania's training to support their master plan activity), and interviewed 49 who had attended training events. The roster of formal interviews included: Botswana 6, Lesotho 8, Malawi 10, Tanzania 10, Zambia 8, and Zimbabwe 7.

At the time of the review, no one from Angola or Mozambique had attended events. By the end of 1989, however, Mozambique had sent four persons to a regional workshop, and a workshop for lusophone countries was under discussion.

Participation in Numbers

The project had conducted 11 workshops to the end of July 1989 — when the review team left the field. Total participation in those workshops then stood at 310 — 42 females among them. Research officers made up the largest group, 218, followed by those at the policy level, 62; 22 were university related, with 8 from the private sector, parastatals, or other ministries.

Training records through July 1989 showed the following total participation among the countries:

Angola[2]	0
Botswana	9
Lesotho	17
Malawi	67
Mozambique[2]	0
Swaziland	10
Tanzania	93
Zambia	71
Zimbabwe	43

Review team findings: in general

Reviewers reported responses in three categories: participation, content, and follow-up.

Participation

Respondents agreed generally with the selection process for participants. That is, senior officers in NARS (in some cases university deans) chose participants. The "quality" of participants chosen has been satisfactory, they agreed. However, they suggested that more women should be involved, conceding that few women hold top positions as research managers. Most agreed that it is desirable to have more women in agricultural research, especially at senior levels.

Content

Respondents perceived that senior officers in NARS chose themes for workshops after discussion with the ISNAR coordinator. Also that the coordinator has set the agenda within themes and invited speakers, discussion leaders, and most of the facilitators.

Participants endorsed that process, finding that themes have been appropriate and useful. They liked the plan of a general start in first workshops and then becoming more specific. They spoke favorably on presentations and sessions, noting some variation in quality and interest. Best, they agreed, were case studies and practical or local issues; poorest have been long lectures.

Follow-up

Those interviewed generally thought there had been little follow-up after workshops, although follow-up would be desirable. In their views, the project had not yet involved much formal exchange of information on management issues in the region.

They felt that the project would be strengthened by more direct follow-up training and by advisory services.

The Future

Participants told the reviewers that the project should continue. The review team concurred.

On the basis of the draft review report, ISNAR and SACCAR are looking to the future. They will increase attention toward developing capacity within the region for training in research management. A regional steering committee will be a step toward stronger planning and monitoring of activities under the project.

Catches Interest of Others

The SACCAR-ISNAR regional training project has caught the eye of others. ISNAR and Projet AGIR co-sponsored a regional research management workshop for Sahelian countries in 1988. Twenty-one participants came from nine West African francophone countries.

[1]Nine countries comprise the SADCC group — which was formed by action of the nine heads of state in their Lusaka Summit of 1980. The acronym SADCC stands for Southern African Development Coordination Conference. Rather than create a regional bureaucracy, SADCC assigned to individual countries the responsibility to coordinate work in given technical areas. Botswana hosts the unit for agricultural research, SACCAR — the Southern African Centre for Cooperation in Agricultural Research. SACCAR and ISNAR jointly sponsor this training project. (Member states of SADCC are those listed above with figures on participation in project training.)

[2]The first participation of a lusophone country came after the period covered in these figures. Mozambique sent four participants to the regional workshop on consultancy skills in October 1989. Local situations have led to postponement of the first of two management workshops planned for the two countries.

International Workshops

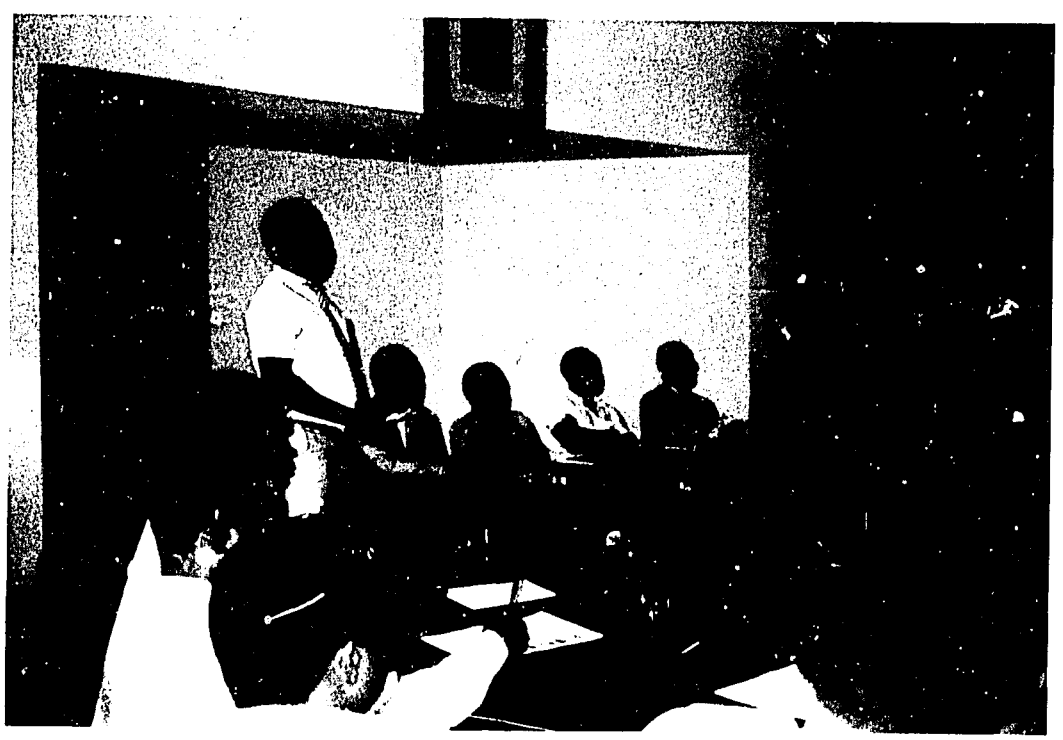
The ISNAR strategic plan calls for two international training events each year. We held three in 1989 — all at headquarters during three consecutive weeks in November.

The International Agricultural Research Management workshop (IARM) reviewed findings and tools proposed by working groups on three critical factors in agricultural research management. In a smaller specialized workshop, we worked with NARS human resource managers on ARIS (Agricultural Researcher Information System). The third workshop, and a major ISNAR event, brought together NARS managers and country-case researchers to help us draw lessons from two research project findings on managing research-extension linkages.

International Agricultural Research Management Workshop The Hague, 5-10 November

Our annual "expert consultation" brought a worldwide group of 28 senior NARS

The SACCAR/ISNAR national workshop on agricultural research management, Malawi. ISNAR trustee Henry Mwandemere is sixth from left.



managers to work with us in three management areas: (1) planning and priority setting, (2) structure and organization, and (3) program budgeting and management information. In this yearly meeting, the invited managers review our growing knowledge base and help us create tools from it that managers can use.

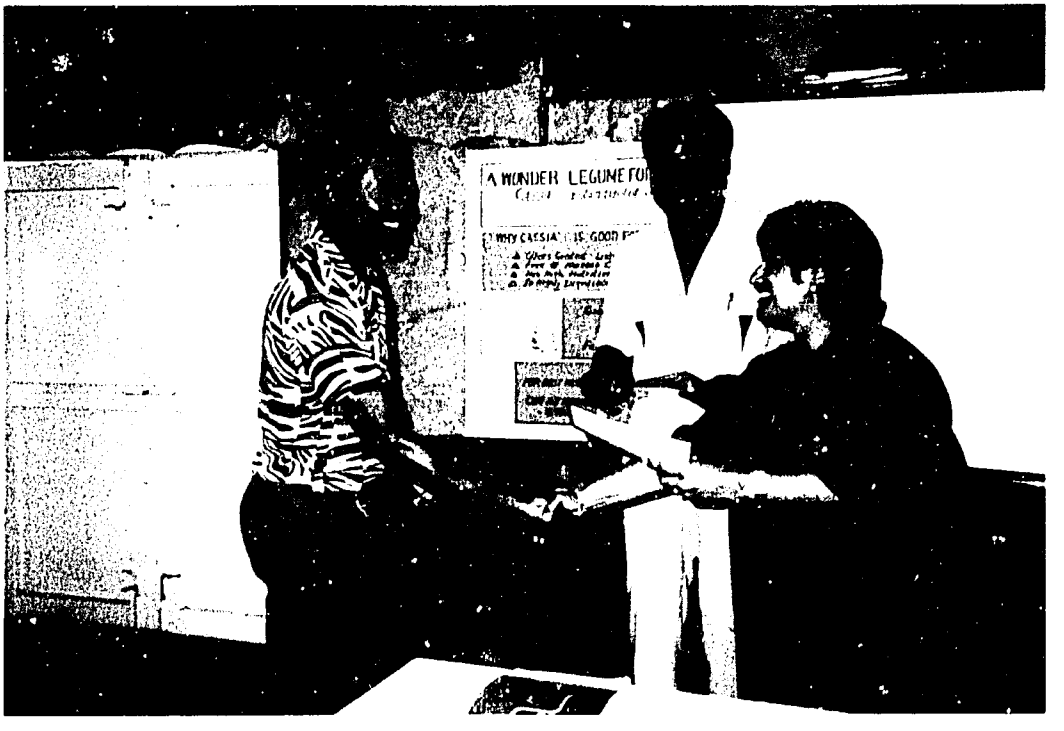
This year's format had the full group in plenary sessions to hear overviews of all three themes. That took the first three half-day sessions. Each participant then joined one of three theme groups. Each group spent four half-days dealing only with that theme. The groups reported back in plenary session. Then all could talk about any and all themes.

This expert consultation gives our working groups feedback from users, which helps assure practical and usable tools. (Reports on these three working groups — in the Research Section — reflect where each placed its present emphasis.)

Proceedings of the workshop will come out in the early months of 1990.

Our 28 working guests came from 25 different countries. The regional breakdown of countries: Africa 11, Asia and Pacific 4, Latin America and Caribbean 7, West Asia-North Africa 3.

Presenting diplomas at the SACCAR/ISNAR regional workshop on effective written communication, Lusaka, Zambia.



Agricultural Researcher Information System
The Hague, 13-24 November

This workshop brought seven human resource managers from six NARS for two weeks to learn about what ARIS offers, how to use it, and how to teach its use to others. A senior research fellow developed ARIS during the year (1987-88) he spent at ISNAR.

ARIS offers managers a human resource questionnaire and analytical program in data base format that can quickly process certain human resource information. It can tell a manager who his people are, their characteristics, where they are, and how they distribute their time. It will also keep track of individual personnel actions. ARIS runs on personal computers, using commercial software.

Participants came from Argentina, Costa Rica, Ecuador, Iraq, Morocco, and Nepal. Several had worked with us on human resource systems in their own country; others were gearing up to move into use of computers to improve their systems.

Four of the participants brought data from their own systems. These sets of real data became the working material for much of the learning. Participants without their own data worked with others who had them. By the end of the workshop the four country systems were entered and analyzed through ARIS. The workshop members reviewed and critiqued the country analyses.

Making the Link
The Hague, 20-25 November

The full title of this international workshop was *Making the Link Between Agricultural Research and Technology*. The substance came from our two international research projects: on-farm, client-oriented research (OFCOR) and research-technology transfer linkages (RTTL).

The main findings of these two studies were in hand by late in 1989, although we were far from through synthesizing management practices from the wealth of case data. (For OFCOR, we studied on-farm research in nine countries; for RTTL, we gathered seven country-case studies on research-transfer linkages.)

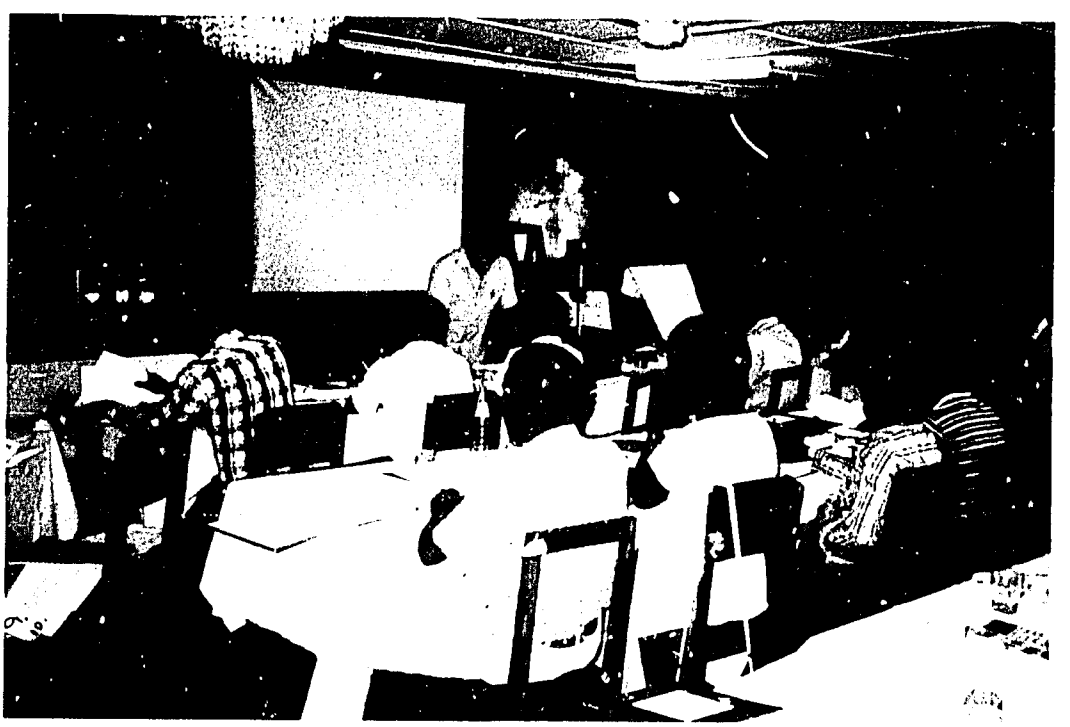
The two projects researched different aspects of the same research management phenomenon: getting research to users. We needed help of NARS managers to "make the link."

The workshop brought together 52 strong participants on this subject. Among the group were: 21 senior NARS managers; directors of case studies in 11 of the countries; 10 international professionals in this area of management and programming; and 10 ISNAR staff.

The five-day session systematically focused presentations and discussions on seven topics: ensuring relevance [of the technology]; ensuring effective transfer; strategic issues in making the link; putting the links into context; organizational considerations; managing coordination and linkage mechanisms; and human resource management issues.

The printed output of this conference follows a different model than for a typical proceedings. Many papers will be reported as synopses. Two professional writer-editors took part, and their summaries will capture the main essences of interaction between managers and scholars. This report should appear by mid-1990.

Dr. D. Wanchinga, manpower and training officer of SACCAR, opening the workshop on research planning and management, Lusaka, Zambia.



Around the World: ISNAR in 1989

ISNAR staff and formal programs touched at least 61 countries in 1989.

We collaborated this year with 37 countries in one or more stages in the advisory service paradigm of Diagnosis Planning Implementation. We worked with people and data from 24 other countries in our research projects or in face-to-face contacts in national, regional, and international training programs — in many cases, both.

Here, briefly and country-by-country, we list our collaborations of 1989:

Africa

Botswana

Botswana was represented in all three SACCAR-ISNAR regional workshops in 1989 — written communication, human resource management, and consultancy skills. In an exploratory visit, we made plans for a review of the country's NARS in 1990.

Burkina Faso

We continued to give technical backstopping to the external resident research adviser, sponsored there by ORSTOM. We helped with programming, budgeting, and program and resource management. Our research on the planning process included review of our work in Burkina Faso. A representative took part in our International Agricultural Research Managers workshop, IARM.

Burundi

The final report and recommendations of our 1988 review came out early in 1989. The country set up a new structure for the Institut des Sciences Agronomiques du Burundi (ISABU). ISABU's new director general visited ISNAR to talk about the review, and actions followed. The country was represented in our IARM workshop.

Cameroon

At the request of a special government commission, we helped IRA and IRZ work out plans for reorganization. Our resident adviser continued his daily work within the NARS. NARS staff took part in our IARM workshop.

Côte d'Ivoire

A local team carried out a case study in our research-technology linkage project. The team leader and a senior Ivoirien also took part in our Making the Link workshop.

Ethiopia

Invited by the NARS, we took part in a World Bank mid-term review of Ethiopia's agricultural research project. Other collaboration included leading a national workshop on research management and a visit to suggest options on computers for the system — including hardware and software. Staff attended our IARM workshop.

The Gambia

A year ago, The Gambia set up a national research board, as recommended in our system review. Our help this year focused on setting priorities for the research areas. The Gambia participated in our workshop on Making the Link. Experts from The Gambia also contributed to our research on special problems of small countries.

Ghana

ISNAR staff worked this year with a Ghanaian task force's diagnostic review of the agricultural research system. The report of this wide-ranging analysis was in draft form by the end of 1989, awaiting government approval. Ghana participated in our International Agricultural Research Management (IARM) workshop.

Guinea

We published the report of our 1988 review of the Guinea NARS in 1989. We presented the main findings in the form of a national research management workshop in the country.

Guinea-Bissau

Our main contacts with Guinea-Bissau were in the training format. We led a national workshop in which over 90% of the country's agricultural researchers took part. In the workshop, they reviewed their own NARS and developed a medium-term research plan. The NARS was represented at both our IARM and Making the Link workshops.

Kenya

Plans were firmed up for the five-year program of research management training in which ISNAR collaborates. Also this year, we took part in training for managers of national and regional programs and stations — on human resource management and program formulation and budgeting. Kenyans attended two of our international workshops, IARM and Making the Link.

Lesotho

A review of the NARS in Lesotho provided one of the case studies in our small-country NARS project. Lesotho staff attended our IARM workshop, plus all three regional training events under the SACCAR-ISNAR project — written communication, human resource management, and consultancy skills.

Madagascar

We were asked to be part of an innovative action taken within Madagascar's system-building efforts: leaders have set up a formal mechanism to coordinate contributions of donors to research under their national agricultural research project. The NARS was also represented at our IARCI workshop.

Malawi

Malawi sent staff for training in the three 1989 regional workshops under the SACCAR-ISNAR project: written communication, human resource management, and consultancy skills.

Mali

The NARS continued work on research planning — in which we have been involved in recent years. We provided help this year on human resource planning and on matters of structure and organization.

Mozambique

Staff of the Mozambique NARS attended the regional SACCAR-ISNAR regional project workshop on consultancy skills. This was the first participation by professionals from Mozambique, one of the nine SADCC countries served by that project.

Niger

ISNAR has worked with Niger in several stages of its national planning for agricultural research. This year we advised on strategic planning approaches and human resource management in relation to their medium-term plan.

Nigeria

Data were collected in Nigeria this year for a case study in our research-technology linkage project. Staff took part in our workshop on Making the Link.

Rwanda

An ISNAR staff member and a consultant reviewed the Institut des Sciences Agronomiques du Rwanda (ISAR) and advised on reorganization of administrative and financial services. Another worked with the national-plan task force including help with methods for setting priorities. An ISNAR staff member, who had led a review of the farming-systems work, went back this year to help in a workshop based on that review. Our study of the planning process in NARS will include Rwanda as one of the cases to be analyzed. Rwanda was represented in our Making the Link workshop.

Senegal

ISNAR staff made two visits to Senegal to work with the ISRA human resource management working group. ISRA staff twice came to headquarters to consult and to work on computerizing their data

base. The joint study and recommendations on salary was a key input for work on designing a career-development system. The report of the Senegal OFCOR case study was published this year.

Sierra Leone

One of our case studies of a small-country NARS will be done next year in Sierra Leone. The first visit came in 1989.

Swaziland

Researchers from Swaziland took part in the three SACCAR-ISNAR regional training events — written communication, human resource management, and consultancy skills.

Somalia

Leaders want to update the strategy from our 1983 review of the NARS. They want especially to consider a semi-autonomous agricultural research corporation and ways to take advantage of the university's trained agricultural faculty.

Tanzania

We related to Tanzania's master-plan exercise in a number of ways this year. Our activities included: consulting on a framework for planning, outposting an ISNAR staff member as external coordinator of the planning exercise, and a workshop on planning under the SACCAR-ISNAR regional project. A consortium of donors funds the work, collaborating through SPAAR. A local team carried out a case study in our project on research-technology transfer linkages. Tanzanians attended the three SACCAR-ISNAR regional workshops, as well as our IARM and Making the Link workshops.

Togo

Togo was selected as a site for a case study of small-country NARS, with a first visit in 1989.

Uganda

The Government of Uganda and ISNAR signed a contract this year that will place an ISNAR research adviser in Uganda in 1990. A national agricultural research plan is a key part of a strategy to rehabilitate and strengthen the NARS. Uganda was represented at our IARM workshop.

Zaïre

Leaders of the Institut National pour l'Etude et de Recherche Agronomiques (INERA) needed to begin a master plan for their NARS. We helped recruit a planning and management adviser — seconded to INERA from CIRAD, and with support from UNDP, we provide backstopping for this adviser. We also cooperate on strategic planning issues and institutional coordination. The country was represented at our IARM workshop.

Zambia

Staff who had worked on the Zambian study in the OFCOR project, took part in our Making the Link workshop in 1989. The country was also represented at our IARM workshop; and it sent participants to SACCAR-ISNAR regional workshops on human resource management and consultancy skills.

Zimbabwe

The focus of advisory service with Zimbabwe this year was on regional stations. We concentrated with NARS staff on a station in one of the natural regions — on serving resource-poor farmers. We emphasized identifying farmers' needs for improved technologies. Zimbabwe provided a case study in our OFCOR project — the case-study report came out this year. Staff from there took part in our Making the Link workshop. The NARS sent personnel to the three regional SACCAR-ISNAR workshops: on written communication, human resource management, and consultancy skills.

West Asia-North Africa

AARINENA Regional Seminar

The Association of Agricultural Research Institutions in the Near East and North Africa (AARINENA) held its regional research management seminar in Egypt in 1989. Representatives of 13 regional NARS attended the event, which was co-sponsored by ISNAR, ICARDA, and FAO. The countries were: Cyprus, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, People's Republic of Yemen, Sudan, Syria, Tunisia, and Yemen Arab Republic. Three ISNAR staff gave papers on agricultural research management, including topics on strategic planning and program budgeting.

Iraq

The Iraq NARS began a system review in 1989, following the ATMS (agricultural technology management system) approach. A NARS staff member took part in our ARIS workshop.

Jordan

Jordan was represented in our IARM workshop.

Morocco

Moroccans kept up their initiative on computer use in program budgeting and human resource management. We helped in a training event there this year, teaching program leaders and researchers to use data bases. ISNAR staff reviewed computer and software needs of the NARS, offering an approach to decisions on these resources. Moroccans took part in our IARM workshop. It was one of six

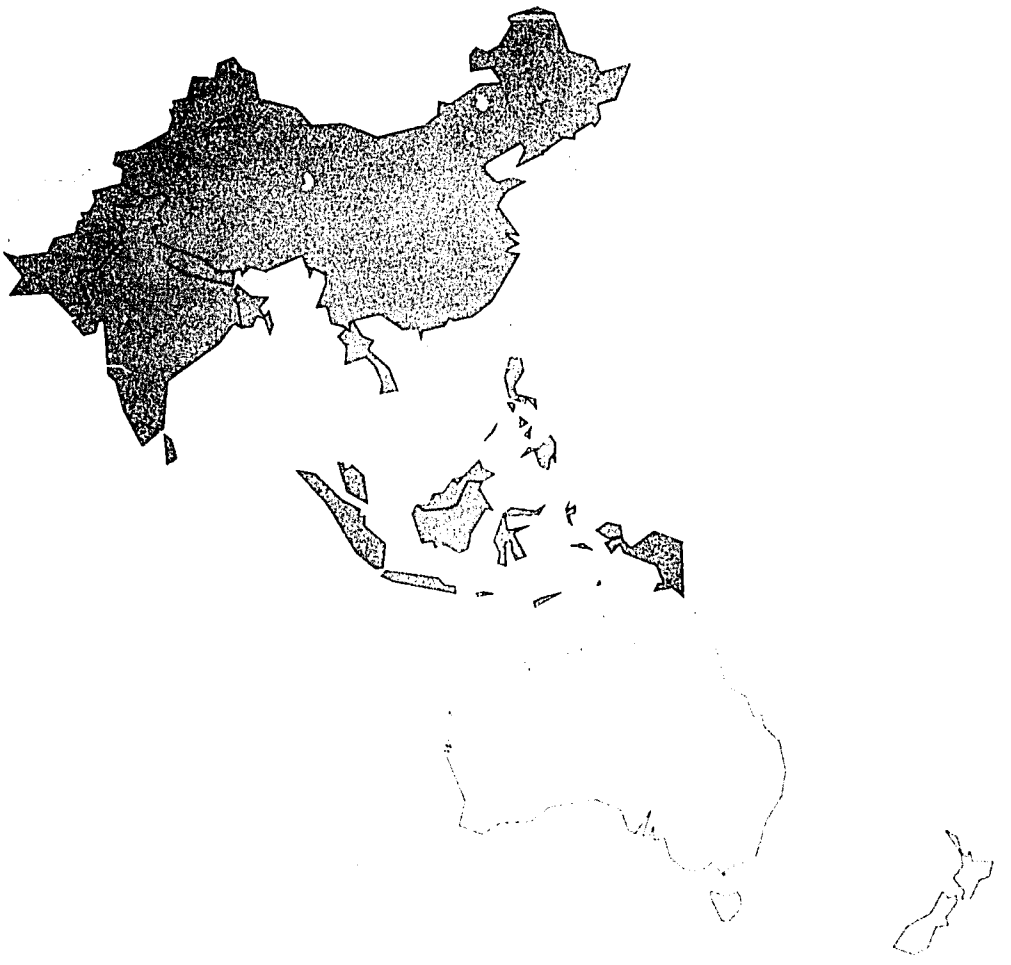
countries undertaking hands-on training with ARIS.

Sudan

An ISNAR team helped introduce program budgeting for research in Sudan's Agricultural Research Corporation (ARC). We trained people from six research stations in use of computers for that purpose. Sudanese staff took part in our Making the Link workshop.

Syria

This year's follow-up to the 1988 NARS review was assisting Syria to develop a strategic plan for agricultural research. We have assisted UNDP and Syria in identifying projects for funding to strengthen agricultural research capacities.



Asia and Pacific

Bangladesh

An ISNAR research adviser took up his post in BARC (Bangladesh Agricultural Research Council) at the start of 1989. Among varied advisory activities, he and headquarters staff worked with setting priorities and systems for management information. A national training workshop introduced the latter topic to 100 staff of BARC institutes. The Bangladesh case-study report in our OFCOR project came out this year. Bangladesh is one of the countries participating in the Asia

project on agricultural research management information systems.

China

A staff member of China's National Center for Rural Technology Development came to ISNAR in 1989, following up the visit by senior ISNAR managers the previous year. Discussions included plans for collaborating in training. Later in the year, a researcher from Hebei Province attended the ISNAR IARM workshop and stayed on for further planning. The result was a research management workshop we will conduct in China during the first half of 1990. The Asia project on MIS will include China.

India

Collaboration between ISNAR and India's National Academy of Agricultural Research Management (NAARM) followed a visit to India by the ISNAR deputy director general. (On this visit, he gave a paper to the regional seminar sponsored by NAARM and the Commonwealth Association of Scientific Agricultural Societies.) The director of NAARM was for three months a visiting senior research fellow at ISNAR later in the year. A major collaboration comes on the ISNAR-ADB Asia project on agricultural research management information systems; one of two 1990 workshops will be held at NAARM, Hyderabad. India will participate in the project, and India staff took part in our IARM workshop.

Indonesia

The ISNAR resident research adviser worked with additional AARD institutes on their management information system. Other ISNAR staff worked with local collaborators on the study of priority setting there. This is part of our cooperation with the Australian ACIAR on priority setting in Asian NARS. The Asia project on agricultural research management information systems will include Indonesia. AARD staff attended our IARM workshop.

Laos

An ISNAR staff member provided support to a review of progress in implementation of planning for their agricultural research project.

Malaysia

The Asia project on agricultural research management information systems will include Malaysia, and the first visit on that work came in 1989.

Nepal

The case-study report on on-farm research in Nepal was published in 1988. NARS staff attended two of our international workshops: ARIS and Making the Link. The Asia project on agricultural research management information will include the Nepal NARS.

Pakistan

Pakistan was represented at our IARM workshop. Its NARS will be included in the Asia project on agricultural research management information.

Philippines

ISNAR staff contributed to two agricultural research management workshops in 1989, with topics on research management and management information systems. One of the case studies on research-technology transfer linkage was carried out this year in the Philippines, and NARS staff took part in our workshop on Making the Link. The country will be included in the Asia project on agricultural research management information systems.

Sri Lanka

Our work with Sri Lanka on program budgeting and a management information system made large strides in 1988. By year's end, 18 of 19 agricultural research institutes had recorded their data in the MIS work. A workshop provided a major input in the process of developing and using the system. An ISNAR consultant worked with CARP (Council on Agricultural Research Program) on planning its work. Other ISNAR staff helped CARP with methods in setting research priorities.

Latin America and Caribbean

Argentina

Staff from Argentina took part in ISNAR-related workshops in two venues: the regional research management event in Chile and three ISNAR international workshops: IARM, Making the Link, and ARIS.

Bolivia

We carried out a diagnostic review in Bolivia. Bolivians attended two regional workshops — at CATIE in Costa Rica and in Chile. They took part in two of our international workshops, IARM and Making the Link.

Chile

Chile joined with ISNAR, IICA, and FAO and hosted a regional research management workshop. Chilean NARS staff attended our IARM and Making the Link workshops.

Colombia

The first case study in our research-technology transfer linkage study was carried out in Colombia. Colombians took part in

our Making the Link workshop, also IARM. An ISNAR staff member served as external coordinator for a review of programs in ICA. The NARS was represented at the regional research management workshop in Chile.

Costa Rica

The coordinating body, the National Commission for Research and Transfer of Agricultural Technology, began operations this year. An ISNAR staff member contributed, by request, in several activities, including a major workshop for planning. An ISNAR consultant advised on research station management. A case study in our research-technology transfer linkage study was done here. Costa Rica staff took part in the CATIE regional workshop and in two ISNAR international workshops -- ARIS and Making the Link.

Dominican Republic

The Dominican Republic hosted a case study in our research on research-technology linkages. NARS staff attended the regional CATIE workshop and our Making the Link event.

Ecuador

Ecuador moved on to planning for the NARS, including some restructuring of INIAP. They put special attention on human resource management: we helped gather and analyze data on human resources. The director of human resources spent more than a month at ISNAR for planning for human resource development and to work on a management system. Ecuadorian staff took part in two regional workshops, at CATIE and in Chile, plus our three international workshops, IARM, ARIS, and Making the Link.

Guatemala

NARS staff took part in our Making the Link workshop; also in the CATIE regional research management workshop.

Honduras

We will carry out a case study of small-country NARS in Honduras. The country was represented at the CATIE regional research management workshop.

Mexico

At the request of leaders in Mexico's INIFAP, we contributed on ways of setting research priorities and program planning and budgeting. The venue was INIFAP's planning workshop.

Peru

An ISNAR staff member took part in Peru's annual conference on agricultural research. Peruvians took part in the regional research management workshop held in Chile.

Uruguay

The government passed the law this year to create a semi-autonomous agricultural research institute, which we had helped Uruguayans plan. Advisory service continued on topics of research policy, setting priorities, and planning and development of human resources. A joint working group reported a study of returns to investment in research and development for the rice industry of Uruguay. And the country was represented at the IARM workshop.

ISNAR Publications 1989

ISNAR's annual published output rose to a new high in 1989: a total of 179 papers, reports, and other publications. We saw increases in three factors that influence publication: more findings from research, more knowledge from our own experiences, and more staff members.

Another way to relate this output is by subject: according to the seven critical-factor working groups. Here is the breakdown for 1989 publications by subject:

- *Agricultural research policy* 15
- *Planning and priority setting* 15
- *Structure and organization* 12
- *Linkage with technology transfer* 39
- *Management information and programming* 11
- *Monitoring and evaluation* 5
- *Human resource management* 31

Publications about ISNAR

Annual Report 1988. May 1989.

Rapport Annuel 1988. Octobre 1989.

Informe Annual 1988. Novembre 1989.

Working to Strengthen National Agricultural Research Systems. May 1989.

ISNAR Newsletter No. 10. April 1989.

ISNAR Newsletter No. 11. August 1989.

Catalog of Publications (trilingual). May 1989.

Conference Reports

The Changing Dynamics of Global Agriculture. Report of a Seminar/Workshop. Feldafing, Germany. September 1988. Published by ISNAR with the German Foundation for International Development (DSE), Feldafing, FRG, and Technical Centre for Agricultural and Rural Cooperation (CTE), Wageningen, Netherlands.

SACCAR/ISNAR Regional Workshop on Human Resource Management in National Agricultural Research Systems. (May 1989). Published by ISNAR with the Southern Agricultural Centre for Cooperation in Agricultural Research and Training, (Gaborone, Botswana).

Working Papers

No. 19 — Sustainable Institutions for African Agricultural Development. February 1989.

No. 20 — Planification Stratégique d'Un Système National de Recherche Agricole. Mars 1989.

No. 21 — Organization and Structure in National Agricultural Research Systems. May 1989.

No. 22 — Some Practical Guidelines for Evaluation within National Agricultural Research Systems Using the Checklist Approach. March 1989.

No. 23 — A Methodological Framework for ISNAR Reviews of National Agricultural Research Systems (NARS). April 1989.

No. 24 — Annual Performance Appraisal Schemes in Agricultural Research Organizations. July 1989.

No. 25 — An Analysis of Human Resource Capabilities and Constraints in INIAP, Ecuador. October 1989.

No. 26 — Strategic Planning for National Agricultural Research Systems: An Overview. October 1989.

No. 27 — The Changing Shape of the Job Pyramid: An Analytical Note. October 1989.

No. 28 — Quantitative Aspects of Recruitment Planning for National Agricultural Research: A Methodological Note. October 1989.

No. 29 — Human Resource Management for Agricultural Research: Review of an Experience October 1989.

No. 30 — Returns to Investments in the Generation and Transfer of Rice Technology in Uruguay. November 1989.

OFCOR Series

Case Studies

No. 3 — BANGLADESH — The Evolution and Significance of On-Farm and Farming Systems Research in the Bangladesh Agricultural Research Institute. April 1989.

No. 4 — NEPAL — Organization and Management of On-Farm Research in the National Agricultural Research System. July 1989.

No. 5 — ZIMBABWE — Organization and Management of On-Farm Research in the Department of Research and Specialist Services, Ministry of Lands, Agriculture and Rural Resettlement. November 1989.

No. 6 — SENEGAL — Organisation et Gestion de la Recherche sur les Systèmes de Production. Novembre 1989.

No. 7 — ECUADOR — Organización y Manejo de la Investigación en Finca en el Insituto Nacional de Investigaciones Agropecuarias (INIAP). Diciembre de 1989.

Comparative Studies

No. 3 — Resource-poor Farmer Participation in Research: A Synthesis of Experiences from Nine National Agricultural Research Systems. June 1989.

No. 4 — Linkages between On-farm Research and Extension in Nine Countries. August 1989.

Research-Technology Transfer Linkages Series

Theme Papers

No. 1 — A Conceptual Framework for Studying the Links between Agricultural Research and Technology Transfer in Developing Countries. May 1989.

No. 2 — Intergroup Relations in Institutional Agricultural Systems. July 1989.

No. 3 — Private Sector Agricultural Research and Technology Transfer Links in Developing Countries. July 1989.

No. 4 — The Political Economy of the Development and Transfer of Agricultural Technologies. August 1989.

No. 5 — The Effect of Changes in State Policy and Organization on Agricultural

Research and Extension Links: A Latin American Perspective. September 1989.

No. 6 — The Agricultural Research-technology Transfer Interface: A Knowledge Systems Perspective. November 1989.

Discussion Papers

No. 1 — Institutional Linkages for Different Types of Agricultural Technologies: Rice in the Eastern Plains of Colombia. September 1989.

No. 2 — Relations between Agricultural Researchers and Extension Workers: The Survey Evidence. October 1989.

No. 3 — Placing Agricultural Research and Technology Transfer in One Organization: Two Experiences from Colombia. September 1989.

Training Series

No. 1 — Management Perspectives for Agricultural Research. April 1989.

Country Activities

R33e — Orientation and Management of Research in the **Burundi** Institute of Agricultural Sciences: Analysis and Recommendations. January 1989.

R35 — A Review of the Directorate of Agricultural Scientific Research. Report to the Ministry of Agriculture and Agrarian Reform of the **Syrian Arab Republic**. January 1989.

R36f — Programme de Développement de la Recherche Agronomique au **Niger**. Tome 1: Analyse du Système National de Recherche Agronomique. Janvier 1989. Tome 2: Proposition d'un Plan National à Long Terme. Janvier 1989.

R37 — Review of the **Nigerian** Institute for Oil Palm Research (NIFOR). May 1989.

R38f — Bilan de la Recherche sur les Systèmes Agricoles au **Rwanda**. Mars 1989.

R38e — A Review of Agricultural Systems Research in **Rwanda**. April 1989.

R39 — Computer Acquisition and Development (**Ethiopia**). March 1989.

R40e — The Decentralization Process in the Instituto Nacional de Tecnología Agropecuria **Argentina**. May 1989.

R41f — Etude et Propositions de Renforcement du Système National de Recherche Agronomique en **R.D.P. Lao**. Juillet 1989.

R42 — **Republic of Uganda.** Establishment of a National Agricultural Research Organization (NARS). August 1988.

R43s — Reforzamiento del Instituto Nacional de Investigaciones Agropecuarias: Base para un Sistema Nacional de Investigaci' . Agropecuaria (**Ecuador**). October 1989.

R44f — Lignes Directrices de Développement de l'Institut de Recherche Agronomique de **Guinée** et Esquisse de Programme de Recherche à Long Terme. Septembre 1989.

R45 — Fortalecimiento del Sistema de Investigación y Transferencia de Tecnología Agropecuaria en **Bolivia**. October 1989.

R48e — Review of **Lesotho's** Agricultural Research System. November 1989.

R49f — Ressources Humaines de l'ISRA [**Senegal**]: Situation Actuelle et Implications Financières de Politiques Salariales Alternatives. December 1989.

PR18e — Acquisition of Microcomputers (**Morocco**). November 1989.

Publications Outside ISNAR

Agudelo, L.A. and **D. Kaimowitz.** 1989. Interacción interinstitucional y technología agropecuaria: El arroz en los Llanos Orientales. *Coyuntura Agropecuaria* Vol. 5, No. 4 (January 1989).

Ballantyne, P.G. 1989. English language problems in agricultural libraries: An example from Thailand. *Quarterly Bulletin* of *IAALD* Vol. 34, No. 1, pp. 13-18.

Echeverría, R.G. 1989. *Public and private investments in maize research in Mexico and Guatemala.* CIMMYT Economics Working Paper 89/02. Mexico, D.F. CIMMYT.

Eyzaguirre, P.B. 1989. Independence and agrarian reform in Sao Tome e Principe. *Journal of Modern African Studies* Vol. 27, No. 4.

Merrill-Sands, D., P. Ewell, S. Biggs, and J. McAllister. 1989. Issues in institutionalizing on-farm client-oriented research: A review of experiences from nine national agricultural research systems. *Quarterly Journal of International Agriculture* Vol. 28, No. 3/4, pp. 279-300.

Nestel, B.L. 1989. *Livestock research in Somalia: Past, present and future.* IICA/ISNAR Report.

Pardey, P.G. 1989. The agricultural knowledge production function: An empirical look. *The Review of Economics* and *Statistics* Vol. 71, No. 33 (August 1989), pp. 453-461.**Pardey, P.G.** and B. Craig. 1989. Causal relationships between public sector agricultural research expenditures and output. *American Journal of Agricultural Economics* Vol. 71, No. 1 (February 1989), pp. 9-19.

Pardey, P.G., B. Craig, and M.L. Hallaway. 1989. U.S. agricultural research deflators; 1890-1985. *Research Policy* Vol. 18, No. 5 (October 1989), pp. 289-296.

Pardey, P.G., M.S. Kang, and **H. Elliott.** 1989. The structure of public support for national agricultural research systems: A political economy perspective. *Agricul-*

tural Economics Vol. 3, No. 4 (December 1989), pp. 261-278. **Pardey, P.G.** and **J. Roseboom.** 1989. *ISNAR agricultural research indicator series: A global data base on national agricultural research systems.* Cambridge: Cambridge University Press.

Thorpe, P. and **P.G. Pardey.** *In press.* The generation and transfer of agricultural knowledge: A bibliometric study of a research network. *Journal of Information Science.*

Raab, R.T. and M.A. Bell. 1989. Assessing a research training course for wheat crop management. *Journal of Agronomic Education* Vol. 19, No. 1.

Staff Participation 1989

Date: January 13
Event: Seminar on Priority Setting
Sponsor: GTZ
Place: Bad Hamburg, Federal Republic of Germany
R. Contant and **M. Dagg**

Date: January 16-20
Event: CGIAR Documentation and Information Services Meeting
Sponsor: CGIAR
Place: Hyderabad, India
P. Ballantyne

Date: February 22-24
Event: Eighth International Course for Development-oriented Research in Agriculture
Sponsor: ICRA
Place: Wageningen, Netherlands
H. Hobbs and **P. Marcotte**

Date: February 23-24
Event: Planning workshop for future organization of production systems research in Rwanda
Sponsor: ISNAR and GTZ
Place: Butare, Rwanda
W. A. Stoop

Date: March 6-8
Event: Regional Seminar on Public Policy Implications of Biotechnology for Asian Agriculture
Sponsor: Asian and Pacific Development Centre
Place: New Delhi, India
H.K. Jain. Paper on Plant Genetic Resources and the Efficiency Factor in Agriculture.

Date: March 8-30
Event: UNDP Mission to Review the Syrian Resource Base for Agricultural Research and Identify Research Projects
Place: Syria
G. Hariri

Date: March 13-17
Place: Puncak, Bogor, Indonesia
Event: International Workshop on Developments in Procedures for Farming Systems Research
Sponsor: Agency for Agricultural Research and Development (AARD), Winrock International, CIMMYT, and IDRC
D. Merrill-Sands. Paper on issues in institutionalizing OFCOR

Date: April 20
Event: Seminar on the Relationships between Public and Private Research for the Case of Maize
Sponsor: Wageningen University
Place: Wageningen, Netherlands
R. Echeverría

Date: April 24-26
Event: Executive Committee and Board of Trustees Meeting — International Network for Banana and Plantain
Sponsor: INIBAP
Place: Montpellier, France
B. Nestel, trustee

Date: June 4-7
Event: AARINENA Executive Committee and Cosponsors Meeting
Place: Nicosia, Cyprus
G. Hariri

Date: June 19-24
Event: Workshop on Agricultural Research and Development AFAA (Association of Faculties of Agriculture in Africa) with ADB
Sponsor: ADB, Abidjan, Côte d'Ivoire
R. Contant. Paper on Strengthening NARS in Africa: Human Resource, Financial and Institutional Dimensions

Date: July 10-11
Event: Biological and Technical Constraints on Crop and Animal Productivity: Report on a Dialogue
Sponsor: Department of Agricultural and Applied Economics, University of Minnesota
Place: Minnesota, USA
H. K. Jain. Paper on Organizing Science for Genetic Technology

Date: July 17-28
Event: SACCAR Training Course on Management of Agricultural Information Services
Sponsor: SACCAR and CTA
Place: Lusaka, Zambia
P. Ballantyne. Led sessions on human resource development and training for information managers/librarians

Date: August 15-19
Event: International Conference on Dryland Farming
Sponsor: FAO, World Bank, and seven USA agencies and organizations
Place: Texas, USA
P. Goldsworthy. Overview paper

Date: August 26-31
Event: Fourth Conference of Arab Ministers Responsible for Higher Education and Scientific Research
Place: Damascus, Syria
G. Hariri

Date: August 28-September 1
Event: West African Farming Systems Research Network Symposium
Place: Accra, Ghana
D. Merrill-Sands, S. Poats, et al. Paper summarizing OFCOR results, presented by S. Poats (consultant)

Date: August 29-September 1
Event: Seminario Internacional sobre Retos para la Investigación y la Extensión Agropecuarias en America Latina y el Caribe
Sponsor: IFARD, Latin America and the Caribbean, IICA
Place: Cordoba, Argentina
D. Merrill-Sands. Paper summarizing results of OFCOR study

Date: August 31-September 2
Event: Conference on Nothing to Read: Crisis of Document Provision in the Third World
Sponsor: Library Association (U.K.)
Place: Birmingham, U.K.
P. Ballantyne

Date: October 2-3
Event: Workshop on Equitable Patent Protection for the Developing World
Sponsor: Cornell University
Place: Ithaca, NY, USA
R. Echeverría

Date: October 25-26
Event: Meeting of CGIAR Administrative and Financial Officers
Sponsor: CGIAR Secretariat
Place: Washington, DC, USA
C. A. Kramer and **G. Krapp**

Date: October 30-November 3
Event: International Centers Week
Sponsor: CGIAR
Place: Washington, DC, USA
Howard Elliott and **Guy Rocheteau.** ISNAR presentation "Helping NARS

Achieve Full Partnership in the Global Research System"

Date: October 29-November 1
Event: AARINENA Co-sponsors Meetings
Sponsor: FAO
Place: Rome, Italy
G. Hariri

Date: November 20-22
Event: First meeting of the Comité de Financement de la Recherche Agricole (Agricultural Research Funding Committee), Ministry of Scientific and Technological Research for Development
Sponsor: Madagascar FOFIFA
Place: Antananarivo, Madagascar
G. Rocheteau

Date: November 28-29
Event: Fourth FCCR Research Management Course
Sponsor: FAO and CIRAD
Place: Marseille, France
R. Contant. Training module on research-priority setting

ISNAR Consultants — 1989

Md. Zainul Abedin, Bangladesh Agricultural Research Institute, Joydebpur, Gazipur, Bangladesh
Prepared a paper for the workshop, Making the Link.

Luis Alfonso Agudelo, Bogota, Colombia
Co-authored paper for the workshop, Making the Link.

Julian Alston, University of California, Davis, U.S.A.
Prepared a project paper on distribution of research gains in a multi-stage, multi-product production system.

Ornella Arimondo, Rome, Italy
Assisted with the study of agricultural research in small countries.

D. Bagnara, Montreal, Canada
Prepared the terms of reference for the Italian Information Service.

Margot Bellamy, CAB International, Wallingford, U.K.
Served as team member in the review mission to Ghana.

Paul Bennell, Brighton, U.K.
Prepared a paper on setting priorities for training on the national agricultural research planning in Tanzania.

Emiliana N. Bernardo, University of the Philippines,
College, Laguna, Philippines
Prepared a paper on linkages in the Philippines for the workshop, Making the Link.

Stephen Biggs, University of East Anglia, Norwich, U.K.
Prepared study on nature of cooperation for the OFCOR Project.

Jim Bingen, Michigan State University, East Lansing, MI, U.S.A.
Assisted with the synthesis and presentation of OFCOR study findings and conclusions. Co-authored, with Faye and Poats, two papers for the workshop, Making the Link.

Mary Kaestner de Cardona, IGA, Guatemala City, Guatemala
Translated the Guatemala case-study report in the OFCOR project.

Joseph Casas, INRA, Montpellier, France
Assisted in the Mali long-term plan and collaborated with INRAN, Niger, in World Bank assessment mission of the Investment Center project for the Nigerien NARS and INRAN issues.

Chayce Publications Service, Devon, U.K.
Simon Chater and Kay Sayce edited papers and prepared the summary report on the workshop, Making the Link; also edited an OFCOR comparative study on management of human resources.

Alex Coles, Wisconsin, U.S.A.
Wrote case studies on the linkages between agricultural research and technology transfer in Costa Rica.

Arnold Colodner, Rehovot, Israel
Co-developed, with Myra Kay, materials for training-of-trainers in the SACCAR-

ISNAR regional workshop on written communications.

Peter Dart, University of Queensland, Brisbane, Australia
Consultant to the World Bank/ISNAR/Australian Government biotechnology study. Prepared a paper on status of biotechnology in relation to plant production and agricultural microbiology.

Johnson Ekpere, University of Ibadan, Nigeria
Participated as team leader on case study of linkages between agricultural research and technology transfer in Nigeria. Revised draft reports from the Nigerian case study. Also prepared a paper for the workshop, Making the Link.

Paul Engel, Bennekom, Netherlands
Collaborated on the study of linkages between agricultural research and technology transfer.

Jacques Faye, SAFGRAD, Ouagadougou, Burkina Faso
Prepared a paper, co-authored with Bingen, for the workshop, Making the Link.

Gregory Gibbons, Australian Biotechnological Resources, Melbourne, Australia
Consultant to the World Bank/ISNAR/Australian Government biotechnology study. Designed a database system to be used for country case studies in the biotechnology study.

Elon Gilbert, Banjul, The Gambia
Prepared a paper, co-authored with Sompo-Caesay, for the workshop, Making the Link. Also prepared papers and assisted with materials in the OFCOR study.

Sarita Gomez Mola, Royneberg, Norway
Translated to Spanish a paper for the IFARD Latin America-Caribbean Seminar. Spanish translation 1988 Annual Report.

William P. Gormbley, Wilton, CT, U.S.A.
Consulted on management practices and administrative matters.

K.A. Haizel, University of Cape Coast, Cape Coast, Ghana
Participated as a team member in the review mission to Ghana.

Fred Haworth, Devon, U.K.
Prepared a paper on the optimum long-term size of a developing-country NARS to acquire capacity for adaptive and applied research to generate technology.

Isiaka Idowu, DITSL, Federal Republic of Germany
Wrote case studies on the linkages between agricultural research and technology transfer in Nigeria.

Clive James, Mexico City, Mexico
Summarized biotechnology country studies on the ASEAN member countries, China, India, Brazil and Mexico and prepared a paper on private-public sector collaboration in biotechnology.

Sandra Kang, East Lansing, MI, U.S.A.
Gathered and analyzed statistical data and prepared tables and graphics for the publication, State of NARS.

Amir Kassam, London, U.K.
Consulted on agroecological zoning in preparation for the national agricultural research management master plan in Tanzania.

Myra Kay, Rehovot, Israel
Co-developed, with Arnold Colodner,

materials for training-of-trainers in the SACCAR-ISNAR regional workshop on written communications.

Stuart Kean, University of Zambia, Lusaka, Zambia
Prepared a paper, co-authored with Singogo, for the workshop, Making the Link.

K. Robert Kern, Ames, IA, U.S.A.
Prepared the 1988 annual report.

Allen Kerr, University of Adelaide, South Australia
Reviewed papers on agricultural biotechnology and presented a seminar at ISNAR on biological control of diseases.

François Labouesse, INRA/ENSA, Montpellier, France
Participated in the long-term plan for Mali.

Ildefons J. Lupanga, Sokoine University of Agriculture, Morogoro, Tanzania
Served as national coordinator for the Tanzanian case study of research-technology transfer linkages.

Luis Marcano, FUSAGRI, Caracas, Venezuela
Participated in a mission to Costa Rica — on station management. Also served on the ISNAR team for the review mission to Bolivia.

Roberto Martínez-Nogueira, Buenos Aires, Argentina
Participated in the ISNAR review mission to Bolivia. Presented a paper at the workshop, Making the Link.

Sudarshan Mathema, NARSCC, Khumaltar, Laliput, Nepal
Prepared a paper, co-authored with Rood, for the workshop, Making the Link.

Diana McLean, Carleton Place, Ontario, Canada
Participated in training and working groups in Guinea Conakry; wrote an assessment of the workshop.

Robert Meyer, Iowa State University, Ames, IA, U.S.A.
Drafted a paper on organizational considerations in linkages between research, extension, and farmers.

Jesus Moncada de la Fuente, Colonia Polanco, Mexico
Served as a short-term research management specialist on the research master plan in Tanzania.

James Nielson, Seattle, WA, U.S.A.
Prepared a framework and indicators for analyzing the impact of ISNAR's work.

Andrew Okello, Amsterdam, Netherlands
Compiled a data base on NARS in small countries and worked with the small-countries project.

Viviana Palmieri, IICA, San Jose, Costa Rica
Prepared a paper for the workshop, Making the Link.

William J.A. Payne, Broadway, U.K.
Served as a team member in the review mission to Ghana.

Susan Poats, University of Florida, Gainesville, FL, U.S.A.
Assisted with the development of the OFCOR synthesis paper. Prepared a paper, co-authored with Bingen, for the workshop, Making the Link.

Pascal Ravohitrarivo, FOFIFA, Antananarivo, Madagascar
Prepared a paper on organization and

mechanisms for research planning in the case of Madagascar.

Terry Roe, University of Minnesota, St. Paul, MN, U.S.A.
Prepared a chapter on agricultural research in a domestic policy context for volume I of the book on agricultural research policy.

Niels Röling, Agricultural University, Wageningen, Netherlands
Prepared a paper on the role of user participation in technology development and delivery.

Peter Rood, University of East Anglia, Norwich, U.K.
Co-authored, with Mathema, a paper for the workshop, Making the Link.

Sergio Ruano, Guatemala City, Guatemala
Prepared a paper, co-authored with Juarez and Ortis, for the workshop, Making the Link.

Paramjit Sachdeva, World Bank, Washington, DC, U.S.A.
Prepared materials on organization and structure of research and took part in the IARM workshop.

Lionel Seydoux, Montpellier, France
Assisted the director general of INERA in agricultural research project preparation and prepared a work program for Zaïre.

Lingston Singogo, ARPT National Coordinator, Chilanga, Zambia
Prepared a paper, co-authored with Kean, for the workshop, Making the Link.

Robert Sivak, Maryland, U.S.A.
Advised management on public awareness approaches.

Geoffrey Swenson, Jakarta, Indonesia
Participated in the joint ADB-ISNAR project on management information systems in 14 Asian countries.

M. Sompo-Ceesay, Banjul, The Gambia
Prepared a paper, co-authored with Gilbert, for the workshop, Making the Link.

J. Tanner, Guelph, Ontario, Canada
Participated as a team member in the review mission to Ghana.

Alexis Vazquez, San Jose, Costa Rica
Served as coordinator for the visit to Costa Rica by the ISNAR Board of Trustees.

A. Visser, The Netherlands
Assisted ISNAR management with delivery procedures for the new office building and with preparation of the official report of acceptance.

Brian Webster, St. Ives, Cambridgeshire, U.K.
Participated in the joint venture with GTZ and World Bank to establish the Council for Agricultural Research Policy in Sri Lanka.

Stanley Wood, Bogor, Indonesia
Defined commodity-specific agroecological zones for Indonesia for various commodities, drawing on FAO data.

Larry Zuidema, Cornell University, Ithaca, NY, U.S.A.
Collaborated in project-group activities and in the Philippines case study of research-technology transfer linkages; consulted on further development and testing of ARIS.

ISNAR Financial Highlights - 1989

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AUDITORS' REPORT

We have examined the accompanying accounts, on pages 2 to 11, of the International Service for National Agricultural Research (ISNAR) for the year ended December 31, 1989.

Based on our examination, we are of the opinion that these accounts have been properly prepared using accounting principles consistent with those used in the preceding year to give the information required to be shown in accordance with the accounting procedures contained in the instructions issued by the Consultative Group on International Agricultural Research, Washington.

PRICE WATERHOUSE NEDERLAND

March 2, 1990

ISNAR
Balance Sheet
as of December 31, 1989
(Stated in US Dollars)

Current Assets	1989	1988
Cash	3,014,187	2,018,415
Receivables from Donors	366,000	252,507
Other Receivables	420,390	214,353
Prepayments	31,011	210,763
Total Current Assets	3,831,588	2,696,038
Fixed Assets		
Vehicles 23,234	23,234	
Furnishings and Office Equipment	1,987,880	1,768,879
Total Fixed Assets	2,011,114	1,792,113
TOTAL ASSETS	5,842,702	4,488,151
Liabilities		
Advance received on 1990 Core Donation	83,921	80,865
Accrued Expenses	999,902	1,003,063
Total Liabilities	1,083,823	1,083,928
Fund Balances		
Invested in Fixed Assets	2,011,114	1,792,113
Unexpended Funds:		
- Core-Unrestricted	126,459	3,117
- Core-Restricted	470,132	0
- Working Fund	1,750,000	1,650,000
- Special Projects	401,174	(41,007)
Total Fund Balances	4,758,879	3,404,223
TOTAL LIABILITIES AND CAPITAL	5,842,702	4,488,151

ISNAR
Receivables from Donors
as of December 31, 1989
(Stated in US Dollars)

Donor		Amount Pledged in Original Currency	US$ Equivalent at time of Pledge		Payment in Original Currency	Received during the Year	Losses/(Gains) Arising on Exchange Differences	Balance Outstanding at Year's End
CORE UNRESTRICTED OPERATING GRANTS								
Australia	AusS	250,000	217,000	AusS	250,000	215,659	1,341	0
Belgium	BFrs	2,000,000	55,000	BFrs	0	0	0	55,000
Canada	CanS	550,000	463,000	CanS	550,000	458,508	4,492	0
China	US$	10,000	10,000	US$	10,000	10,000	0	0
EEC	ECU	600,000	600,000	ECU	600,000	552,389	47,611	0
Federal Rep of Germany	DM	300,000	173,000	DM	300,000	161,526	11,474	0
France	FF	1,750,000	296,000	FF	0	0	0	296,000
IBRD	US$	1,750,000	1,750,000	US$	1,750,000	1,750,000	0	0
Italy	L	350,000,000	250,000	L	350,000,000	253,206	(3,206)	0
Japan	Yen	48,900,000	403,000	Yen	48,900,000	337,241	65,759	0
Netherlands	Dfl	900,000	461,000	Dfl	900,000	427,710	33,290	0
Philippines	US$	15,000	15,000	US$	0	0	0	15,000
Spain	US$	30,000	30,000	US$	30,000	30,000	0	0
Sweden	Skr	700,000	116,000	Skr	700,000	104,520	11,480	0
Switzerland	Swf	520,000	359,000	Swf	520,000	345,085	13,915	0
UK	PdsSt	140,000	259,000	PdsSt	140,000	230,728	28,272	0
USAID	US$	1,000,000	1,000,000	US$	1,000,000	1,000,000	0	0
IBRD / Stab. Fund	US$	320,000	320,000	US$	320,000	320,000	0	0
Total Core Unrestricted Operating Grants 1989			6,777,000			6,196,572	214,428	366,000
CORE RESTRICTED OPERATING GRANTS								
Federal Rep of Germany	DM	300,000	173,000	DM	300,000	160,889	12,111	0
Italy	US$	515,000	515,000	US$	515,000	516,120	(1,120)	0
Total Core Restricted Operating Grants 1989			688,000			677,009	10,991	0
Total Core Unrestricted and Restricted Operating Grants 1989			7,465,000			6,873,581	225,419	366,000
Earned Income Received during the year			309,583					
Unexpended Balance Prior Year			3,117					
TOTAL REVISED 1989 BUDGET			7,777,700					

ISNAR
Statement of Source and Application of Funds for the Year Ended December 31, 1989 (Stated in US Dollars)

Source of Funds	1989	1988
1. Core Operations		
Unrestricted	6,777,000	5,817,598
Restricted	688,000	191,100
Unexpended Balance from Prior Year	3,117	15,274
Earned Income Applied to Core Operations	309,583	0
	7,777,700	6,023,972
2. Capital		
Unrestricted	0	229,862
Earned Income Applied to Capital	219,001	216,401
	219,001	446,263
3. Working Fund		
Unexpended balance from prior year	1,650,000	1,150,000
Earned Income Applied to Working Fund	100,000	500,000
	1,750,000	1,650,000
4. Special Projects – Cumulative		
Income on Projects not Completed	4,859,850	3,907,312
TOTAL SOURCE OF FUNDS	14,606,551	12,027,547

Application of Funds		
1. Core Operations		
Advisory Services to NARS	2,493,236	2,240,683
Research	1,716,811	1,264,349
Training	1,274,938	1,107,500
Program Support	518,726	511,707
Management & Administration	1,177,398	896,616
	7,181,109	6,020,855
2. Capital		
Capital Additions	219,001	446,263
3. Special Projects – Cumulative Expenditure on Projects not Completed	4,158,676	3,948,319
4. Unexpended Balance		
Core – Unrestricted	126,459	3,117
Core – Restricted	470,132	0
Working Fund	1,750,000	1,650,000
Special Projects	401,174	(41,007)
	2,747,765	1,612,110
TOTAL APPLICATION OF FUNDS	14,606,551	12,027,547

Donors to Special Projects — 1989

The Asian Development Bank for a project to strengthen agricultural research in Asia, with special emphasis on improving information systems. **$ 198,500.**

The Asian Development Bank to provide assistance to the national agricultural research system of Lao PDR. The technical assistance is financed by the United Nations Development Program. **$ 7,975.**

Cameroon/IBRD for the posting of an agricultural research management specialist to work with IRA. **$ 139,723.**

The Canadian International Development Agency (CIDA) for a study of the organization and structure of national agricultural research systems in developing countries.
$78,778.

The Canadian International Development Agency (CIDA) for the SADCC/ISNAR Southern African Agricultural Research Management Training Project. **$ 166,770.**

Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) for the travel costs associated with the participation in a planning workshop in Rwanda. **$ 3,337.**

Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) for assistance to the Council for Agricultural Research Policy of Sri Lanka. **$ 214,574.**

The Federal Republic of Germany (BMZ) for the preparation of a framework for a national agricultural research masterplan for Tanzania. **$ 85,653.**

The Malagasy Democratic Republic/IDA for assistance in the preparation of a long-term plan. **$26,825.**

The Malagasy Democratic Republic/IDA for assistance in the preparation of an agricultural research project. **$ 194,592.**

Niger/IDA for a review and planning assistance to the National agricultural research system. **$ 215,581.**

The Overseas Development Association for the SADCC/ISNAR Southern African Agricultural Research Management Training Project. **$ 85,159.**

The Rockefeller Foundation to support research fellows with responsibilities for research in the areas of the policy organization and management of national agricultural research. **$ 33,000.**

Rwanda/IDA for the posting of an agricultural research management specialist.
$ 173,250.

The United Nations Food and Agriculture Organization (FAO) for a study on the implications of biotechnology in developing countries. **$ 25,000.**

The United Nations Development Programme (UNDP) to assist in the reorganization of the agricultural research system of Zaire. **$ 49,360.**

The United Nations Development Programme (UNDP) for participation in a mission to identify and formulate a project in Syria. **$ 13,062.**

The United Nations Development Programme (UNDP) for assistance in the reorganization of the agricultural research system of Zaire. **$ 19,907.**

The United States Agency for International Development (USAID) for a review of ISABU in Burundi. **$ 38,243.**

The United States Agency for International Development (USAID)/Dakar for assistance to ISRA in human resources management.
$ 22,650.

The United States Agency for International Development (USAID)/Dhaka for assistance to the Bangladesh Agricultural Research Council. **$ 241,546.**

The United States Agency for International Development (USAID)/Gaborone for the SADCC/ISNAR Southern African Agricultural Research Management Training Project. **$ 155,018.**

The United States Agency for International Development (USAID)/Jakarta for assistance under the applied agricultural research project. **$ 97,240.**

The University of Wisconsin under contract to USAID for ISNAR's assistance to the University of Wisconsin/Gambia agricultural research and diversification project. **$ 17,243.**